FORESTRY LEAVES

Official Publication of the Alumni and Student Body
U.P. College of Forestry, College, Laguna

IN THIS ISSUE

MOVING-UP DAY ISSUE Vol. XVI No. 1

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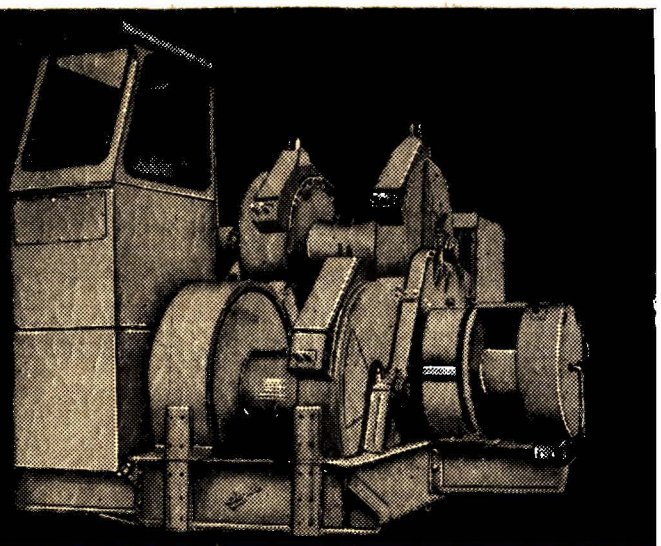

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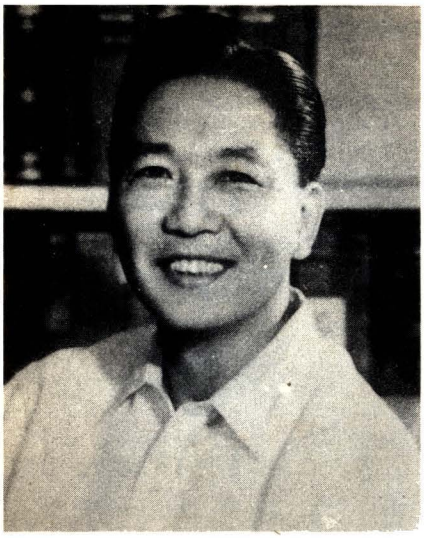
M E S S A G E

I am pleased with this opportunity to extend my greetings to the U.P. College of Forestry, through its official organ, FORESTRY LEAVES, on the occasion of its 1965 graduation exercises.

One of the oldest colleges of the University of the Philippines, the College of Forestry has contributed its share in the overall development of the country. Its numerous graduates have distinguished themselves in the public service. Indeed, those who pass through the portals of this institution of learning are certain to fit into the pattern of the country's economy because of their thorough technical preparation. Naturally the fresh graduates will have their own full share of struggles and disillusionments, but I wish to enjoin them not to despair, for that is what life is in its rawest realities. How well they can face these realities will depend on how much they have learned in college and how well they can make use of their learning. I am certain that with their thorough preparation, they will succeed.

I reiterate my congratulations to the graduates and wish them luck as they face the actualities of life.

PRESIDENT OF THE PHILIPPINES



Ferdinand E. Marcos
President

Republic of the Philippines
Office of the
President of the Senate

M E S S A G E

Please allow me to convey my heartfelt congratulations to the graduating class of the UP College of Forestry through the pages of the"Forestry Leaves".

Your chosen field of endeavor enables you to do a great service to your country and people. Our Philippine forests provide potentialities for a truly sound and stable economy. With the technical resources acquired from your Alma Mater, you contribute a substantial sharing in our massive campaign of forest conservation.

Our forests represent an important mainstay of our economy. We conserve our forests not only for ourselves but for the rest of the Filipino generations after us. If we don't protect our forest, it shall be a bitter indictment against us from future generations for failing in securing unto them and their prosterity the wealth and opportunities offered by our forests.

With your technical know-how acquired from a leading university, conservation of our forest faces a bright prospect for the good of our country.

FERDINAND E. MARCOS

UNIVERSITY OF THE PHILIPPINES
QUEZON CITY

OFFICE OF THE PRESIDENT

MESSAGE

The strength of Philippine nationalism will ultimately depend on our capacity for economic independence. This, in turn, will rely on our skill to make the general patrimony of the nation - our natural resources - yield the maximum good and benefit. Hence the necessity of technical skills, scientific knowledge, and foresight on our part as citizens.

These necessary skills, competence, and scientific vision the University must be able to provide. The College of Forestry has functioned for the University of the Philippines not merely as a national agency of training and technical education, but has even won the acknowledgment and respect of our Asian neighbors.

It is a pleasure to congratulate the 1965 graduating classes of the College of Forestry and, in this regard, I wish to extend my best wishes to the staff of Forestry Leaves.

Carlos P. Romulo

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES
BUREAU OF FORESTRY
P. O. Box 2089, Manila

In Reply, Address
DIRECTOR OF FORESTRY
P. O. Box 2089, Manila

Moving-Up Day 1965
College of Forestry, U.P. April 21, 1965

M E S S A G E

The different government forestry agencies have a common problem which strikes at the very core of their existence. The acute shortage of technical personnel has the effect of considerably hampering the all-out implementation of vital forestry programs of the country.

The hope of the forestry agencies for the solution of their common problem lies in the direction of the legendary Mount Makiling in Los Baños, Laguna, where the College of Forestry of the University of the Philippines is proudly nestled.

But even the College of Forestry can not meet the demand of the agencies for technical personnel. The graduates produced by the College every year are not enough because they are very few in the first place.

The College of Forestry, it seems, has a problem of its own. High school graduates prefer to enroll in schools offering high sounding college degrees. A forestry course does not seem to hold attraction for high school graduates.

The members of the graduating class of 1965 should have every reason to be proud of the fact that they are now alumni of the U.P. College of Forestry. Although, the course they finished is not as glamorous as other courses from other schools, the opportunities to serve not only the present, but also the future generations are unlimited.

The Forestry graduates are very few in numbers, but in quality they are superior. They have become dedicated workers whose main thought after graduation is not to ask for more but rather to give more in service. This is what distinguishes the U.P. College of Forestry graduates from other groups.

To the graduating class, I extend my congratulations and say: Welcome to the Bureau of Forestry.

A. F. Rivera

APOLONIO F. RIVERA
Acting Director of Forestry
(On Leave) *

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES
REFORESTATION ADMINISTRATION
VISAYAS AVE., DILIMAN, QUEZON CITY

In reply, address:
P. O. Box 2363, MANILA

TEL. NOS. (GTS):
55-53
55-52
55-51

MESSAGE

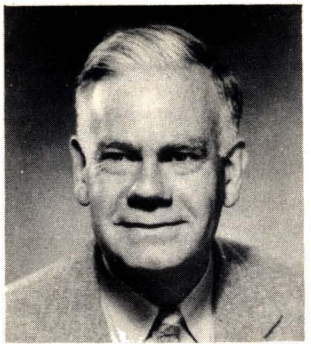
It gives me great pleasure to convey my greetings to the 1965 graduating students of the U.P. College of Forestry on the occasion of their Moving-Up Day. After years of diligent study and conscious training for future responsibilities, you are now about to leave the portals of the University, confident that you are properly equipped to meet the varied requirements of your profession. I have my fervent hope that in the course of practicing your chosen profession you will not only have the nation's well-being as your ultimate goal but also that of your fellowmen.

We are now a wary people because we are conscious of our diminishing forest resources. Hence, no stone is left unturned by the government to conserve these resources as they form one of the pillars of the nation's social and economic structure. You, who are imbued with the right attitude and perspective toward these resources, coupled with burning enthusiasm and nationalism, should be able to contribute substantially toward this end — conservation.

Here's wishing you Godspeed.

JOSE VIADO
Administrator

Dr. Hardy L. Shirley, Dean of the State University of New York's College of Forestry at Syracuse



College of Forestry Revisited

It has been my good fortune to visit the Philippine College of Forestry at Los Baños in 1960, 1962 and again in 1965. The changes I have observed on each successive visit have been highly gratifying. Between 1960 and 1962 physical development and increased size of faculty stood out as major accomplishments. What seems most noticeable in 1965 is a change in quality—better students, a more competent and able faculty, improved curriculums, closer ties with other forestry agencies and industries, a ten-year development plan showing imaginative educational statesmanship, integration of instructional program with that of the College, and good prospects of outside grants for expansion of its programs.

The joint AID, University of the Philippines, State University of New York Contract is terminating June 30, 1965. It is well at this time to review briefly the objectives and accomplishments of the past 5 years under this program and of the 3 preceding years under the Cornell contract.

Eight major objectives were set forth. Seven of these have been largely attained.

1. *Modernizing the curriculum.*—The curriculum has been divided into separate curriculums—one for forest resource management and one for wood science & technology. A five-year program for each will probably be adopted by next academic year.

2. *Training faculty members.*—The faculty has been increased from 15 to 49 members. More than half of these have pursued graduate education at universities of the USA and other countries. All have had the benefit of working in association with visiting professors.

3. *Improving teaching methods.*—New teaching methods have been introduced, laboratory work expanded, and various teaching aids supplied.

4. *Improving students recruitment, and increasing the number of professional graduates.*—Enrollment has expanded considerably while at the same time admission standards have been raised. The number of professional graduates has increased some 4-fold.

5. *Enlarging the physical plant and acquisition of instructional and laboratory equipment.*—A student dormitory of 164 beds has been built, a forest technology building has been built and equipped, a wood products laboratory & sawmill have been made available. The water system has been enlarged. The library collection has been greatly increased and the stacks air conditioned. Some $120,000 has been expended on new equipment.

6. *Improving College-wide organization & administrative procedures.*—The faculty has been organized into 4 separate departments for instruction and research each headed by a chairman. Four additional administrative assignments have been made to handle the Makiling Forest, business affairs, academic affairs and College secretary. A University Vice President has been appointed for Agriculture and Forestry.

7. *Strengthening & expanding cooperative relationships of the College with organizations both within & without the University.*—Relations with the College of Agriculture have become much more intimate

Participants and resource persons of the Short Course on Communication Methods and Techniques sponsored by the Joint Committee on Public Information and Education in Forestry and the General Forestry Committee held on April 19 to May 1, 1965 at the UPCF. From left to right are Erico Enriquez, Artemio Rivera, Benjamin Cariño, Saturnino Macaraeg, Basilio Cruz Jr., Virgilio Fernandez, Felix Eslava Jr., Oscar Gendrano, Bernardo Sinues, George Gomez, Hari Garcia and Teofilo Cruz. Infront from left are Eliseo Casia and Winlove A. Cudal, training director and audio-visual representative respectively of the KODAK (Philippines) and resource persons for the short course.

through forestry students attending classes on the Agriculture Campus and faculty members collaborating on research. Cooperation with the Forest Products Research Lab. on research has also grown. Relations with the Bureau of Forestry, Reforestation Administration, Parks & Wildlife Office, are extensive and increasing. Industry understanding and support has grown markedly especially within the last three years. Industry financed scholarships have increased. Various extension and short course activities have helped immensely to cement relationships. The College sponsored Kaingin Conference elicited wide participation and support.

8. *Developing effective programs of graduate education, research & extension.* An extension department has been organized, financed, and has started an ambitious program of bringing forestry to the people through news articles, radio programs, films, lectures, short courses, and conferences.

It is only in graduate education and research that a bare beginning only has been made in relation to needs. It was recognized at the beginning that faculty training to the Masters & PhD level must necessarily precede graduate education and research so that little was expected to be accomplished in the first 8-year program.

The College for Forestry and USAID can therefore be justifiably proud of the accomplishments of the College under the State University of New York Contract. Generous and understanding support has been provided by AID and the College has responded in a gratifying manner. Though the SUNY contract closes June 30, 1965, participant training for 3 PhD's and 2 MS faculty members is expected to continue for one or two more years.

It is therefore time to close the current AID-SUNY program and to give thought to what lies ahead.

The major task is to organize a strong program of graduate education backed by a vigorous research effort. No nation can be self sufficient in forestry until it can educate its own teachers, research workers and top level administrative men. It is particularly important that the Philippines do so because it is a tropical country. No truly strong program of graduate instruction and research in tropical forestry now exist in the Southeast Asia area. The Philippines despite flagrant misuse of forest still have a magnificent forest heritage. Modern technology will be needed for its perpetuation and exploitation if the people of the Philippines are to reap maximum benefits from it. It is estimated that a minimum of 20 Filipinos should be graduated annually at the Master of Science level mostly trained in the Philippine tropics where they will work.

This then is the major task ahead for the College. For its realization it will require a five-year program of development involving added faculty members, graduate assistantships, visiting professors, and special facilities and equipment for a high class post graduate educational program. The College is currently working out the details of such a program. It will require the backing of the University, other government agencies, private industry and of a devoted alumni body for its realization. It is hoped that every alumnus will keep informed on the prgoram and give it his vigorous support.

Now that the contract between State University of New York and the College of Forestry of the University of the Philippines is drawing to a close, I wish to express my thanks and those of all visiting professors for the wonderful response to our efforts of the faculty, students, and alumni of the College of Forestry at Los Baños. We cannot imagine a friendlier, more tolerant, or more appreciative response to our work. All of us have felt it to be a great privilege to have worked with you. Our interest in your continued development will but grow with the years. We expect your future to be bright and productive.

LOG PRODUCERS & WOOD PROCESSORS CONVENTION

Dr. Dioscoro L. Umali, U.P. Vice President for Agriculture and Forestry Affairs and concurrently Dean of the College of Agriculture. delivering his welcome address to the 5th Annual Convention of Log Producers and Wood Processors of the Philippines at th U.P. College of Forestry.

Bureau of Forestry Assistant Director Juan L. Utleg deliberating on the "Work of Bureau of Forestry in Relation to Silvicultural Research and Forest Resources Inventory" during the 5th Annual Convention of Log Producers and Wood Processors.

Mr. Abu Sayeed Mohamed Zahirrudin Director, Forest Research Laboratory Chittagong, Pakistan before the Log Producers and Wood Processors Convention.

Forester Jose Viado, Administrator of Reforestation Administration, emphasizing the "Contribution of Reforestation Administration in the Conservation and Perpetuation of the Forest" to the delegates of the Log Producers and Wood Processors during their 5th Annual Convention.

Prof. Gregorio Zamuco, Dean of the College fo Forestry discussing "What the U.P. College of Forestry is Doing in the Program of Forest Conservation and Development of Forest Industries" with the delegates to the 5th Annual Convention of Log Producers and Wood Processors.

Delegates from Pangasinan headed by Forester Domingo Madrid with Dean G. Zamuco, Actg. Dir. Juan Utleg, PCWI Pres. G. Mañalac, For. Florencio Tamesis and Dir. M. Monsalud of the Forest Products Research Institute.

Delegates to the 5th Annual Convention of Log Producers and Wood Processors in the U.P. College of Forestry Auditorium.

Delegates to the 5th Annual Convention of Log Producers and Wood Processors infront of the UPCF Administration Building.

Development in Forestry in the Asia-Pacific Region

(A report based on the Seventh Session of the FAO Asia Pacific Forestry Commission held at Rotorua, New Zealand From September 22 to October 2, 1964)

by

D. M. LANTICAN

Associate Professor of Wood Technology

(Member, Delegation of the Republic of the Philippines to the Seventh Session of the FAO Asia-Pacific Forestry Commission)

I. INTRODUCTION

The Asia-Pacific region includes all countries in the Asia mainland and the countries in the Pacific bounded by Japan and the Rhukyus in the North and Australia and New Zealand in the south.

This region, which is among the most thickly populated in the world, contains the last remaining natural forests in the Far East. Some of these countries especially those in the Asia mainland are among the oldest in the world where earlier civilization has cleared the land of trees to such extent that today its effect is endangering the productive capacity of the land. Here too, lies newly developing countries whose forests are still unexploited and could very well supply the timber needs of the region but handicapped by financial and technical problems. Here may also be found young countries such as Australia and New Zealand which have made great leaps forward in the establishment of man-made forests not only for their own needs but to feed the forest industries of other countries.

A timber famine is not yet eminent in the region since one country could fill the need of another. Some countries, however, have destroyed their forest to the point where retorestation and forest management are necessary to bring back the hydrologic capacity of the watersheds, to check floods and erosion and to hold back shifting sands that threaten to engulf agricultural lands. Whereas timber needs may be solved through export, no nation can exist without forest whose important influence is a vital factor in the ability of the land to support life.

The FAO of the United Nations cognizant of the importance of forest and the varied forestry problems all over the world has supported many projects aimed at improving the forest situation in all member countries. The Asia-Pacific region with its tropical and sub-tropical forests have problems common to many member countries not only in forest production and management but also in the utilization of forest products. Because of the proximity of the nations to one another within the region, sharing more or less common problems, the FAO has organized the Asia-Pacific Forestry Commission with a Secretariat at Bangkok, Thailand which facilitate assistance priority, coordination and exchange of information.

Since its founding the Asia-Pacific Forestry Commission has held six conferences, each time in a different country within the region. The Seventh Session was held from September 22 to October 2, 1964 at Rotorua, New Zealand upon the invitation of the New Zealand Government.

Sixty-one participants representing thirteen nations attended the conference. The Director and Assistant Director of the Forestry and Forest Products Division of the F.A.O. and the Regional Secretary of the F.A.O. at Bangkok and observers from Sudan, the

forest industries of New Zealand, the Commonwealth Agricultural Bureaux (N.Z.), the International Union of Forest Research Organizations and the World Federation of the United Nations were also present.

II. PROGRESS OF FORESTRY DURING THE BIENNIUM 1962-1964

As a whole there is a marked progress in forestry in the Asia-Pacific region during the two-year period 1962-1964. This is true in all areas: forestry policy, survey and management of forest resources, harvesting and processing of forest products, marketing, education and research and forest economics. However, there are still the problems of capital, labor supply in both professional and sub-professional level and other problems traceable to local political and socio-economic limitations.

The progress in the region is a result of use of modern techniques especially the use of aerial photography in forest surveys, the introduction of modern machinery in logging, transportation and processing of forest products. Increase in the acreage of forests through reforestation, afforestation and the establishment of plantations of fast-growing species is among the notable achievements in the region. Majority of the countries have programs on water management. The conservation of wildlife has received notable attention. Research in all aspects of forestry is gaining momentum and the training of research men is an important function of forestry agencies in all countries. More forestry schools have been improved and new ones have been established.

The salient features of program and problems in each country within the Asia-Pacific regions are summarized in the following sections:

a. *Australia*

An Australian Forestry Council has been created. This is composed of the state and commonwealth ministers concerned with forestry. This body will deliberate on forestry matters to be assisted by a Forestry Standing Committee consisting of the heads of the State Forest Services, the Director General of the Forestry and Timber Bureau and the Chief of the Division of Forest Products, C.S.I.R.O.; and a representative of the Department of Territories.

The survey of public forest and plantations are almost complete. Forest plantations are increasing by 30,000 acres annually.

The permanent forest area in the commonwealth increased but some poor forest lands were released for grazing. More lands were set aside for the conservation of wildlife. There was increased interest in water management policies. Government budget allocation for forestry was bigger than in previous years.

At present Australia imports about £80 million worth of forest products. She is investing £2 million a year on forest plantation with the aim of reducing imports considerably in about 36 years. By that time she expects to produce half of her requirement of 1.26 billion cubic feet of timber.

The methods of logging in steep terrain have improved. Sawmills and plywood mills are being modernized and one plant has installed a mechanical stress grading machine. There are now six particle board plants. The increase in the capactiy of pulp mills has been notable in the last two years.

Improved efficiency of the mills has resulted in the reduction of the labor force in the wood-using industry.

In education the important achievement is the institution of a correspondence training course for sawmill managers. New research activities were on pest control, watershed management, physiology and genetics and electronic data processing.

b. *Brunei*

A definition of forest policy has been approved. The importance of forests is recognized not only because it is a source of revenue but also because of various benefits from forest influences. In view of this the policy includes management and maintenance of forests; protection through delineation of reservations; development of the forest for domestic, agricultural and industrial uses; and recruitment and training of government forestry personnel.

About 47,000 acres are under planned management. The sustained allowable cut is 1,500 acres. Cutting is based on diameter limit.

Forest utilization is mainly limited to timber production. Among the problems is the destruction of 1,700 acres of forest lands by fire and a constant shortage of technical labor.

c. *Ceylon*

In Ceylon more recognition is now being given to Forestry as a factor in land use planning. In all Land Development Schemes involving the clearing of forest, 10% of the cleared land is required to be replanted to forest trees.

All watersheds are maintained as forest land and the reforestation of watersheds in cleared land has been started.

Recent surveys show that Ceylon has 7,164,710 acres of forest land comprising 44 per cent of the total land area. Reforestation projects are small although the rate is increasing. Thirty-six thousand acres has been set aside for reforestation work.

The volume of the forest amounts to 4,533,543,000 merchantable cubic feet excluding the plantations. The allowable cut is 30,000,000 cubic feet per year.

The demand for wood products has increased. Three large sawmills and portable mills have been constructed. A government run plywood factory has increased its production. The construction of seasoning kilns and preservation plants are being planned.

The training of rangers and forest guards is done at Forest College, China Bay and at Madras. For Graduate education, Ceylon still depends on overseas training.

d. *Fiji*

The intensive management of smaller areas planted to fast grownig exotic species has gained favor over setting aside big tract of indigenous forest. New plantations totalled 1,560 acres of which 1,000 acres are planted to mahogany and 400 acres to pine.

New forest reserves were established. The Yawara Forest Reserve was proclaimed a silvical area to protect reforestation work. Efforts to make the Samura Water Catchment into a Nature Reserve including two other areas are being exerted.

Aerial reconnaissance of the Serua Watershed for purposes of road alignment, location of gravel deposits and possibly nursery sites have been made.

Studies on identifying forest types by photo interpretation are being conducted.

Damage to mahogany seeds in the Island was caused by heavy rains. Plantings were supplemented by about 400 lbs. of seeds from Ceylon and the Philippines. The establishment of seed orchard for *Pinus caribaea* has been recommended.

Log production increased by 15 per cent over 1961, reaching a total of 20.5 million board feet as a result of the operation of one large sawmill.

The total importation of sawn lumber reached 5.09 million board feet in comparison with an export of 1.3 million board feet. Exports included half a million board feet of rain tree (*Samanea saman*) logs.

Research on seed extraction, drying and storage and nursery problems were done in Fiji. Timber research were conducted for the Islands by the Forest Products Laboratory in Melbourne.

A revised training schedule for rangers was instituted at the Forest Rangers School.

e. *Hongkong*

The main interest in forestry in Hongkong is in the afforestation of waste hill lands for erosion and flood control as protection of water supply; production of forest products on sustained yield basis; encouragement of private and village forestry; protection of vegetation in water catchment areas.

Most parts of the catchment areas of Hongkong have been planted to trees. The direct catchment area of the main reservoirs are free of agriculture and settlement.

Interest in the use of forests including watersheds for recreation is being studied. The protection of wild life is enforced by the Agriculture and Fisheries Department.

The forest plantations of Hongkong is estimated at 15,000 acres. It is hoped that this area will be increased by as much as 2,000 acres yearly when a major policy has been decided.

The wood-using industries of Hongkong is supported through importation of timber. Rattans for the manufacture of furniture are likewise imported. Fuel wood is imported from Brunei, Sabah and Malaysia

f. *India*

An overall developments in forestry is reported by India. The forest services expanded and training capacities in Colleges and schools were strengthened. Intensified forest management and planting fast growing species are new trends in forest practices. A 3½-year program is underway in the survey of 18,400 square kilometers of forest using aerial photography. She aims to expand forest plantations to 545,176 hectares. A plan for a dynamic forest inventory which will be revised every 10 to 20 years is being devised.

India has a forest area of 78,396,000 hectares out of which 57,741,000 hectares are accessible. There has been a steady progress in afforestation and reforestation work.

There is a rising interest in Wildlife Conservation. There are now 4 national parks, 80 game sanctuaries, 21 zoological gardens covering a total of 15,275 square kilometers.

Shifting cultivation is a problem but a human approach to the problem to discourage the practice is bringing favorable result.

The big problem in the country is soil erosion and sedimentation of reservoir due to overfelling of trees, heavy pressure of grazing, shifting cultivation and faulty methods of agriculture. Soil conservation measures are being applied to 55,800 hectares. Afforestation, contour trenching and terracing are being applied to 14 river projects. Eleven other projects are being considered.

Man power and animal logging methods are being supplanted by machines. New seasoning and preservation plants have been established. New plywood factories brought up the total plywood mills to 71. There are now 42 mills manufac-

turing paper and paper board with a combined capacity of 549,150 tons. These mills provide employment to 42,000 people. The match industry comprising 225 factories employ 24,500 workers.

Fuel consumption is 102 million tons yearly but still short to meet the needs and 55 million tons of cow dung cake is still being burned yearly for fuel.

Due to the heavy demand for forest products part of India's need is met through importation.

The Indian Forest College of Dehra Dun turned out a peak of 95 graduates in 1964.

g. *Indonesia*

The objectives of Indonesian forest policy is the promotion of production and export of forest products, establishment of industries, establishing plantations of fast-growing species in denuded areas and poor stands, increasing the extent of forests in thickly populated areas as in Java to 30% of the land area, encouraging farm forestry, intensifying the utilization of forest lands by multiple use concept, promotion of wild life management, application of sustained yield principle.

Sixty-five per cent of the total land area of Indonesia is under forest totalling 121,800,000 hectares. An aggregate area of 2,215,154 hectares has been set aside for nature and game reserves, 38,000 hectares of which has been reserved to protect the Javan Rhino. Other areas have been established to conserve deer, tiger, elephants, orang-outan and other animals and rare flora.

Specific plans for watershed management has been made.

Production figures for lumber hardly show progress. In spite of increase in the number of mills production has gone down in 2 years. Plywood production went up slightly. Pulp and paper is on the increase. Production of hardboard remained the same. Pencil production has not yet met the country's requirement. The number of furniture factories has decreased.

There are five Government universities in Indonesia all having a faculty of forestry: University of Indonesia at Bogor, Gadjah Mada University in Djakjakarta, Hanudin University at Makassar, Telanapura University at Djambi, Swiridjaja University at Palembang. Of these universities 3 have not produced forestry graduates yet while University of Indonesia has turned out 131 foresters and Gadjah Mada, 45.

h. *Japan*

Japan has a forest area of 244 million hectares which is 68% of the total land area. The existing planted forests of 5.57 million hectares are expected to increase to 10 million hectares within 20 years. Private forests are subsidized at the rate of 24 per cent for reforestation and 48 per cent for afforestation.

Reforested area is increasing. The planted area, which in 1962 was 402,000 hectares is expected to increase 4,176,000 by 1972 and 3,582,000 by the year 2002 or an increase of 9 times the 1962 figure within the next 40 years.

The improvement of the growing stock, afforestation, fertilization, tree breeding is being planned.

The protection and propagation of wildlife is being assured through the establishment of a model school for loving birds and the appointment of a protection officer of wildlife in every community.

Forest roads in Japan are now motor car roads which have improved the socio-economic development of the rural areas. The system in the National forests totals

22,162 kilometers and in private forest, 37,761 kilometers. A 10-year program calls for 13,000 kilometers of national forest roads and 37,000 kilometers of private forest road (25,000 kilometers of which will be subsidized).

A notable achievement by Japan in promoting forest products utilization is the creation of a Forestry Credit Fund to help finance and to give credit to forest owners for the production and marketing of forest products.

Japan predicts an expected increase in the demand for forest products. Forestry law is being revised to suit supply and demand for forest products.

Logging and transport is being mechanized and modernized. Full tree skidding has been found to increase production by 24 per cent; reduce the number of men for measurement and increase utilization.

There have been increases in the production of sawmill, pulp, plywood, particle board, fiber board, but a decrease in fuelwood consumption. The importation of logs has likewise increased.

A shortage of labor and increase in wages is expected but this, it is believed, will be offset by improvement in operation and by mechanization.

There are now 24 Forestry Departments and 3 Forest Products Departments distributed in various Universities in Japan. The graduates from these schools total 800 annually. In addition there are 87 high schools offering forestry courses in wood processing, soil conservation and forest management.

The expansion of research facilities has resulted in the establishment of forest products departments in schools with a consequent increase in the knowledge of higher degree of utilization of timber.

Researchers include the study of short rotation species in tree breeding stations; investigations in silviculture, wood technology, soil survey, protection and forest management.

i. *Korea*

The major policy in Korea is the conservation of national land since most of the forests in Korea are not productive. Erosion Control Law has been passed and 60% of the total expenditure for forestry in 1962 and 80% in 1963.

Demand for forest products is increasing so that the government is forced to supply domestic timber to very urgent industrial need and fill most of the national requirement through log importation. Wood-using industries are being urged to use wood substitutes in the effort to economize on wood consumption.

The forest area of Korea — 6,750,324 hectares. This shows a decrease of 14,065 over the 1961 figure and there is fear of further reduction due to needs for food production.

Plywood production keeps increasing although all veneer logs are imported. Paper mill production is going up but the bulk of the pulp is also imported. The lumber industry produced 1,776,900 cubic meters of sawn lumber.

Forestry research is centered on finding better quality species and propagation studies.

j. *Territory of Papua and New Guinea*

On the whole the biennium is characterized by an increase in the demands for forest products and increase in log export (to Japan in particular). Concessions to remove merchantable timber has been granted to a foreign company, roads are being constructed to open up forest areas for utilization. Hydrographic survey was conducted in New Britain and Papua, major forest area has been sur-

veyed and volume determined by helicopter. Preservation of a wide range of species has been developed.

The present policy is geared towards increased local processing of forest products. Most of the wood-using industries have modern machines to increase production, reduce cost, reduce waste and improve the quality of finished products. By 1964 all sawmills are expected to be equipped for wood preservation mostly by dip-diffusion process. There is at present a modern plywood plant and there are plans for other industries such as pulp and chip board plant.

The forest products of New Guinea are exported primarily to Australia, Japan and the U.S.A. and to a certain extent to British Solomon Islands, New Zealand and the Pacific Islands. Minor forest products are exported to Hongkong, Germany, United Kingdom, Belgium, Holland and France.

k. *Malaya*

Similar to other countries in the Asia-Pacific Region, Malaya's policy is to perpetuate protection and production forests. As of now she has no policy on watershed management.

Improvement in logging methods and sawmilling and increase in wood preservation plants from 14 to 45 in the last two years marked the progress in wood utilization.

Malaya's problem is the shortage of qualified forestry officers and the absence of professional teaching facilities.

l. *Nepal*

In general, Nepal is struggling for forest conservation. The forest is being decimated through uncontrolled clearing and conservation of land for agriculture and other uses. Coordination of land use is non-existent.

The contribution of forest products to the development of Nepal is being recognized but forest industry is at its infancy and its socio-economic influence is not yet fully realized.

One of the main obstacles to forest utilization is the lack of roads. Logging and transportation of logs is still primitive. The lumber industry is small but gradually expanding.

The training of forestry officers is done in the Forest Institute. In 1962-1963, 25 graduated as forest rangers and 53 as foresters. In 1964 the number of graduates was 19 and 40 for rangers and foresters, respectively.

No organization for forest research is in existence but its establishment is being considered.

m. *New Zealand*

The exotic forest of New Zealand is now the base of the pulp and paper industry and sawn lumber. The extent of forest plantations in the country may be gauged from the fact that in spite of increasing utilization of forest products the cut in exotic forests is not yet equal to the rate of growth.

The number of forestry associations increased to 34 with a total membership of about 3,000. Further increase in acreage is expected with a goal of 100,000 acres by the year 2000 with the establishment of a Farm Forestry Incentive Loan Scheme.

Forest protection has been stepped up. Introduction of pests is guarded against through careful inspection of timber at the point of entry. A Forest Biology Survey team watch the build up of insect population in forests. The cutting of natural stands is regulated and enforcement of laws on trespass is strict although violation is rare.

The present logging practice is clear felling mostly from mature exotic stands.

Acceptance in the use of wood by engineers and architects has brought about diversified preservation treatment of railway sleepers, wharf and bridge decking and glue laminated members. A building code for timber construction has been established.

Progress has been made in the utilization of lesser known woods. Vegetable turpentine is now being produced in New Zealand and part of the product is being exported to Australia.

The production of sawn lumber is declining but pulp production is on the increase and production has reached 200,000 tons.

The timber industry has a problem of high labor turn over. The companies are trying to remedy the situation through some incentive plans. The problem is probably due to high demand for labor in the industry. Thirty-three thousand workers (out of 2.5 million population) are employed in the forest industries.

New Zealand does not now have a professional forestry school but hopes to have one in the near future. In sub-professional training emphasis is now placed on practical training.

The Forest Research Institute is conducting a wide range of forestry research. Among the most important projects are the critical review of silvicultural operations in exotic forests and the biological control of *Sirex noctilio*.

n. *Philippines*

During the past two years there has been a growing concern for forest protection and conservation as shown by the passage of about a dozen bills on forestry matters in the Philippine Congress.

Important forestry projects include aerial survey of the forest areas of western and central Mindanao which showed a reduction of 1.8 and 1.2 per cent, respectively, for the two regions due to release of forest areas for agriculture and destruction due to timber stealing and shifting cultivation. Reforestation of denuded areas has steadily been increasing and trial plantings of fast-growing species has been done. Permanent forest with a total area of 906,266 hectares has been demarcated.

Logging methods have been regulated to minimize damage to remaining trees (residuals) without hampering production. Trees are being cut closer to the ground and merchantable tops and branches are now being utilized. Better roads are paying off in the form of increased delivery throughout the year, lower road maintenance cost and less wear and tear on the equipment.

The wood-using industry is progressing. The number of plywood mills has gone up to 21. Another wall board factory is coming up and additional pulp and paper mills are being installed. More sawmills have gone into operation to meet the increasing demand for lumber. Exportation of logs and other forest products to Japan, United States, Canana, Australia, South Africa, Taiwan, South Korea and other countries increased.

Forestry education has been improving with the expansion of both faculty and facilities at the College of Forestry, University of the Philippines. Two major curricula: forest resources management and forest utilization, have been strengthened.

In addition to the professional courses there is also a sub-professional ranger course. Enrollment has gone up and graduates in the B.S.F. level increased although ranger graduates are on the decrease.

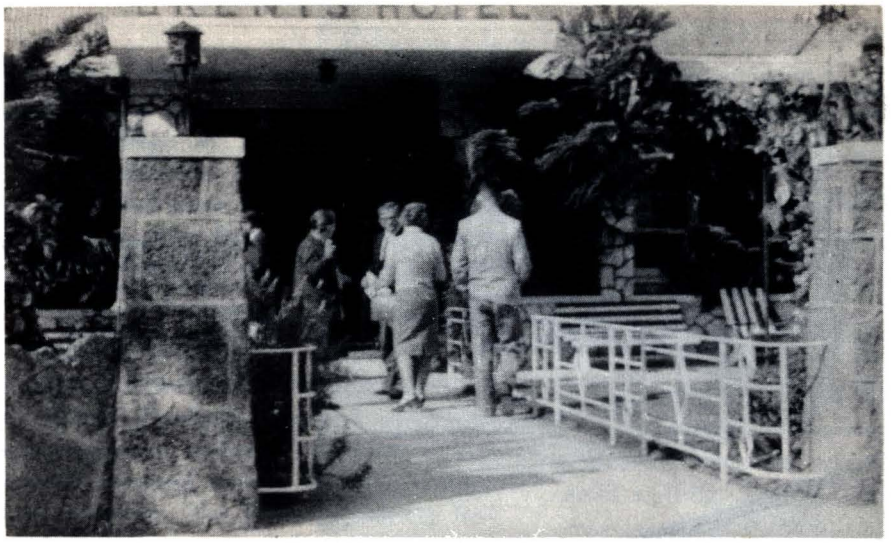
A close up view of a 20-year old exotic pine forest in New Zealand. Note the density of the stand.

Yarding radiata pine. Note the clear cut felling of the stand.

Preparing the ground for planting to radiata pine by means of a root raker.

Clear felling radiata pine for sawlogs and pulpwood.

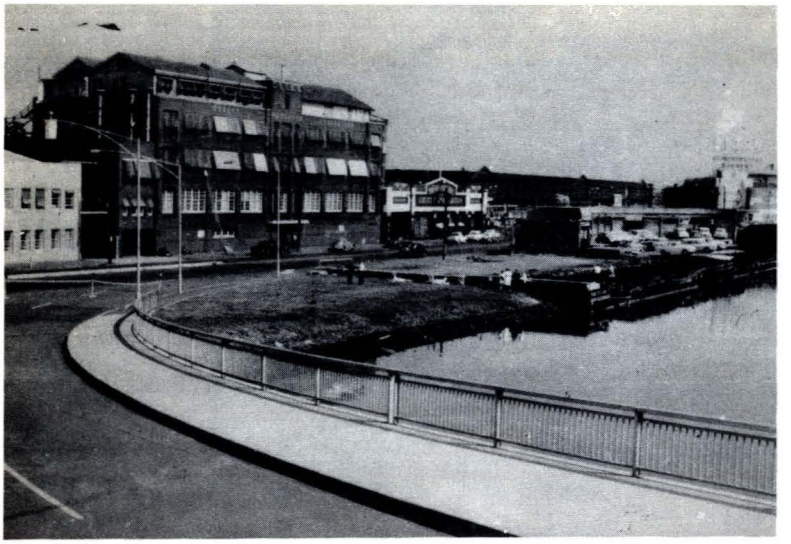
Highland yarding radiata pine.



Brents Hotel, Rotorua, New Zealand, where most of the delegates to the 7th Asia-Pacific Forestry Commission Conference held September 22 to October 2, 1964 stayed.

Giant red wood, *Sequoia gigantea*, planted in 1887 near the Post Office at Rotorua, New Zealand. Its growth, as manifested by its increase in d.b.h. and height, is being measured at regular intervals.

Geyser in Wakarewarewa Reserve in Rotorua, New Zealand, which, by the way, especially near Rotorua in the North Island, is dotted with numerous manifestations of geothermal activities such as sulfur springs, geysers, boiling mud and so on.



Main laboratory of the famous Forest Products Division of the Commonwealth Scientific and Industrial Research Organization (CSIRO) in Melbourne, Australia.

Wood chips from Eucalyptus species moving on a belt conveyor in a semi-chemical pulp mill somewhere in Tasmania, Australia. This pulp-mill produces pellets of semichemical pulp for bulk shipment to the mainland of Australia for conversion into paper.

Typical scenery outside of cities in Australia showing windmills used for pumping water to water livestock, gardens and so on.

A strong Forestry Extension has been established in the University of the Philippines College of Forestry. All media of communication, including the press. the radio and even television is used in this activity. The Reforestation Administration also uses the radio in its extension work.

Research activities in the Bureau of Forestry, Reforestation Administration and the Forest Products Research Institute have expanded although the Bureau of Forestry reported lack of funds for some of its projects. The Forest Products Research Institute made progress in the utilization of previously non-commercial woods.

Unfavorable report was made on the not too clearly defined policy on watershed management and the depletion of Philippine Wildlife.

o. *British Solomon Islands Protectorate*

Forestry in this area is administered by a Forestry Department established in 1952. At present it is still hampered by shortage of staff but forestry projects such as forestry surveys, botanical investigations and research on silviculture are making progress.

Large scale logging is a recent introduction and at present timber is exported. It is hoped that sawmilling and other industries will commence in the future.

Forestry training for personnel is done at the Forestry Training School in Fiji. The sending of men to Bulolo, Territory of Papua and New Guinea and the training of a senior officer in silvicultural research at Oxford is being contemplated.

p. *Thailand*

The forestry situation in Thailand has remained essentially the same for the biennium although progress in some areas are worth mentioning. A Division of Forest Police has been created to make protection more effective. Protection against insects received considerable attention due to borer damage to teak plantations and saw flies attack on young pine needles.

The National Forest Act has brought about progress in demarcation of forest reserves and 20,000 sq. kms. of forest is expected to be reserved in 1964.

The forests of Thailand are managed under the selection system with improvement cutting. Replenishment of cut-over areas is done through reforestation with teak and other hardwood species at an annual rate of 1,600 hectares.

Forest research covered studies on forest soils, forest fires in Teak and Dipterocarp species, growth studies of some mangrove and Dipterocarpus species, the economics of the use of power saws and portable sawmills. Findings show that teak seedlings take 6-15 years to establish itself while *Shorea obtusa* requires as long as 15 years. Many species of orchids and a species of European Birch were discovered. Wood-using industries are progressing. A new type of portable mill run by a Massey-Ferguson tractor has been designed. The units of this mill include a 3½-foot circular main saw and two 2-foot saws for slash sawing and trimming, 3 benches and a detachable shed. This has been found to reduce waste in the extraction and conversion of teak logs.

Six dry kilns have been installed and 3 parquet flooring factories went in operation. There are plans for a paper and a fibre board factory.

New species have been introduced in the market for timber and plywood core

Professional forestry (5-year) course and sub-professional (3-year) course are given at Kasertsart University. The Prae Forestry School offers a 2-year sub-professional course. The Forest Products Re-

search Division offered a 5-week training course in air-seasoning and kiln drying to employees of the wood-using industry. Courses in wood structure and identification has also been conducted.

q. *Taiwan*

The total forest area of Taiwan is about 2.14 million hectares equal to about 60% of the total land area. The policy on this area is to ensure a sustained yield. Also included in the policy is a change from government logging to stumpage sales, encouragement of private planting of forest land, forest protection against destructive agencies and shifting cultivation, improved utilization of native timber, development of the wood-using industries and forest research.

The total annual area planted is very impressive being five times the area cut annually. While the annual cut remains constant government revenue is on the increase.

The need for research especially forest products has been expressed. Among the important projects were the preparation of yield tables for some species, timber stand improvement, ecological studies, seed storage and germination, propagation of bamboo, control of forest pests and diseases and study on vegetable drugs. In forest products research projects included the pulping of hardwood, mechanical properties of wood, preservation of wood and bamboo, plywood manufacture, solar drying, application of improved wood stabilization of hardwoods and bamboo, lamination, machining properties, kiln drying, wood waste utilization and lumber grading.

Forest industry is on the way up especially plywood manufacture although the veneer logs were all imported from the Philippines and North Borneo. Out of the total export in 1962-1963, 65% was from wood products amounting to US $28,000,000.00.

r. *Pakistan*

The utilization of the forest resources of Pakistan is still very young — starting only sometime in 1947. In spite of this government revenues from forest is about 4 times that of expenditure.

The forest area of East Pakistan constitute about 15.66% of the total area is constantly being destroyed by shifting cultivation ("Jhooming") and a Jhoom Control Division has been established. To increase the forest area, 11,000 acres are being planted annually.

Logging is done manually, by animal power and by mechanical means. There is no big sawmill and primary sawing is done manually and resawing done in small band mills. Plywood production is limited to the manufacture of tea-chests and flush doors. The 18 match factories are supplying the country's need with some surplus for export.

Research in forestry has been directed to collection of growth data and the introduction of fast-growing species.

Professional training is done at the Pakistan Forest Institute at Pesshawar while sub-professional training is given at the Forest School.

a. *Sabah, Malaysia*

Sabah has a rich forest resource of 5,960,000 hectares equal to 80% of the total land area. Of this 2,590,000 hectares is covered with accessible Dipterocarp forest and 2,072,000 sq. miles inaccessible Diptorocarp forest, 64,750 hectares productive fresh water swamp and 284,900 hectares of mangrove. About 777,000 hectares are under shifting cultivation.

Forest concessions are cut on sustained yield basis with a rotation of about

80 years. The concession agreement is for 21 years with provisions for renewal.

Regeneration operations are confined to logged over areas. Weed trees and "relics" are poisoned with sodium arsenite (two pounds per gallon of water). Production of timber shows an upward trend reaching 95,868,412 cubic feet which is 23.7% over the 1962 figure. Ninety-six per cent of the total cut belong to the Dipterocarpaceae family.

The usual log extraction method is by tractor and primarily transportation is by water.

Lumber production is low due to poor market conditions. The large band mills have stopped commercial operations and export figures dropped by 47.8 per cent over 1962 figures). One factor for this trend is higher profit for marketing logs.

The principal log markets are Japan, Hongkong, Formosa, Australia, Korea and Italy. The principal competitor is the Philippines, supplying 70% of the Japanese requirement.

Research work on the light of requirement of young Dipterocarp, collection, survival and growth of Dipterocarp seedlings, arboricide trials, thinning studies, growth of regeneration, plantation trials of softwoods, and fast-growing species comprise the important projects.

Forest education is limited to a two or three months basic training. Some students were sent to the Forest School at Kepong, Malaya for a 10-month training.

Professional education is wanting and forest officers are sent to Australia and India.

III. THE DEVELOPMENT OF FOREST INDUSTRIES AND THE ROLE OF FAST-GROWING SOFTWOODS IN MEETING WOOD REQUIREMENTS

The demand for forest products in the Asia-Pacific Region is predicted to increase substantially by 1975. This will be true for industrial wood, pulpwood and pulp products. (See Table 1).

If the present trend of forest conservation continues, on the whole, Southeast Asia will have a surplus of 13,000,000 cubic meters ot industrial wood yet the entire Asia-Pacific region will have a deficit of 21,600,000 cubic meters. (See Table 2).

The problem facing the region is a shortage of chemical pulp from softwoods as in other regions of the World. Europe will be short of pulpwood by 25 million cubic meters. North America, because of its own requirement, will have a diminishing surplus which can be channelled to the European market. It would seem, therefore, that the Asia-Pacific countries must have to look for substitute long fibered pulp as well as grow its own requirement.

The problem presented here leaves little doubt as to the importance that fast-growing softwoods plantations will play in future economic development. The success of existing softwood plantations demonstrates the feasibility of plantation forestry but there are still problems that need to be overcome.

There is a general lack of information on site requirement of species, improvement of natural ecological potentialities, plantation techniques and silvicultural measures, protection techniques, and products utilization. Exchange of data and research will be the key to the solution of these problems.

The fast growing softwood species observed in the region include *Pinus radiata, P. caribaea, P. elliottii, P. taeda, P. palustris, P. patula, P. strobus, P. ponderosa, P. contorta, P. merkussi, P. insularis, P. pinaster, P. calabrica, P. brutia, P. densiflora, P. massoniana, Agathis sp., Araucaria cunninghamii, A. hunsteinii, Chamaecyparis obtusa, Cryptomenia japonica, Cupressus macrocarpa, Larix decidua, Larix leptolepis* and *Pseudotsuga menziesii.*

TABLE 1. — *Predicted Timber and Pulp Requirement in the Asia-Pacific Region by 1975*

	1053/55	1960	1975
Industrial wood	86,800,000 cu.m.	114,500,000 cu.m.	185,400,000 cu.m.
Pulpwood	11,100,000 cu.m.	19,500,000 cu.m.	49,700,000 cu.m.
Chemical pulp, softwoods	861,000 tons	—	3,231,000 tons
Mechanical pulp	872,000 tons	—	4,064,000 tons

TABLE 2. — *Expected production of Industrial Wood In The Asia-Pacific Region by 1975*

Region	1955		1975	
	Surplus	Deficit	Surplus	Deficit
	(Cubic meters)		(Cubic meters)	
Southeast Asia, Mainland		100,000	3,600,000	
Southeast Asia, Islands	2,000,000		9,400,000	
South Asia		900,000		10,400,000
East Asia		100,000		19,700,000
Oceania		2,200,000		4,500,000
Total	2,000,000	3,300,000	13,000,000	34,600,000

IV. MANAGEMENT OF THE MAN-MADE SOFTWOOD FOREST OF NEW ZEALAND

The early settlers of New Zealand were primarily concerned with the production of food and wool. By the end of the 19th century the land cleared of natural forest for conversion into agricultural lands were so great that there arose apprehension on the future timber supply. The indigenous species are slow growing and regenerates very poorly. Early attempts to propagate them artificially for timber supply seemed too impractical due to the very slow growth.

Introduction of fast-growing species from Europe and America showed better promise. In the 1890's Douglas fir, Corsican and ponderosa pines, larch, radiata pine and Eucalyptus were used for reforestation. Among these *Pinus radiata* exhibits rapid height and volume growth, good seeding, ease of establishment and adaptability which made it the most popular plantation species.

In 1920 the Forest Service was created and its report on the indigenous forest area to meet future needs was very discouraging. The Service decided to embark on a large scale tree planting program. At about the same time private interest saw prospects on woodlands and started commercial scale plantings. The program has progressed steadily so that today the rate of planting totals 25,000 acres annually.

The utilization of radiata pine timber started during the II World War. The war requirement promoted the use of timber which otherwise would have been rejected due to knots and other defects. The Forest Service demonstrated the feasibility of utilizing plantation-grown stock and developed gang frame saws for sawing logs. At the beginning the use of the timber was acceptable for cratings and form lumber for concrete but research and promotion programs showed the excellent qualities of radiata pine both for lumber and industrial raw material especially for pulp. Today the use of radiata pine has received general acceptance and is now the base of large-scale industry.

The impressive growth of radiata pine may be seen from the fact that at 40 years, on an unthinned stand on a good site, the height diameter of 18 inches or more with a volume of 12,000 cubic feet (calculated to 6-inch top) per acre from 160 trees.

Radiata pine is not suitable for wet or low fertility podsolized clays. It suffers windthrow in shallow soil especially where there is a hard pan. It suffers from frost so that in New Zealand the recommended altitudinal range is 2,000 ft. in the north Island and 1,500 feet in the south Island.

In the central pumice country of North Island site-quality indicator based on the secondary vegetation has been developed. This has been found helpful in the planning of plantations.

The main objectives of management of radiata pine plantation is to increase yield, improve the quality of the derived product and to have sustained yield. The measures being adopted to meet these objectives are intensive silviculture and tree improvement.

Radiata pine has been found to be prone to natural pruning and thinning, but dead branches are found to be persistent. This results in poor quality timber due to loose knots hence, intensive silvicultural treatment is applied to preserve timber quality.

The thinning operations vary with the location of the forest with respect to the industry. Where there is a demand for pulp wood, thinning is done earlier and heavier than when there is no market for small poles The operation is done at 20-25 years at which time the thinnings have reached saw log size.

The usual rotation is 30 to 40 years at present although in the central North Island some stands will probably remain up to the age of 60 or 70 years.

Seed orchards of superior trees are being established and progeny tests are in progress. This will probably supply seeds in the future but for the present production it is still small and bulk of the seeds for plantation establishment come from existing stands.

The establishment of the forest consists of clearing the land usually by burning or crushing of scrub or line cutting and then planting one year old seedlings with a stocking of 650 to 700 per acre although in some instances a stocking of 1,000 to 1,200 seedlings per acre has been used.

In some areas natural regeneration is suitable and may take a very dense cover which necessitates reduction to 800 to 1,000 stems per acre at the age of 3 to 5 years.

The allowable cut is determined from yield tables based on unthinned stands with sufficient allowance to cover up for a logging waste of about 5%.

V. INDUSTRIES DEPENDENT ON THF EXOTIC MAN-MADE FOREST OF NEW ZEALAND

Radiata pine is the main stay of the forest products industry of New Zealand. At the beginning the supply of raw materials came from indigenous forest. The change to plantation-grown timber necessitated change in

equipment and production techniques. The Forest Service in 1939 introduced various timber processing and handling techniques such as Swedish log frame for primary conversion of timber, anti-stain treatments and kiln drying.

Because of keen competition from higher grade indigenous timber, there was greater emphasis on standards and quality in the manufacturing of radiata pine. This has won the confidence of the people and as a result the use of radiata pine has been met with general acceptance. In time the consumer found its equally strong properties in comparison to naturally-grown species so that at present radiata pine dominates the market for frame timber, flooring, interior joining and manufactured items. Its ease of drying, preservation, machining, fastening and good strength-weight properties contributed much to its utilization. End jointing and finger jointing has helped in producing clear lumber. Lamination of beams has increased the load bearing construction of structures.

The per capita consumption of wood in New Zealand is one of the world's highest being 275 board feet annually. Out of the total production of 666 million board feet of timber 60% was exotic softwoods 90 per cent of which was *Pinus radiata.*

The single storey type house is most popular in New Zealand and radiata pine has filled the needs for frame structures. Its light weight, ease of machining and assembly and handling has made it suitable for prefabrication.

It is interesting to note that before the World War II there was no large-scale pulp industry in New Zealand. Today there are five pulp and paper mills. Three of these are integrated with sawn timber production. These mills produce chemical and mechanical pulp, newsprint, kraft paper, fiber board and paper board. New Zealand now is the world's 5th largest producer of newsprint (200,000 tons a year). Production of pulp products today totals 300,000 metric tons a year. In 1963 exports reached 63,000 tons of pulp, 108,000 tons of newsprint and other pulp products with a total of $31,000,000.

Veneer production from radiata pine is limited to the production of cross band material and short length face quality veneer derived from between branch nodes. Of the total volume of logs used for peelers only a third is radiata pine.

Laminated frames have been manufactured out of radiata pine in recent years although limited laminated construction materials have found their way in churches, schools, grandstands and gymnasium.

New Zealand claims to have the highest per capita consumption of treated timber in the world — a result of a short supply of durable timbers.

The progress of preservation treatment has brought about utilization of plantation thinnings. In 1963-1964, 40 per cent of the sawn timber production was treated with preservative.

There are 97 pressure treating plants using water soluble preservatives. Acid borate treatment by diffusion process is used for building timber. Coal tar creosote and pentachlorophenol are also used.

The widespread use of preserved wood has led to the creation of the Timber Preservation Authority which maintains quality control and authorizes preservatives, specifications, processes and standards.

The success of the wood-using industry lies to a great deal on government pioneering, support, research and technical guidance. The government did not only start reforestation efforts but has undertaken developmental and demonstration work in the processing of exotic species. It conducts training courses for men from the industry in all aspects of wood utilization.

VI. REPORT OF THE A.P.F.C. COMMITTEE ON FOREST WORKING TECHNIQUES AND TRAINING OF FOREST WORKERS

The A.P.F.C. Committee on forest working techniques and training of forest workers (headed by J. J. Spiers of New Zealand with members from Australia, India, Indonesia, Japan, North Borneo, the Philippines and Thailand) studied the forest working techniques and the training of forest workers in the Asia-Pacific region and came up with the following proposals:

a. *Training of Forest Workers, Foremen and Officers:*

(1) Publish a list of all educational institutions providing vocational forestry training in the A.P.F.C. area including the complete curriculum facilities offered.

(2) Publish a list of the specialized courses in forest work carried out in A.P.F.C. region in the past five years. Collect copies of the material offered for reprinting and distribution as required.

(3) Publish an annual list of the courses to be offered in the region during the year ahead.

(4) Attempt to assist member nations holding courses by providing qualified instructors where required.

b. *Safety and Accident Prevention:*

(1) Collect accident statistics from all member countries, and attempt to reduce the main hazards by compiling literature on accident prevention in the critical fields. Such literature could be the basis for pamphlets distributed by members of their local supervisors.

(2) Compile and publish a simple illustrated booklet comparing safe and unsafe practices by cartoon.

c. *Hand tools — their Use and Maintenance:*

(1) Collect and circulate notes on hand tools use and maintenance.

(2) Circulate notes on the use and maintenance of power chain saws, chains and bars. Considering the rapid increase in the use of power saws, this is particularly important.

(3) Circulate notes on the development of new hand tools including chain saws.

d. *Organization and Mechanization of Forest Work:*

(1) Compile a bibliography of publications on:

(a) Forest working techniques
(b) Logging methods and techniques
(c) Forest wood studies or work science
(d) Training of forest workers and machine operators.

(2) Ask members to present annually notes on developments that have taken place in (a) to (b) above and compile a journal incorporating these notes for distribution to members.

(3) Review work done by the similar E. C. E. Committee and include reports on the more pertinent subjects in the journal for distribution.

VII. SILVICULTURE AND FOREST MANAGEMENT RESEARCH*

In the tropical countries within the region the softwood species are limited mainly to the genera Agathis, Araucaria, Callitris and Podocarpus. Their occurrence is common in the evergreen forest type with an equally distributed rainfall of no less than 45 to 60

* Reported by Mr. Hari Singh, Inspector-General of Forests Ministry of Food and Agriculture, New Delhi, India, Chairman, Committee on Silvicultural and Forest Management Research.

inches (35 to 5 monthly) throughout the year and with 3 to 4 months of dry period. Limited number of species are found in deciduous type of forest with high rainfall. The absolute maximum temperature requirement is 103°F (75°—95°F average) and the absolute minimum is 25°F (55°—70°F average).

Araucaria cunninghamii shows promise for introduction in Queensland, Australia, Papua and New Guinea; *Araucaria hunsteinii* in Papua and New Guinea; *Agathis loranthifolia* in Indonesia. In the Northern Territory, Australia where there is low rainfall *Callitris intratropica* and *Callitris glauca* seem to thrive well.

Araucaria cunninghamii, Araucaria hunsteinii and *Agathis loranthifolia* have been noted to grow well from 0.0 elevation to 7,000 feet. with better growth in the upper limit.

In general *Callitris, Dacrydium* and *Podocarpus* are shrubs or small trees. *Podocarpus* may grow to timber size but very slow growing.

Studies on fast-growing hardwood and softwood species are recommended for the next biennium. Member countries are asked to report on improved methods of pruning including techniques, tools, economic considerations and literature on this operation.

VIII. WATERSHED AND FOREST RANGE MOVEMENT

Korea, Japan, New Zealand, Philippines, Thailand and Vietnam reported on the water shed management projects. Korea has two pilot demonstration areas under the assistance of the United Nations Special Fund. Japan has a ten-year program on a specific river project to be followed by a development program on all major aspects of water control and utilization. New Zealand reported on farm basis projects for stock water supply and a reforestation project in the catchment area of one river. The Philippines with United States assistance is undertaking water resources surveys and investigation on a comprehensive program to cover seven major basins with a drainage area of 101,137 square kilometers. With a United Nations Special Fund assistance a pilot demonstration and training project of watershed management based on multiple-use concept will be started in the Ambuklao River basin. Thailand is working on two river projects. Vietnam reported a project in highland watersheds and in coastal areas to arrest shifting sand threat to agricultural land.

On the whole most of these projects revolve on water resources survey and development, flood control, erosion control, stream bank stabilization, prevention and control sedimentation, debris control and reforestation and afforestation of catchment areas.

A program on Forest Range Management for Asia and the Far East has been outlined.

a. Interest of animal husbandry in relation to utilization of natural pasture lands: animal husbandry is concerned with production of the best meat and dairy products at minimum cost while utilization of range lands calls for high quality forage.

b. Overcrowding and prolonged grazing hinders full production of fodder and exhaustion of palatable species.

c. Problems in Animal Husbandry varies: some countries are studying how to raise production by reducing the number of animals or how to restore grazing land without harm to animal production by raising superior breeds. Other countries are endeavoring to increase production by increasing the number of animals.

d. The need for improvement of existing pasture land establishment of new ones to relieve over grazing. Pasture land will be difficult to improve as long as pressure of livestock on the land exists.

e. The lack of trained men in range management must have to be met.

f. An adequate management plan require an adequate survey of range resources.

IX. REPORT OF THE TEAK SUB-COMMISSION

Interest on the growing of teak has spread to countries outside of the Asia-Pacific region. Because of these countries such as Dahomey, Ghana, Ivory Coast, Nigeria, Senegal, Togo, Sudan and Kenya will be invited to the Fourth Session of the Teak Sub-Commission tentatively scheduled for 1965 at Bangkok, Thailand, Cameron, .Maly, Nyasaland, Sierra Leone. Tanganyika and Upper Volta have been recommended for addition to the list by the African Forestry Commission.

On the basis of teak conversion in Burma, Thailand and Indonesia the "Asia-Pacific Regional Grading Rules for Teak Conversion" has been finalized by the sub-commission. A grading rule for teak veneer logs has been recommended for study.

Teak provenance trials have been undertaken by Australia, Territory of Papua and New Guinea, Pakistan and the Philippines making new additional member countries to the participating countries: India, Burma Thailand, Laos, Indonesia, Malaya and France.

X. FOREST PRODUCTS RESEARCH*

The thousands of species of plants found in the tropical and sub-tropical forests of the Asia-Pacific Region create complex problems in forest products utilization. Because of this every country is trying its best to study its own species and find the best utilization techniques. The various researches in the field of forest products in the region cover the following subjects:

a. Wood identification
b. Pulping properties
c. Timber seasoning
d. Timber preservation
e. Physical and mechanical properties
f. Tannin based wood adhesives
g. Veneers, hardboard and particle board
h. Timber for home construction
i. Training course.

Majority of countries in the region are studying the identity of their own wood species and building up wood collections. Wood identification is basic to wood utilization.

Most countries in the region are importers of pulp and paper products. To utilize a mixed stand of tropical hardwoods for pulp is not a simple problem since species vary in their response to pulping processes and also exhibit different pulp properties. It is, therefore, understandable that pulp evaluation studies occupy an important area of forest products research in the region. The Philippines has been studying the potentialities of her own hardwood species and fast-growing exotics. Other countries wanting of facilities have been sending materials to better equipped countries like Australia for pulp studies.

Timber seasoning research is becoming an important project in many countries as the wood-using industry gets developed. Australia has set the pace in this field and has introduced pre-drying which is now being tried in some countries.

The preservation of timber and wood products has received considerable attention but more work on this has to be done to best utilize many hardwood species found in the region.

The mechanical properties of the commercial timbers are being studied in almost all countries. Japan, Australia and New Zealand are conducting studies on stress grading. Japan, Philippines and New Zealand are doing work on glue-laminated structural members.

* Reported by Dr. H. E. Dadswell, Chief Division of Forest Products C.S.I.R.O., Australia; Chairman Committee on Forest Products Research.

Australia has developed the commercial use of wattle tannin for tannin-formaldehyde adhesive for wood. The Philippines and India are conducting research on tannin-formaldehyde glue from their own species.

Many new tropical species are now used for peeling into veneer as a result of studies on veneer quality. More hardwood and particle boards are being manufactured and used in the region but more studies on these are necessary.

The use of timber for home construction is increasing although shortage of wood is being felt in some countries.

The training of men for forest products research is generally recognized and all countries have a program for personnel training.

XI. WOOD PRESERVATION

The preservation of timber in the region has become popular in the Asia-Pacific region and new preservation plants have been established. This has resulted in a number of weed and non-durable species being utilized.

The Secretariat reported the recommendations of the Meeting of Experts on Wood Preservation in Rome in 1959:

a. Study on a regional basis the potentialities of the development of timber seasoning and wood preservation, taking into account the economic consideration, site, details of machinery and plant layout.

b. List various research requirement.

c. Evaluate service life of treated material.

d. Establish a code on the use and treatment specifications.

e. FAO organize special training courses.

f. FAO assist in the organization of symposia on national, regional and world level.

In September 1963 the Working Party on wood preservation discussed the subject during the Fifth FAO conference on wood technology at Madison, Wisconsin, U.S.A.

The possible sources of funds for the proposals were enumerated as follows: EPTA, U.S. Special Fund and other agencies such as ILO.

The Secretariat recommends that should the commission decide on a training course, it should include not only training of technical personnel in research and production but also personnel from management groups.

A regional meeting on wood preservation was also suggested.

XII. STUDY TOURS

The Study Tours which supplemented the conference included a visit to the Rotoehu, the Whirinake and the Kaingaroa State forests, the New Zealand Forest Products Limited forest, the New Zealand Forest Research Institute and some of the wood-using industries in the vicinity of Rotorua. As a whole the study shows the feasibility of man-made forest and its potential as a steady source of raw materials to feed multi-million dollar processing plants.

a. *Kaingaroa forest*

The Kaingaroa forest is located in the Kaingaroa plains of North Island, New Zealand. This area used to be desolate wastelands covered with no more than a thin growth of scrubby vegetation [manuka (*Leptospermum scoparrium*), bracken fern (*Pteridium esculentum*), monoao (*Dracophyllum subulatum*) and tussock grass (*Poa caespitosa*)]. Today, this forest is the biggest man-made forest in the world having a total area of 151,350 hectares (out of 400,000 hectares in all New Zealand) out of which 115,750 hectares are planted to conifers.

Plantings in this area started as early as 1897. The harvesting of matured *Pinus radiata* started in 1940 but not in a large scale until 1947.

The timber stands of Kaingaroa forest are as follows:

Pinus radiata	60,000 hectares
P. ponderosa	19,000 hectares
Pseudotsuga taxifolia	14,000 hectares
Pinus nigra	12,000 hectares
P. contorta	5,300 hectares
Larix decidua	1,200 hectares
Miscellaneous spp. ..	4,000 hectares
T o t a l	115,500 hectares

The net volume of the forest is 34,800,000 cubic meters, with a current annual increment of 1,530,000 cubic meters and a mean annual increment of 1,360,000 cubic meters.

The success of this forest lies on the unusual favorable conditions of growth and absence of destructive agencies. The climate is maritime with a rainfall of about 55 inches, evenly distributed throughout the year The soil is porous which allow for maximum water percolation thereby minimizing surface water flow — hence soil erosion is reduced. Winds of gale force are seldom although strong northeasterly winds with heavy rain have caused minor damage to newly thinned stands.

b. *Fire Protection*

Because of the softwood constituent of the forest, fire is an ever present hazard. The investment on the forest plantations and on the wood processing plants are so big that this danger cannot be ignored. The government of New Zealand therefore has adopted numerous measures to minimize the danger and to combat fire. Among the steps in fire prevention include communication network; maintenance of extensive roads within the forest (1,000 miles in Kaingaroa forest alone); establishment of fire breaks; planting of belts of fire resistant species around the boundaries and along public roads; observation of weather condition; logging by staggered settings; maintenance of water points; training of workers and efficient trespass control.

c. *Silvicultural Practices*

Various silvicultural practices in the exotic forests were shown particularly pruning and thinning. These operations improve the quality of the trees in the stand as well as afford maximum utilization of the area and allows for maximum production. Basically the idea is to plant as much trees as possible per unit area and periodically remove some of these trees as the demand for space increases with growth. In so doing, a continuous harvest of utilizable thinning is assured up to the time when the ultimate timber crop is left to mature.

The New Zealand exotic forest is characterized by a very high yield per unit area. Examples of this are shown in table 3.

Aside from conventional tools, poison (liquid ammate) is being used in the thinning of non-merchantable trees. A specially designed machine for boring and injecting poison into the stem allows a man to do thinning operation at a cost of about ₱10.00 per hectare. A prunning ladder likewise especially designed, allows pruning to 38 feet with pruning saw at the rate of about 40 trees per day.

TABLE 3. — *Examples of yields from exotic softwood plantations in New Zealand*

Species	Date Established	Volume per Hectare	Yield	Operation
Pinus radiata	1928	542 cu.m.	542 cu.m.	Strip, felling
" "	1920	524*cu.m.	210 cu.m.	First thinning
P. nigra	1916	350*	503 cu.m.	2nd thinning
			629 "	Thinning
Pseudotsuga taxifolia	1923		322 "	Thinning

d. *Reforestation*

The stocking of the softwood plantations is usually by transplants spaced 4 x 4 feet and later 8 x 8 feet between seedlings. Lately 6 x 6 feet planting has been practiced. Other methods of stocking include strip sowing in rows 6 feet apart, natural reproduction from seeds falling from felled tree, and aerial seeding.

Aerial seeding with Pinus radiata at 3.4 kilograms per hectare has been tried with satisfactory result giving a stocking range of about 5,900 to 37,000 stems per hectare. Thirodust is used as seed coating to serve as bird repellent.

e. *Preparation of the site for planting*

Where topography will permit the cut-over areas are prepared for planting by means of root raking the area with a D-8 tractor to remove the stumps and residues. The advantages of this operation is that the area is free from second growth hence, no release cutting will be required after planting.

Planting can be done in regular lines and full stocking of the area is possible.

In steep country the left over trees were felled and the area burned. This reduces regrowth after planting and reduces the cost of release cutting.

Planting ploughed strips reduces frost damage since the temperature at ground level on ploughed areas are several degrees (3°-4°F) higher than on unploughed areas.

Shelterwood and strip felling methods of harvesting are employed to improve the microclimate for the favorable growth of the regeneration especially as protection to frost damage. The strip method, however, is less expensive and less destructive to the reproductions.

f. *Other exotic species*

Poplars are being planted in New Zealand but this silviculture is still under study. Current silvicultural practices are based on European standards. It is hoped that poplars will in the future fill the needs for peeler logs, pulp and wood of the match industry.

g. *Forest Products Industries of Rotorua*

The production of exotic timber began its expansion sometime in 1945. Rotorua which is centrally located among indigenous and man-made forest had a population of only 7,500 in 1945. Due to the development of the forest industry the population has grown to 20,000 in 1963.

The seven sawmills in the Rotorua area produced 48.5 million board feet in 1963 out of which only 12.8 million board feet are of indigenous species.

The development of the lumber industry using exotic species was initiated by the Government of New Zealand by establishing a government sawmill at Waipa with the aim of demonstrating the effective utilization of man-made forests and also to supply the needs of government projects for lumber. Today Waipa sawmill has a daily (8-hour day) production of 80 to 100 thousand board feet of sawn lumber, claims to have the largest batteries of dry kilns in the Southern Hemisphere and its preservation plant since 1954 has produced 250,000 telephone poles and 3 million fence posts.

Other industries include the Lockwood Building Limited which produces prefabricated houses at the rate of 120 units each year, the Bay Ply Company Limited producing veneer plywood out of native and plantation-grown trees.

There are three pulp and pulp products mills around the Rotorua area which are all dependent on exotic timber forests: Whakatane Board Mills, New Zealand Forest Products Limited at Kinleith and Tasman Pulp and Paper Company Limited at Kawerau. The first two get their timber supply from their own plantation of 100,000 hectares while

the last is supplied from government plantations. The three plants have a combined output of 394,000 tons of pulp yearly. In addition to paper, and other pulp products, these firms produce about 150,000,000 board feet of lumber yearly, has a distillation plant capable of producing 60,000 gallons of vegetable turpentine and cuts 50 million square feet of veneer.

h. *Forestry Research*

The center of forestry research in New Zealand is the New Zealand Forest Research Institute with a professional staff of 50 scientists.

Research in silviculture includes morphological variations of *Pinus radiata* and other species and the taxonomy of New Zealand flora. Growth studies and research on nutrition and soil fertility are also conducted.

Forest improvement studies include the control of weeds in the nurseries and plantations. Pre-emergent and post emergent sprays in the nurseries are studied using various weed killers. Control of woody species and tree ferns by using arboricides is being tried. Low volatile oil-based ester formulations of 2, 4-D and 2, 4, 5-T with diesel oil as carrier have been found effective in killing several species and are also being tried to kill coppice sprouts and second growths.

Bird repellent dressing have been found to protect seeds in seed beds and seeded areas.

Direct seeding in logged-over areas are also being studied especially in stands, felled during winter where natural seeding is poor.

The silviculture of indigenous species and the reforestation of indigenous forests, the ecology of natural forests and the economics of silvicultural operations are being studied.

The studies on forest tree improvement include provenance tests, tree selection and breeding.

Research is being conducted on volume estimation, growth and yield and growth predictions.

In forest pathology and entomology the greatest achievements is the biological control of *Sirex noctilio* attacking some of the softwood species particularly Pinus radiata. Certain species of Rhyssa and Megarhyssa wasp are used as the control parasite.

Surveys of watersheds are being made on the condition of the vegetation incidence of erosion and the state of all tributary of streams and behavior of stream channels are being noted.

In some areas of New Zealand four nutrient deficiencies have been found: phosphorus, nitrogen, boron and magnesium. About 6,000 hectares of exotic forest have been fertilized from the air with encouraging results.

In the area of forest products studies are being made on the mechanical and physical properties of wood, wood and fibre structure, wood chemistry, wood preservation and seasoning.

The relationship of strength properties to wood density, growth rate and latewood content is being studied with the aim of enabling the forester to regulate timber quality of the forest crop. The chemical composition of wood is being studied to determine the effects of site and cultural conditions and its possible application to pulp production. A dip-diffusion treatment of green wood with boron has been developed. Simple treatment methods have been devised to help farmers in the treatment of wood in the farms.

XIII. OBSERVATIONS AND COMMENTS

a. *The possibility of fast-growing species as plantation crops in the Philippines* — There is a growing interest in the propagation of fast-growing species in the region. The acreage devoted to this project is in-

creasing every year. The feasibility of forest plantations has been demonstrated in New Zealand and Australia. In the Philippines the effort has been limited to trial plantings and up to now the species together with the silvical requirements has not yet been found. *Albizzia falcata* and *Antocephalus cadamba* and a few other species have shown excellent growth and are under observation as possible pulpwood materials. One drawback of most fast-growing broad leaf species is the shortness of bole in comparison to *Pinus radiata* which reaches about 100 feet at 40 years. Hence, the volume per unit area of our species cannot be expected to compare or excel that of *Pinus radiata.* On the other hand both *Albizzia falcata* and *Antocephalus cadamba* mature earlier and the deficiency in volume may be made up by increasing the number of crops or cutting cycles.

Swietenia macrophylla has been growing luxuriantly in the Makiling Forest and in other places in the Philippines. At 40 or 50 years some trees have yielded amazingly high quality lumber with widths up to about 24 inches. Again most of the trees planted here tend to be short-boled.

It will, perhaps, be difficult to beat an all-purpose crop like the Pinus radiata and other conifers in the forest plantation of New Zealand and Australia. Nevertheless, some fast-growing species in the Philippines such as those previously mentioned may become the important plantation species that will supply many of our future needs.

The continuous climb of pulp products requirement is evident all over the world and it is feared that the needs for coniferous pulp wood will outpace the supply especially in Europe.

This same problem will be so in the Philippines and throughout the whole Asia-Pacific Region since we have limited source of long-fibered pulp. Hardwoods alone as a rule cannot supply high quality pulp and will require an admixture of long fibers to produce high grade newsprints.

Pinus insularis and *P. Merkus*ii are the only pine species native to the Philippines. Planting in reforestation project in Cebu has been successful but there is a need for more areas to be planted to pine species. Although *Pinus insularis* has exhibited rapid growth more studies should be done in the introduction of new species to the Philippines. Many softwood species have been tried in other tropical and subtropical areas and information is readily available from other member countries in the Asia-Pacific region.

Teak is fast becoming popular not only in Asia but in Africa and the African Forestry Commission has recommended the inclusion of Africa in the forthcoming Teak Sub-Committee Session in Bangkok sometime in 1967. The Philippines has joined the active member countries of the Teak Sub-Commission in the study. Experience with teak in the Philippines has not been very encouraging due to the usual tendency of the species to produce a branchy stem. An exhaustive provenance study is in order which may change the outlook for this species in the Philippines.

b. *Trends in Silvicultural practices*

Silviculture is receiving plenty of attention and tree breeding studies are in progress in the region. In some countries even the establishment of seed orchards are under consideration if not already in existence. This is an area where the Philippines is quite behind. The Philippines may learn from the experience of Australia, New Zealand, Japan, India and other countries in the region.

The fertilization of forest lands by top dressing (aerial dusting) has proved successful in *Pinus radiata* stands. This is worthwhile trying in the Philippines in area where reforestation has failed due to poor growth. This will call for careful soil analysis to determine nutrient deficiency in the soil. The control of weed species by aerial spray may be a solution to one of our problems in reforestation work. This method is being tried in New Zealand.

c. *The position fo the Philippines in forest products utilization.* — The Philippines is among the heaviest timber producer in the region and dominates the timber export market. At present it is supporting many of the forest products industry of Japan, Korea and Taiwan. Australia to a certain extent also imports timber from this country. With the modern timber extraction methods and efficient transportation system in the Philippines, the lead in the timber trade is assured for the near future. However, Indonesia and Malaya and other countries report increasing timber exports and New Zealand is now exporting pulpwoods.

Almost all countries in the region is aiming for increased forest production to meet an ever increasing need, which according to estimates will more than double in the next ten years. This is an interesting fact in that the role of the Philippines as a supplier of finished forest products could have remained undisputed in this region for a long time because while other countries are short of supply or improving production, the Philippines has the technical experience, logging machinery and adequate timber resources. This country could have benefitted more than by shipping valuable timber out of the country. New Zealand with only 2½ million population cannot absorb its own production yet processes forest products for export and at the same time provide employment to about 33,000 people. India, an importer of raw wood material employs 42,000 people in her pulp product mills and 24,500 workers in her match industry. The number of people employed in the wood-using industry of Taiwan, Korea and Japan, all supported by imported raw materials from the Philippines will be, in all probability, too large to allow an accurate guess.

d. *Wildlife conservation.* — Wildlife in the Philippines has been reported as being decimated. The same situation exists in many countries in the region and it is encouraging to note that this situation is being met with concern. The Philippines should follow the lead of other countries such as Japan, India, and Indonesia in establishing game and nature preserves. A wildlife conservation program should be instituted in the Philippines to save our wildlife from extinction.

e. *Watershed management.*—The importance of watershed management to control floods, erosion, siltation and water conservation is now generally recognized in many Asian countries. Many countries have a program on the management of watersheds and catchment areas. The Philippines has embarked on a project of its own. All forestry agencies should join efforts in soliciting public and government support in this project. This country has only a few rivers suited for hydro-electric projects and these few are valuable to the country. The success of industrialization must have to depend on electricity quite heavily in the absence of other fuel such as oil and coal. The development of our water resources for industry, irrigation and domestic use is of prime importance.

f. *Range management.*—Range management is still at its infancy in the Asia-Pacific Region. The Philippines has a long way to go in this field. The number of livestock per unit area, the quality of fodder in relation to animals per unit area, the quality of fodder and soil nutrients relationship, effect of stocking on soil erosion and so many other things need study. New Zealand and Australia with its rich experience in the livestock and dairy industry are repositories of information that will be valuable to member countries.

g. *Forestry education and research.*— The reports on research in forestry in the Asia-Pacific region is very encouraging. There is a concerted move in this direction and member countries can learn plenty from each other. All that is needed is a system of exchange of information.

The University of the Philippines College of Forestry must develop a strong research program and contribute to forestry knowl-

edge in the region. The College has good facilities and has a concentration of well-trained staff in forestry to undertake such a project.

There is a shortage of technical men in forestry in the Asia-Pacific Region and many forestry schools are being established and others are being improved. The Commission recommends the following:

a. Countries in the region consult with F.A.O. Advisory Committee on Forestry Education before putting up schools.
b. Strengthening of sub-professional forestry training.
c. F.A.O. should investigate the possibility of organizing a training course in Forest and Forest Industry Development Planning.

The commission noted "a continued strengthening of institutions for forestry education and research . . . but only a few countries have implemented the recommendation of the Sixth Session to give greater attention to the training of forest economists, and forest products engineers and technicians."

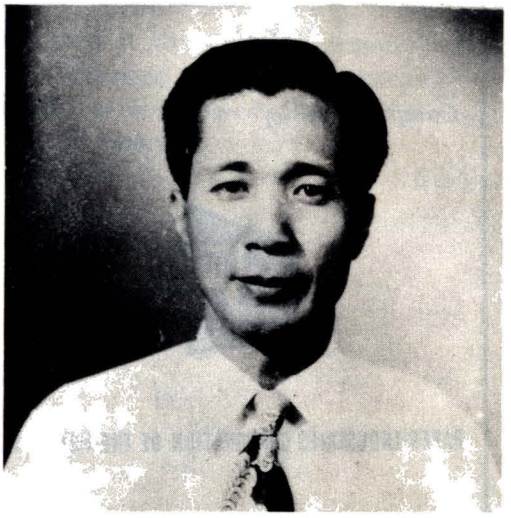
In the light of this revelations on forestry education, it would seem that the current move to improve forestry education in the Philippines is quite timely. The College of Forestry, University of the Philippines, has bfeore 1962 instituted a forest products curriculum in anticipation of the expansion of the forest industry. There is, however, a need for more activities in the area of forest economics especially on research. The institution ot a separate ranger curriculum is a move in the right direction.

The U.P. College of Forestry has developed tremendously in the past years both in facilities and faculty build-up although there are yet plenty of improvement that needs to be done. The College must have to strengthen its undergraduate curricula to meet the needs of existing conditions. It must have to institute a graduate program to meet the needs of Forestry in the Philippines. The Asia-Pacific countries need men and the U.P. College of Forestry can help supply these men. The Philippines has the advantage of geographical location, a climate and vegetation not too different from other countries in Asia, uses English as a medium of instruction and has a way of life familiar to Asian countries and share forestry problems common in the region. This College can very well develop into a center of forestry learning in this part of the world.

h. *Forthcoming forestry conference.* — There will be important conferences in forestry in the near future where the University of the Philippines College of Forestry will benefit by sending representatives: The Pacific Sciences Congress in Tokyo in 1966, the World Forestry Congress in Madrid in 1966 and the proposed meeting of the Sub-Committee on Forestry Education of the FAO. The attendance of conferences of these nature helps the College of Forestry posted on new development in forestry, establish contact with highly trained foresters in various fields, and gain experience in international exchange of technical knowledge. It is necessary at this stage to look for sources of travel funds for the purpose.

"*Diliman! Here We Come*" — Delegation of College of Forestry Faculty and Students who helped in the beautification of the University Campus at Diliman six years ago at its first Arbor Day Planting.

Mr. Gaudencio Mañalac, President of the Philippine Chamber of Wood Industries, addressing the delegates to the Log Producers and Wood Processors Convention in the College of Forestry Auditorium.



Forester N. P. Lansigan, Executive Forester of Soriano y Cia, President of the Society of Filipino Foresters, is the *Editor-in-Chief* of the Bureau of Forestry Diamond Jubilee and College of Forestry Golden Jubilee Memorabilia, which will be off the press in September 1965. He is also a frequent contributor to the *Forestry Leaves*.

A National Forest Policy for Philippines

by

NICOLAS P. LANSIGAN*

The Masbate incident and its lesson. — The incident looked very inconsequential at the start. But it set forth a chain reaction that fairly collapsed the forest protection system that had been abuilding in the Philippines during the last half century.

President Ramon Magsaysay was on an inspection tour, this time in the island-province of Masbate. His tour took him to the provincial jail. Here he saw six prisoners serving terms. The President asked why they were in jail, got the reply that they made kaiñgins in the forest. The President flared up, berated the forest officers who helped secure the conviction of the prisoners.

"Jailing these poor people for making kaiñgin! How else can they live?" he was reported to have said. On the spot he set the prisoners free.

This was in 1956. Since then the job of protecting the forest of the Philippines, never an easy task, became more difficult. The President of the Philippines had spoken; by his act he had set the official attitude. Prosecuting kaiñgineros ran counter to the "land for the landless" policy.

Forest officers were aghast, could not believe that the very Chief Executive whom they looked up to uphold the laws of the land would be the very one to tolerate violation of these laws. The kaiñgineros all over the land rejoiced, grew defiant, literally thumbed their noses at the forest agencies. Before long the forestry officers found it almost impossible to prosecute kaiñgineros.

Even provincial fiscals and judges soon became indifferent to handling forest destruction cases. Local politicians, coddling their rural constituents, made the situation worse. All over the country the restraint on the kaiñgineros fell apart and widespread forest destruction went on the upsurge. Forest reserves, national parks, any public forest became prime targets for kaiñgin-making. The unwritten policy of previous administrations over the years to give utmost protection to the public forests was shattered in one blow by a well-intentioned president.

Firmness of forest policy paramount. — Perhaps in no other natural resource is continuity and firmness of policy more needed than in the case of the forests. A forest is a dynamic, living property, existing through generations of man, with each generation capable of enhancing it or despoiling it. Every generation has a stake in this forest property in terms of its rights to the benefits and services of the forest and such stake must be protected with a firm, continuing policy that would hold from one generation to the next one, the said policy guiding each generation as it takes its turn at custodianship of the forest property.

Otherwise, through the known frailities of human nature and the exigencies that may beset a particular generation, the basic safeguards might be let down and the dissipation of the property may follow. In such an eventuality, this will not only deprive the next generations of their rights to enjoy the forest resources but will also leave them the burden of repairing the damage done.

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The history of the handling of the Philippine forest property has shown a very discouraging trend. Policies, or what pass for policies, are very fluid, often depending on the whims of whoever happened to be in power. A few examples will suffice.

Take the case of the major task of the Bureau of Forestry of classifying lands of the public domain. This is done to determine what lands are better adapted and more valuable for agriculture than for forest purposes. There are criteria for deciding what lands are to be declared alienable and disposable and what lands are required by public interests to be kept under forest. These have never been firm.

For instance, there had been worked out the so-called 42-58 policy on soil cover balance; that is to say, the Bureau of Forestry stood committed to maintaining at least 42% of the total land area of the country in forests and eventually having 58% for agricultural and other uses. Accordingly, the target forest area for each province has been fixed — some less than 42% for provinces relatively level and agricultural, some above 42% for provinces which are relatively rugged or mountainous. This objective has never been put in the form of a solid, stable policy There never has been a consistent effort to adhere to this goal. What is the result? There are now gross and alarming land imbalances in many provinces which will be hard, perhaps now impossible, to correct.

Take the matter of granting licenses for the utilization of timber and other forest products. Here a firm policy is most essential as there is involved not only capital investments but also the factor of a long range management of the forest on sustained yield basis. Among others, until now there is no set policy as to the optimum size of concessions. For one thing, this has resulted into fragmentation of forest holdings into units both uneconomical as a business and difficult to handle for sustained yield management. One set of officials could be for larger-sized areas, the next could undo this. Corollary to this are the very fluid policy on bidding or negotiating for the grant of licenses, the duration of the licenses themselves, the granting of allowable cuts, etcetera. Where there should be some sort of firmness and continuity, there have been disconcertingly frequent changes, oftentimes as often as a new set of officials take over.

Likewise, policies if there are any, on reforestation, special land uses, forest taxes and fees and many others are wanting not only in clarity but also on assurance of continuity. This holds true to policies or lack of policies, on incentives to promote the wood-processing industries.

Urgency of need. — Now more than ever is the need of guarantees that the caprices of political administrations and popular leaders would not lead to the misuse or mishandling of the forest property. There is the ever present danger that an administration in its desire to serve what it thinks may be the best interests of its time may in the few years of its stewardship sacrifice the long run objectives of forestry, or start trends that would be hard to correct — as was the Masbate incident in 1956. A forest policy, if there is one, would serve a bar to this.

It is not to be inferred, however, that a forest policy is a static one. It is not so. Laws, and even constitutions, can be amended. It follows that forest policies can be modified. Since this is so, one may ask, where do the safeguards come in?

What can happen, and what had already happened in older countries well-advanced in handling their forests, is that the logic and benefits of a policy tested by time and marked by acts of forebearance of previous administrations — or generations — have kept those coming after them to abide by the policy, and have even inspired them to improve on their predecessors.

It is unfortunate that many countries in the world over most often come to realize the importance of taking good care of their forests when abuses have already reached alarming proportions. Oftentimes, this realization comes too late or after much harm has been done as to make reparations laborious and expensive. How easier it would have been if people could have the sense to profit from the experience of those of some older countries!

There are profuse object lessons to go by. On one extreme are the countries and civilizations of the past which neglected to look properly after their forest resources — Persia, Babylon, China, Jordan, India, Mexico, Spain — and as a consequence are now paying for their neglect in the form of land resource difficulties and the huge costs reparations. On the other hand, we have the examples of Sweden, France, Germany, Japan, etc. which practiced forestry in time — and as a result their forests are fountainheads of industries and prosperity. Very easily, the younger countries could learn from the experiences of these countries.

Forest conservation in the Philippines is waging an uphill struggle against various pressures. For instances, there is the ever-increasing clamor for agricultural lands. By all means, this legitimate desire of the people should be given the solution that it deserves. But this should be done under a policy that will make available to the landless lands that will be of permanent benefits to them and not any kind of land they fancy on. There are lands which by reason of topography, soil condition and national interests are better suited for purposes other than for settlement and agriculture.

National park areas which by reason of their aesthetic, educational, scenic or historical values must be spared. And so are the protection forests on which we depend to keep the soil on our uplands and hold the water for our irrigation, waterworks and hydro-electric systems. And above all, we have to maintain by all means the irreducible minimum of timberlands which will produce for us the wood we need — and which if we do not watch out, we might even have to import.

A situation, however, has been reached where it has become the thinking that anybody can enter and clear and till any forest lands. The experience has been that after a few crop year, the kaiñgineros have to abandon these lands when soil fertility runs out. Protected by political leaders and guided by shortsighted interests, kaiñgineros have been on the rampage. The result is our more than five million hectares of waste barren lands — an economic blight we are trying to make amends by costly reforestation.

And certainly, the time is fast approaching when there would not be any more agricultural lands to distribute. The national policy must make it certain that we must adhere strictly to an irreducible minimum of forest lands. And after this is reached, statesmanship and foresight must prevail. Not one more square inch of forest lands needs be sacrificed or let out any further. Otherwise disaster will not be too far away.

What a forest policy is. — A forest policy is a declaration of the objectives of a people in the handling of their forest resources and of the means of carrying them out. In much the same way that a proprietor determines how his property is to be handled or to what use it should be put, the people of a country could adopt a policy statement stipulating how their forests are to be managed, how their products and services are to be made use of, and what safeguards are to be taken to protect the forests from neglect or abuse. Thus, some countries have formal national forest policies. These are adopted through legislative processes or through executive decrees. Others have no such formal policies but the national intents are reflected in scattered legislation on forests and forest lands or on allied resources, such as land, mineral, and waters. Some countries have

none of either of these but they have merely followed unwritten practices that have become part of the national thinking and, therefore, have passed for and have been accepted as national policies.

In general, any national forest policy aims at a rational management of the forest resources on the principle of the greatest good to the greatest possible number of the people.

What passes for a Philippine forest policy. — Expressions or indications of the forest policy or policies of the Philippines are not found in a single document. Some are expressed in scattered pieces of legislation, some in judicial decisions and in opinions of the Department of Justice; the greater bulk, however, are still not in the form of laws, but are merely in administrative orders, executive pronouncements, and even in forestry circulars.

For one, the Constitution of the Philippines enunciates the policy of State ownership of timberlands and as to who are entitled to participate in their use. The pertinent portion of the Constitution reads as follows:

"ARTICLE XIII. — CONSERVATION AND UTILIZATION OF NATURAL RESOURCES

"Sec. 1. All agricultural, timber, and mineral lands of the public domain, waters, minerals, coal, petroleum, and other mineral oils, all forces of potential energy, and other natural resources of the Philippines belong to the State, and their disposition, exploitation, development, or utilization shall be limited to citizens of the Philippines, or to corporations or associations at least sixty per centum of the capital of which is owned by such citizens, subject to any existing right, grant, lease or concession at the time of the inauguration of the Government established under this Constitution. Natural resources, with the exception of public agricultural land, shall not be alienated, and no license, concession, or lease for the exploitation, development, or utilization of any of the natural resources shall be granted for a period exceeding twenty-five years, renewable for another twenty-five years, except as to water rights for irrigation, water supply, fisheries, or industrial uses other than the development of water supply, in which cases beneficial use may be the measure and the limit of the grant."

The Constitution, as is expected of constitutions, provides only the basic concept but does not cover policy details.

Another source of policy expression is the Revised Administrative Code (Act 2711) which lifts almost verbatim some provisions in the Forest Act of 1904. Two sections of this Code, among others, are cited hereunder:

"Section 1824. *Principle governing administration of forests.* — The public forest of the (Philippine Islands) Philippines shall be held and administered for the protection of the public interest, the utility and safety of the forests, and the perpetuation thereof in productive condition by wise use; and it is the purpose of this chapter to provide for the same."

"Section 1825. — *Extent of public rights in forests and forest products.* — No prescriptive right to the use, possession, or enjoyment of any forest products, but any permanent concession, continuing right, privilege or easement of any kind whatever upon or within the public forests and respecting the products thereof, shall accrue or be granted otherwise than in conformity with the provisions of this law, and except as especially provided, all such forests shall be and remain open to the people of the (Philippine Islands) Philippines for all lawful purposes."

More recently also, another policy milestone came about with the amendment of Section 1826 of the Code. It used to be quite easy to slice off portions of forest reserves. When pressed hard enough, the President of the Philippines, upon recommendation of the Director of Forestry and the Secretary of the Department, could reduce the area or even disestablish a forest reserve. Through an amending legislation passed in 1961, R.A. 3092 set the policy that

once a forest reserve is established, even the President, by himself, cannot reduce or disestablish the area: He would need the concurrence of Congress to do so. Section 1826 as amended now reads as follows:

> "Sec. 1826. *Regulation setting apart forest reserves, — permanency of same* — Upon the recommendation of the Director of Forestry, with the approval of the Department Head, the President of the Philippines shall set apart forest reserves which shall include denuded forest lands from the public lands and he shall by proclamation declare the establishment of such forest reserves and the boundaries thereof, and thereafter, such forest reserves shall not be entered, or otherwise disposed of, but shall remain indefinitely as such for forest uses.
>
> The President of the Philippines may, in like manner upon the recommendation of the Director of Forestry, with the approval of the Department Head, by proclamation modify the boundaries of any such forest reserve to conform with subsequent precise survey but not to exclude any portion thereof except with the concurrence of Congress."

Among other laws which, directly or by implication, express policies are R.A. 115 which commits the Government to the forestation and afforestation of watersheds, cogon and open lands; Act 3915 which establishes the system of national parks and the preservation of aesthetic and recreational areas; Act 2590 which provides for the setting aside of game refuges and bird sanctuaries; Section 1839 of Act 2711 establishing communal forests where residents of municipalities may gather timber free of charge.

Unstable policies. — While these laws, and others not here mentioned contain or indicate policies, they are not conveniently put together for easy guidance of all concerned. But a far serious observation is that there are expressions of policies found in less stable documents. Take the case of forestry administrative orders. Often these contain policy expressions. For instance, FAO 11-10, S-56, gives guiding principles in the disposition of forest areas for timber concession; FAO 11-11, S-56, fixes the maximum area that may be allowed under ordinary timber license without benefit of public bidding; FAO 23, S-54, initiates logging under sustained yield; FAO 11-13, S-58, presumably in pursuit of the industrialization program of the government established a policy of granting license agreements through negotiations.

Even some forestry circulars could contain policy statements. A close examination of these orders and circulars would show that often they are more than procedural regulations. What is being pointed out here is of course not the technicality of finding the policies in such orders and circulars, but rather the lack of stability in these forms of documents. Forestry administrative orders are issued by the Department Head upon recommendation of a director of forestry. Thus, a change in either secretaryship or directorship can bring about a change in policy. And frequently, this has happened. But obviously less firm are the forestry circulars. Issued only on the responsibility of a forestry director, such circulars can change as often as there are changes in directors.

Basic aims of a Philippine forest policy. — For the Philippines, as in fact for any country for that matter, the primary aims of a forest policy would be the following: [1]

1) Ensuring an adequate area of land under forests to protect the climate and the soil and water resources;

2) Satisfying as far as possible the national wood requirements of the people, their industries and internal and foreign trade;

3) Providing for the best utilization of all lands in the general interest of the country; and

4) Removing all obstacles which stand in the way of a sustained yield management of the forest.

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[1] Francois, T.: Forest Policy, Law and Regulations, (1950) FAO Forestry and Forest Products Studies.

To achieve these goals, the Food and Agriculture Organization (FAO) has furnished newly developing countries the following seven principles as a guide in the formulation and implementation of a forest policy:

1) Each country should determine and set aside areas to be dedicated to forest, whether at present forested or not. This should be done progressively, if necessary, but always in accord with the economic and social policy of the country, taking into account the close interdependence of all forms of land use.

2) Each country should apply the best practicable techniques in seeking to derive in perpetuity, for the greatest number of its people, the maximum benefits available from the protective, productive and accessory values of its forests. This implies that —

(a) protection should be afforded against damage or destruction by man, or by such causes as fire, insects and tree disease;

(b) production should be organized, in quantity and quality, with a view to obtaining at least a sustained yield as soon as practicable, giving consideration first to any protective role assigned to the forest and then to any other interests, whether worldwide, regional, national or local that the forest should serve. The country concerned must itself adjudge priorities, taking into account that a forest may be called upon to render multiple service, including offering recreational values, protection for wild life and a source of supply of many kinds of produce;

(c) economic and rational methods of forest exploitation and of conversion and utilization of forest products should be encouraged, so that the volume and variety of commodities obtained from the raw material furnished by the forest shall be increased to the maximum extent possible.

3) Adequate knowledge of all aspects of forest rseources, forestry and the consumption and utilization of forest products, is indispensable. This includes, in varying degrees at the different stages of development of forest policy, a knowiedge of the resources available on forested lands; of the national needs for forest products; of the natural laws that apply to forests; and of the techniques employed in the production of forest crops and the utilization of their products. To this end research should be organized and expanded to keep pace with all developments in the field concerned, and the application of the results obtained should be consistently encouraged.

4) Public consciousness of forest values should be developed by all means possible.

5) Forest law to give effect to the forest policy should be enacted in consonance with the judicial forms and customs of the country. Such legislation should be developed in keeping with the economic and social progress of the country and should in fact anticipate such progress.

6) A Forest Service should be established and staffed by suitably quilified personnel in all its grades to develop and implement forestry policy in collaboration with any suitable organizations which may exist, and to administer the forest law. Such a service should be formed on a permanent basis; it should be endowed with adequate authority and financial support, and should work in close association wth other governmental agencies concerned. There should be an effective organization to deal with forest research, its coordination, and the dissemination of results.

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Forestry in the German Democratic Republic

by

HENRY BUGGEL, THARANDT

1. *History*

In Germany the endeavours to manage certain forest areas dates back to the twelfth century. The largest part of the German forest areas, however, was treated without any care until far into the 17th century. Since the commencement of capitalism timber requirements have increased rapidly. Devastation of forest on large areas was the rule, as wood utilization was performed in an inadequate manner by insufficiently trained forestry people. At the beginning of the thirteenth century the wood famine reached its climax in Germany, above all in the then already industrialized parts of the country, e. g. in Saxony (mining, glass manufacture, iron manufacture). In the second half of the eighteenth century various attempts to reorganize forestry proved a failure. Heinrich Cotta deserves the greatest credit for having initiated the successful reorganization of forestry. He recognized that it was impossible to establish a sustained-yield efficient forestry without a personnel, well trained in practice and science. Therefore, he founded a school of forestry in 1786 in Zillbach, which was transferred to Tharandt in 1811 and raised to the rank of a Royal Academy in 1816. The Forestry College was combined with the Dresden Polytechnical University. Thus, Cotta laid the foundation of the oldest forest training and research institution in the world. — In the following decades Tharandt was helped very much to bring about an efficient forestry as well as a highly developed forest research and training. Among former teachers at Tharandt the following deserve special mention: Cotta, Reum, Pressler, Judeich, RoBmaBler, Judeich, Martin, Stockardt, Nobbe, Escherich, Huber, Vater, Hugershoff, Krauss, Prell, Heske, Wienhaus, Heger, Kienitz, Blanckmeister and many others, who had and are still having great influence on forest practice and science. The good reputation which the German forestry enjoys in the whole world can be attributed to them.

2. *Area and Population*

The total area of the German Democratic Republic is 10.8 million hectares. Of this area 6.4 mill. hectares are agricultural areas (60.1 per cent) and 2.9 mill. hectares are forests (27.4 per cent). The ratio of forest to total area amounts to 27.4 per cent and is somewhat the average of Europe (28.3 per cent). The forest area per capita (1960: 17,200.00) is 0.17 hectare and lies far below the European average which is 0.25.

3. *Distribution of Principal species*

In the German Democratic Republic conifers exceed (79 per cent of forest land) in comparison to the broadleaf forests (21 per cent). The ratio of forest to total area and he distribution of trees species in the various of the GDR is extremely different. In the northern parts of the republic (low country) broadleaf and pine forests predominate. In the south of the republic mountains of medium height (Harz Mountains, Thuringian Forest and Saxonian Erzgebirge) predominate. In these regions spruce is dominant. In the GDR the unproductive forest area is 2.2 per cent.

4. *Property Relations*

4.1 *Forest Ownerships*

Prior to 1945, the property conditions were very different. After World War II, when the agrarian reforms were accomplished, the private forests over 100 hectares were transferred to national ownership. Until 1948 a forest area of about 760,000 hectares which formerly belonged to big landowners and war criminals was confiscated. In 1963 the situation was as follows:

National forest	1.89 million hectares	64.1 per cent
cooperative forest	0.53 " "	17.9 " "
private forest	0.49 " "	16.4 " "
church forest	0.03 " "	1.0 " "
foreign property	0.01 " "	0.4 " "
	2.95 million hectares	100.0 per cent

The proportion of the cooperative forest is steadily increasing.

4.2 *Size of the enterprises*

The nationally owned forests are managed by 96 State Forest Enterprises. The productive area of the various SFE is very different, it varies in the mountains with medium altitudes from 10,000 to 20,000 hectares and in the low country from 20,000 to 60,000 hectares. Management in the cooperative forest is performed by 9,000 Agricultural Cooperatives and management in private forests by 80,600 ownerships.

5. *Silvicultural Systems*

While in the seventeenth century mixed broad leaf forests still prevailed, the forests suffered a tremendous change through the influence of the capitalistic doctrine of soil rent in the 19th and 20th century. This development did not remain without influence on the silvicultural systems. In 1800 in Germany the portion of the coppice forest (coppice shoot) with hornbeam, oak, alder, maple with rotations from 5 to 25 years was still 30 p.c.; coppice with standards 10 per cent. At present, in the DGR pure, one-storey high forest stands (spruce, pine with rotations from 80 to 120 years) predominate. Conversion of the single crop stands to multi-storey, highly productive mixed stands on suitable sites is one of the most important problems.

6. *Growing stock and Age Class Proportion*

The present growing stock conditions give a clear picture of the excessive fellings which began in 1936 due to the war preparations and were continued after 1945 for the purpose of recofering and rebuilding the economy of our country. During this time the excessive fellings varied between 50 and 400 per cent above normal. Today fellings are lower than total increment.

The following table 1 shows the growing stock relations, divided into tree species and ownership categories (situation in 1961):

tree species	total forest land		nationally owned forest		other forest	
	wood-land in p.c.	solid volume per hectare	wood-land in p.c.	wood supply m3 per hectare	wood-land in p.c.	wood m3 per hectare
spruce, fire	22	134.7	25.5	135.7	16	132.4
Douglas fir						
pine, larch	57.5	94.5	53	93.1	65	96.2
oak	5	147.2	5.5	153.7	4	135.6
hard broad leaved	10	180.7	11	184.0	9	173.7
soft broad leaved	5.5	75.4	5	82.5	6	66.7
	100.0	113.6	100.0	117.0	100.0	108.3

The excessive fellings have a detrimental influence on the age class composition. The originally high proportion of woodland from 1 to 20 years shows this clearly (table 2):

Table 2: *Age Class Composition of state forest in 1954*

Age Classes	Composition on Basis of Area
over 80 years	23 per cent
61 — 80 "	15 " "
41 — 60 "	16 " "
21 — 60 "	16 " "
0 — 20 "	30 " "

After 1954 the proportion of stands over 80 years has further decreased on the other hand the proportion of stands under 40 years have increased. The high proportion of medium-aged stands with high increment as well as lowering of the cut-figures according to plan made it possible that since 1960 the current annual total increment is higher than the annual cut figures so that the desired increase of increment could be realized in order to stabilize stock conditions little by little. The present current annual increment on the total area of the GDR at an increment per cent of 3.5 is given with approximately 9 to 10 million cubic meter.

7. *Felling Volume and Timber Import*

World War II brought the heaviest devastations to all sectors of economy of the GDR. Wood was the only building material and fuel being at disposal in sufficient quantities at that time. Consequently, the forest had to make great sacrifice. Constructional timber, fuel, pitwood, and pulpwood were needed in large quantities in order to normalize economy in all fields and to supply the population with most needed products. Cut figures in the years 1946-1960 can be seen from table 3:

Table 3: *Cut figures for Total Forest Area in 1946-1960*

years	wood under 7cm top	firewood over 7cm top	total of wood over 7cm top	M3 of wood over 7cm top per hectare woodland	wood under 7cm top
	in million		m3	without bark	
1946	13.2	6.1	19.3	7.2	)
1947	12.0	10.0	22.0	8.2	)
1948	12.9	6.2	18.1	6.7	) 1)
1949	10.5	4.4	14.9	5.5	)
1950	10.2	3.7	13.9	5.1	0.8
1951	11.1	3.1	14.2	5.3	1.1
1952	9.2	2.6	11.8	4.4	0.9
1953	9.7	2.7	12.4	4.6	1.1
1954	9.3	3.3	11.6	4.3	0.9
1955	8.8	1.8	10.6	3.9	0.5
1956	8.1	1.4	9.5	3.5	0.7
1957	7.9	1.3	9.2	3.4	0.7
1958	7.9	1.0	8.9	3.3	0.6
1959	7.3	0.9	8.2	3.0	0.7
1960	7.6	0.8	8.4	3.1	0.6

1) Not known.

The proportion of fuelwood in total cut of wood over 7cm top decreased from 40 per cent in 1947 to 9.8 in 1960.

It is at once evident that the forests of the GDR are not capable of supplying all the timber needed now, timber import decreased 39,000 cubic meters without bark in 1950 to 2,100 cubic meters without bark in 1960. There is great interest, too, in fine wood from tropical countries.

8. *Wood Working and Processing Products*

The use of wood in 1913 compared to 1955 is as follows:

	1955	1913 (German Empire)
Construct. timber	14 p.c.	30 p.c.
sleepers	3 "	1 "
poles	1 "	1 "
mine timbers	7 "	10 "
pulpwood	24 "	9 "
Furniture	11 "	3 "
packing material	7 "	8 "
other kinds of wood proc.	21 "	1 "
fuelwood	12 "	37 "
total	100 p.c.	100 p.c.

When comparing the quantitative production of the most important wood products using the following table it can be seen that is a trend towards decreasing the processing of sawn timber in favour of slab production and chemical decomposition of wood.

Table 4: *Production of Selective Products of Wood Working and Processing in* 1936 *(territory of GDR),* 1950, 1955 *and* 1960

	unit	1936	1950	1955	1960
sawn timber	1000m	3461	3510	2864	2483
sleepers	"	—	424	406	492
plywood and plywood sheets	"	—	10	20	24
hardboards	"	—	11	19	17
insulation boarding and hardboards	1000m2	—	—	2415	5085
wood pulp	100t	466	178	220	245
sulphite pulp	"	162	192	252	283
sulphate pulp	"	4	30	43	38
paper	"	812	321	422	542
paperboard	"	330	171	229	268

9. *Forest Minor Products*

Besides the endeavours undertaken to reduce our figures to the level of the current increment and to improve the raw timber grading since 1956 attention was more and more paid to forest minor products. Of the classical minor produce only the winning of tan bark and resin is of great importance to national economy. As can be seen from table 5, the winning of tan bark is steadily being offset by the increasing chemical winning of tanning substances.

Table 5: *Winning of Tan Bark and Resin in* 1958-1960 *in comparison with* 1947 *and* 1950

years	oak tan bark	spruce tan bark	total bark	pine raw balsam	spruce scrape resin	total resin
			in tons			
1947	567	29630	30197	422	360	782
1947	468	24150	24618	3388	758	4146
1950	762	25211	25973	12820	368	13187
1959	345	23663	24008	13684	557	14241
1960	319	15601	15920	14865	555	15420

The classical minor produce as winning forest litter and forest pasturage are restricted to a large degree by legal regulations. On the other hand, the utilization of berries, medicinal herbs, graminaceae for industrial purposes is being encouraged. In 1956 the government undertook measures for extending and increasing the forest minor produce. For

examples, processing of thin sorts of wood (wood under 7cm at the thick end) on stationary yards, fish breeding, establishment of osier plantations, fattening of poultry, harvesting of fur-bearing animals, winning of stones and sand have been organized in the State Forest Enterprises by experienced forestry people. These reserves of forestry production brought high yields. In order to utilize all reserves of forest production plans for the utilization of waste wood were adopted. Thus, in 1956 a total of 200,000 m3 waste wood until 1960 already 600,000 m3 could be processed (= 45 p.c. of the total)

10. *Forest Gross Production*

The GDR is a highly industrialized country. The portion of agriculture and forestry, especially of forestry, in the national income is low. Though the forestry shares only 0.5 per cent in the gross production of the entire national economy, the land improvement tasks and performances of the forest (wind protection, protection against deterioration of soil and erosion, sanitary significance, recreation of people, influence on water balance, etc.) as well as the supply of raw timber should not be overlooked in our climatic zone. Unfortunately, it is impossible to define these matters economically by figures. As can be seen from table 6, since 1955 the gross production of forestry has increased tremendously. Besides improved timber conversion and a rise in prices for raw wood in 1956 this may be attributed to intensive forest minor production.

Table 6: *Gross Production of Forestry during the period* 1955-1960 *as a whole and in the nationally owned sector.*

	total		nationally owned sector
year	in million German Mark	year	in million German Mark
1955	440	1955	235
1956	600	1956	385
1957	547	1957	903
1958	565	1958	921
1959	599	1959	462
1960	635	1960	495

11. *Regeneration and Afforestation*

Already during World War II restocking did not keep pace with the rate of cutting. With the beginning of the economic development plans in 1948 measures were taken to restock enormous cleared areas with the help of the population. Between 1950 and 1958 about 700,000 hectares were regenerated and restocked. In nationally owned forests this work was accomplished by 1956, in private and cooperative forests this aim was attained only in the recent time. These measures served to restock the denuded areas with tree species suitable to the site and in addition to this the most important tree species spruce, pine, and beech. Furthermore, these measures served to mix them in hursts and groups for the purpose of reducing damage caused by storm and insects. Special attention was paid to the cultivation of quick growing tree species (poplars) in agricultural districts. Five million poplars have been planted outside the forests by the population on the basis of voluntary work. In a country with highly developed industry and agriculture like the GDR a considerable extension of the forest area cannot be awaited. More likely is a tendency towards diminution of forest area. Quicker growth of the individual tree species through

change of the natural conditions is out of question, too. It is, however, possible to raise the yields by intensifying and rationizing the forest measures as well as by better tending, fertilization, and meioration. For instance, between 1953 and 1958 an area of 72,700 hectares that makes 2.5 per cent of the total forest area was fertilized and in 1958 tending operations were performed on an area of 180,000 hectares that makes 6.1 per cent of the total area.

12. *Forest Organization*

In 1952 the forest organization of the GDR was subject to a fundamental change. The then existing administrative units, the so-called forest districts, with areas ranging from 2,000 to 4,000 hectares and working on the basis of a budget, were abolished. In their place legally independent State Forest Enterprises were established with an area of 10,000 till 25,000 hectares in the low country. The functional organs ensure the recourse of all work done or to be done. Premiums are paid to the workers and employees of the enterprise. Indicators for the premiums are: yearly fulfilment of estimates and production plan with close observance of the prescribed quality. Allocations out of the return of the enterprise for various funds (e.g. culture, sports, holidays, entertainment funds) also depend upon the aforementioned indicators.

The administrative unit of a State Forest Enterprise is divided into the managing staff, production section, commercial section, planning and statistics section, staff and training section.

Table 7: *Structure of the State Forest Demonstration Enterprise at Tharandt*

Managing Staff

Administration		*Vocational School*
Production Section Subsections: utilization sylviculture planning and statistics transport technology labour economics *Commercial section* *subsections:* marketing purchase and sale and material supply real estates and mensuration accounts *Bookkeeping section* *subsections:* chief of bookkeeping wages and costs finances machine accounting invoice-clerks Personnel and training section	*Outdoor Work* 5 head foresters 31 foresters 5 yard supervisors 1 nursery superv. 7 foresters for cooperative and private forests 1 workshop superv. 1 chief assistant *Cooperation with the Faculty of Forestry at Tharandt* (Scientific care of the managing staff and forest districts by the special institutes. Care of the experimental plots)	(forming part of the enterprise) 4 teachers (theoretical training) 7 trainers (practical work) 100 apprentices (2-year-training)

The ranges of responsibility of a State Forest Enterprise comprise all activities from work in the forests to the purchase and sale of timber and include also timber transport from place of felling to the works, in which timber is processed. Each worker has the right to express his own opinion on matters concerning operational tasks and other problems through the Trade Union Organization.

The forest area of the GDR is divided into 96 State Forest Enterprises. All wood plants within and outside the forests are subject to management. Not a single tree is allowed to be cut without permission of the competent forester. The SFE is the sole purchaser and seller. The cooperative and private forests are administered by foresters of the State Forest Enterprises (SFE). Management of forests is performed by the forest owners within the bounds of legal regulations.
Twenty to twenty-five SFE are under the administration of a Forest District Enterprises. The central forest authority in Berlin is put under the control of the Agricultural Council of the GDR. The central forest authority consists of the sectors economics, product, planning and statistics, staff and training. Special schools and the Potsdam Institute for Forest Management and Site Reconnaissance with five branch-offices and a calculation centre are subordinate to the central authority. In the GDR forest management in the State Forest Enterprises is preceded by a reconnaissance and mapping technique for the purpose of determining the tree species that are most productive and economical with relation to the site.

13. *Labour and wages*

Substance and form of labour have changed very much in the SFE in comparison with former times. All details of operational and long-term plans are discussed on Trade Union meetings with the entire personnel and measures are taken which ensure fulfilment of state plans in due time. In the agreement concluded between the Trade Union's council of forest enterprise and the managing director every year all rights and duties of the managing staff, employees, and production worker, the main tasks of the enterprise and measures for their solution, principles of wages and salary, measures for labour protection, bonus rules and social as well as cultural activities and engagements of the enterprise in relation to workers and employees are laid down. In all branches of forest activities workers are paid according to the work performed. Most of the forest operations are fully mechanized. In general, the attitude of the forest personnel towards work is exemplary. The work teams contend for the State Title "Team of Socialist Work". During the past year the technical and economical innovator and inventor movement has made good progress. The workers participate materially in the success of the enterprise and for this reason they are very much interested in the results of their enterprises. The cooperation between faculty and SFE is very good. In 1962 the number of persons occupied in forestry amount to 50,000 of whom 43,000 were engaged in the production. The average monthly income is 530 marks.

In 1956 the proportion of individual kinds of production in nationally owned forests in relation to total working hours was as follows:

raw timber and winning of bark	31 p.c.
reforestation, tending of forests	33 p.c.
transport	12 p.c.
resin tapping	6 p.c.
grading on yard	6 p.c.
minor produce	3 p.c.
miscellaneous	9 p.c.
	100 p.c.

14. *Forest legislation*

In Germany legal regulation of forest, wood, and hunting affairs began very early. The first forest ordinances appeared 8 centuries age. This applies, above all, to state and communal forests. The forest devasta-

Table 8: *Killing of game* 1957 *until* 1960 *and game figures of* 1960

game	killing of game 1957	1958	1959	1960	games figures 1960
red-deer	2851	5843	8025	7615	12374
among them stags	1193	2599	2908	2769	
fallow-deer	482	1137	1662	1726	3485
among them stags with shovel antlers	192	538	606	538	
roe-deer	25255	81494	137407	146803	140497
among them bucks	12791	33820	45047	58225	
black game	14587	21235	28351	27204	18921
hares	234708	271072	376336	379635	377799
rabbits	9167	8868	20911	22179	?
wild ducks/geese	21478	20356	32098	19614	?
foxes	11962	13664	29437	37960	?
dadgers	927	815	1310	1426	?
martens	599	844	2655	6205	?

tion Law of 1926 applies to all forest owners. It provides that an area which has been cut over in contravention of law and has not been reforested within two years according to correct forestry principles, will be reforested by the state, at the proprietor's expense. Management of forest as well as rights, duties, and tasks of the state forest enterprises are regulated by law in 1952, 1956 and 1958. The same applies to the administration of private and cooperatives forests by the SFE.

15. *Hunting*

In the GDR hunting is organized by the Hunting society. Hunting is allowed to be exercised individually or collectively. Each citizen has the right to become member of the hunting society, if he passes the hunting examination. The most significant kinds of game and the results of game killing in 1957-1960 can be taken from table 8.

16. *Training and qualification*

The educational standard required for the admission to a forest school or forest academy is the certificate of skilled forest worker. The examination for skilled forest workers is passed at vocational schools forming of an enterprise. Length of course for leavers of secondary schools: 1 year. Length of course for leavers of other schools: 2 years. Continued professional training of skilled forest workers with the object of acquainting them with the tasks supervisors of nurseries, timber yards, and workshop as well as team leaders, power saw operators, cone pluckers, teachers for the training of apprentices is performed at special schools in courses lasting several weeks.

Training of medium technical staff (district foresters) is arranged at four special schools in the Republic. The two-year training terminates with the State Examination as forest engineer. Working in the capacity of managing director, high-forester, technologist, planners, production manager, silviculturist, economist for labour problems in operational affairs, and director or chief of department in superordinate places requires a 9-semester study at the Faculty of Forestry of the Dresden Polytechnical University. The degree conferred after 4½ years is certified Diplom-Forestingenieur. In regular intervals these come back to the faculty and in special courses they hear the last word of science in their special branch.

The yearly forest-show at the agricultural exhibition of the GDR in Leipzig-Markkleeberg serves as innovation centre of the exhibition and further serves to propagate the scientifical and technical progress made in forestry. The entire system of training and continued professional training in the GDR is manifold and rests on a very liberal basis, but is well organized and, in effect, gratuitous. Ninety-eight percent of the students at the faculty of forestry receive a monthly scholarship (130-180 marks basic scholarship and 40-80 marks in compliance with results of learning).

Since 1945 a total of 1,200 students has been trained at the Tharandt Faculty of Forestry. The proportion of female students is about 5 percent and, thus, still very low. Owing to the generous support given to training and science the number of scientists of the Faculty of Forestry at Tharandt has risen to 108, 14 of whom are professors, 6 university lecturers, 41 scientific workers, 47 assistants, and 156 female technical assistants. At the faculty 12 institutes and 5 departments are engaged in research and training work: The Institutes of Forest Economics, Silviculture, Forest Organization, Forest Engineering, Forest Utilization, Mechanical Technology and Saw Milling, Forest Botany, Forest Zoology, Forest Yield, Plant Chemistry and Wood Research, Soil Science and Forest Ecology, Geodesy, Mathematics, Meteorology and Climatalogy, further the Department of Forest Protection, Fume Damage, Social Science, Extra-Mural Studies, and Continued Professional Training. To attain a high quality in training and research, sufficient funds are available every year. Annually, the faculty receives about 1 million marks from the budget for wages and salaries, 25,000 marks fees for extraordinary lectures, lectures held by guests, etc. and approximately 150,000 marks for purchase of implements, books, materials, etc. — For students and scientists of the faculty room, equipment, library (50,000 volumes, part of them polyglat books, journals, and periodicals) as well as of the botanical garden (2,000 tree species) is gratuitous. Since 1945-, 106 scientists have taken doctor's degree and 11 persons qualified for a lectureship at the faculty.

The Faculty of Forestry at Tharandt is engaged not only in training and educating young forest academicians, but also in intensive research. On the country, the forest institutes of the German Academy of Agricultural Sciences in Eberswalde and Graupa deal only with research work. About 100 scientists and 250 employees work in the institute of the Academy. At the Tharandt Faculty special attention is paid to forest research work. At present 56 research subjects are being treated. Annually, 450,000 marks from the State Research Fund are available.

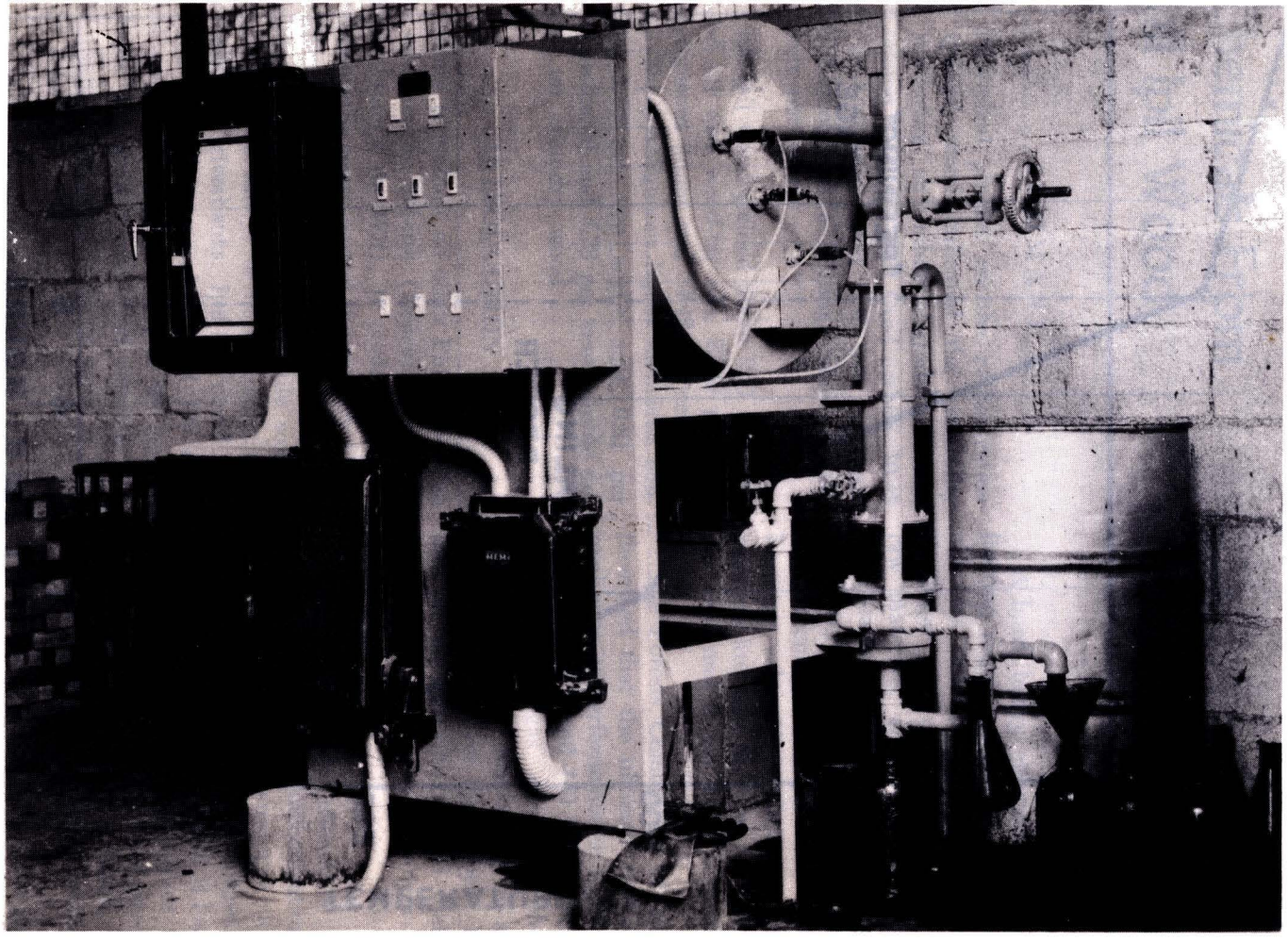

FIGURE 1.

The wood distillation retort showing the automatic temperature recorder-controller, the coaling chamber fitted with three thermocouples and the condensing unit.

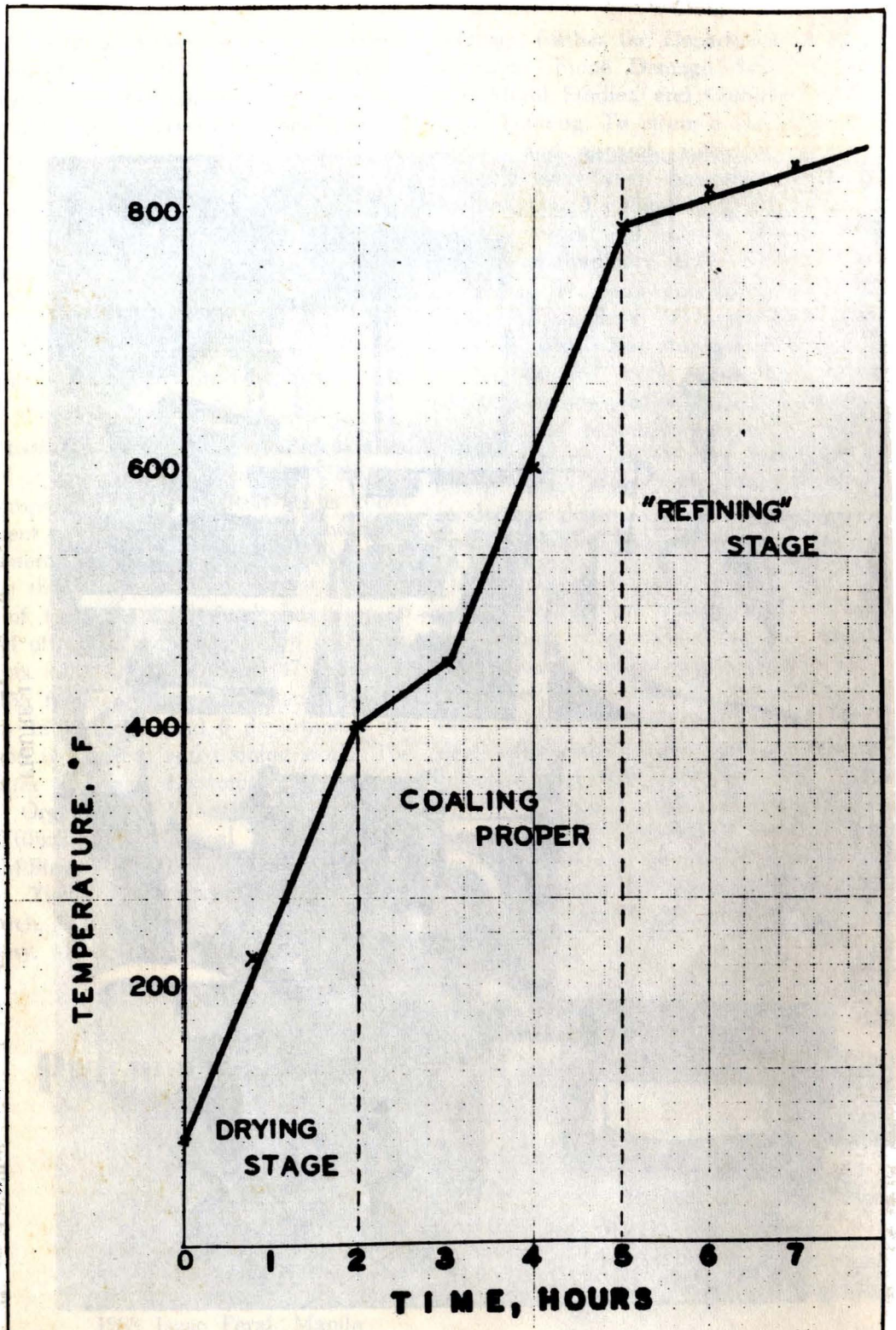

FIG. 2. THE CARBONIZATION PROCESS

Industrial Charcoal and Chemicals From Ipil Ipil Wood

by

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& N. B. LAXAMANA[1]

SUMMARY

Pilot-plant studies on the carbonization of ipil-ipil wood indicated the possibility of producing an industrial-grade charcoal containing 87.23 per cent fixed carbon, 10.45 per cent volatiles, and 2.32 per cent ash. The charcoal has a heating value of 7470 calories per gram.

Ipil-ipil wood yielded about 9.21 per cent wood tar and wood-tar oils, 25.46 per cent pyroligneous liquor and 34.42 per cent charcoal. The pyroligneous liquor recovered contained 1.76 per cent acetic acid, 0.81 per cent methanol and 3.73 per cent soluble tar, based on oven-dry wood.

INTRODUCTION

There is perhaps no other Philippine tree as common as ipil-ipil (*Leucaena leucocephala* (Lam.) de Wit). It could be found in practically every part of the country (10)[2]. It grows sturdily and abundantly in any condition, whether it be in the fertile soils of the farms and valleys or in the rocky cliffs of hills and riverbanks. Ipil-ipil could well be the Philippine wonder wood for charcoal production because despite its comparatively fast growth and short rotation age, the charcoal produced from its wood is hard and heavy.

A hard, heavy charcoal which meets the limiting requirements for volatiles is applicable for industrial purposes. According to Beglinger (2), unlike most other industrial raw materials, charcoal is seldom sold on specifications. The usual market guarantees relate only to the weight per bushel and to the percentage of contained volatile matter. Limiting values for volatile matter and for moisture are that they be not more than 14 per cent and 2 per cent, respectively (2).

The Forests Commission of Victoria (5) theorized that the ultimate test of charcoal quality is its performance in a gas producer. W. Atkinson Wood (5) showed that a suitable producer-gas charcoal when burnt, should not cause blackening of a tin plate placed directly over the embers. Laboratory tests at the Institute showed that this corresponds to charcoal containing volatiles less than 20 per cent.

The volatiles are chemicals which are formed during the carbonization process. They escape from the burning wood as smoke. When ipil-ipil wood is carbonized, about 60 per cent of its original weight is lost as smoke (1). However, when the vapors are passed through a condenser, a liquid product called *pyroligneous liquor* and a black, waxy residue called *settled tar* are recovered.

The chief components of the pyroligneous liquor are acetic acid, methanol and soluble tar (11). The commercial recovery of these chemicals have largely augmented the wood

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[2] Numbers in parentheses refer to Literature Cited.

distillation industry of the United States and Germany during World War II (7, 11). Acetic acid is presently, one of the chief chemical imports of the Philippines (3).

The settled tar contains wood-tar oils (4). It is not definitely known how wood tar and wood-tar oils are used in Philippine industry but they are imported into the country in large quantities. In 1962, 1,047 tons worth ₱238,000.00 were imported. Until lately, there is an apparent increasing price trend of this product. In June 1963, 163 tons worth ₱53,-000.00 were imported, and in July 1963, only 33 tons came into the country but at a total cost of ₱87,000.00 (3).

The operation of some Philippine industries depends on wood-carbonization products. Certain metallurgical, chemical and home industries need industrial-grade charcoal as fuel and raw material (Table 1). The manufactures of plastics, textiles, paints, rubber and pharmaceutical products need acetic acid, methanol and probably wood tar and wood-tar oils.

This study is therefore aimed to develop a process of producing an industrial-grade charcoal from ipil-ipil wood. Experiments were conducted to evaluate the smoke chemicals in terms of its acetic acid, methanol, wood tar and wood-tar oil contents.

EXPERIMENTAL

Raw Material

Matured ipil-ipil trees obtained from the Mt. Makiling area, Los Baños, Laguna were used in the study.

Round woods were split and cut to uniform sizes, about 2 in. x 2 in. x 12 in. and air-dried. The average moisture content of the wood charge in every run was determined.

The wood samples, analyzed according to the methods suggested by the Technical Association of the Pulp and Paper Industry (12), showed the following chemical compositions: [3]

(a) Ash	2.25%
(b) Alcohol-benzene extract	5.09%
(c) Hot-water extract (w/o prior leaching)	11.60%
(d) Hot-water extract (leached)	6.95%
(e) Lignin (corrected for ash)	23.90%
(f) Solubility in 1% NaOH	16.35%
(g) Pentosan	15.24%
(h) Holocellulose (by difference)	62.17%

Carbonization

The carbonization runs were made in a stainless steel, electrically-heated retort, equipped with a water-cooled condenser (Fig. 1). At tight-fitting steel cover was used to seal the wood charge completely in the coaling chamber.

The retort was fitted with a temperature-recorder controller. In all runs, this was set at 900 deg. F to allow carbonization to proceed as fast as possible. Three thermocouples extending into the coaling chamber were fitted at strategic positions, so that the temperature in every part of the chamber may be determined (Fig. 2).

Heating was terminated when no more smoke came out of the flue. At the completion of a run, cooling water was allowed to continue flowing through the condenser for another half hour before the control valves for hot gases and water were closed.

The weight of the condensate was determined 15 hours after heating was stopped. The settled tar was separated from the pyroligneous liquor by settling and decantation. After cooling for 20 hours, the steel cover was opened and charcoal yield was determined.

[3] Percentages are on oven-dry weight basis.

Pyroligneous Liquor Analysis

1. *Methanol.* — The methanol content was determined by the specific gravity method.

2. *Total acids.* — The total acid content of the pyroligneous liquor was determined on a redistilled sample as acetic acid by direct titration with standard base using phenolpthalein as indicator.

3. *Soluble tar.* — The black residue left in the flask after redistilling the clear pyroligneous liquor was considered as soluble tar. The weight of soluble tar was obtained by difference.

Chemical Analysis and Calorimetric Determinations

Chemical analyses of the charcoals were made according to the methods of Moore and Beglinger (8). The amount of volatile matter was reported as the percentage of loss in weight of oven-dry charcoal after heating for 11 minutes in a covered crucible at 950 deg. C. The weight of residue, after completely burning the charcoal for 6 hours at 750 deg. C, was reported as the ash content of the charcoal. The fixed carbon content was obtained by difference.

A Parr peroxide bomb calorimeter was used in determining the heating value of the charcoals (6, 9).

Redistillation of Settled Tar

The settled tars were subjected to a secondary distillation in Pyrex distilling flasks at atmospheric pressure. By careful, controlled heating, the distillation-temperature schedules below were followed:

DISTILLATION TEMPERATURE RANGE, DEGREES C	APPROXIMATE DURATION, HOURS
Room temperature to 210	1.5
210 to 235	1.0
235 to 270	1.0
270 to 315	1.5

The distillates at different temperature ranges were collected separately. The color and other physical properties of the liquids were observed. Their specific gravities, using the pycnometer method, were determined.

RESULTS AND DISCUSSIONS

Charcoal Yield and Quality

The carbonization process used in this study was based on a controlled pyrolysis at a temperature range of 800 to 900 deg. F. The heat generated at this range seemed sufficient to carbonize the wood and "refine" the charcoal by vaporizing the complex organic chemicals, thereby leaving a product rich in carbon content. The maximum temperature was low enough to eliminate the danger of incurring unnecessary deterioration on the equipment.

A charcoal yield of 34.42 per cent was obtained at the above conditions (Table 2). The charcoal analysis of 87.23 per cent fixed carbon and 10.45 per cent volatiles (Table 3) substantially met the limiting chemical requirements of industrial-grade charcoal. Its heating value of 7470 calories per gram compared favorably with coke and the industrial "white charcoal" of Japan (Table 6).

The indicated carbonization process has produced a hard and dense but cracked charcoal. The ruptures probably resulted from rapid drying coupled with the violent expulsion of hot gases from the interior of the wood during carbonization. However, this condition has not affected the utility of the products to an appreciable extent.

Investigations on the Pyroligneous Liquor

The composite sample of pyroligneous liquor, obtained from the carbonization of ipil-ipil wood, was a turbid, brown liquid having a distinctly pungent odor. It contained a dye

which left a dirty brown stain on the hands and clothes. The stain cannot be removed by rinsing with ordinary soap and water.

On an oven-dry wood basis, about 25.46 per cent pyroligneous liquor was obtained (Table 2). The chemical analysis of this liquid indicated that the carbonization of one ton of oven-dry ipil-ipil wood would yield approximately 17.60 kilos acetic acid, 8.10 kilos methanol, and 37.30 kilos soluble tar (Table 4).

Wood Tar and Wood-Tar Oils

Laboratory studies at the Institute showed that one ton of oven-dry wood could produce 90.20 kilos of wood tar. This tar contained 7.14 per cent light oils (specific gravity range 0.90 to 1.0) distilling below 200 deg. C and 9.91 per cent heavy oils (specific gravity range 1.01 to 1.03) distilling from 200 deg. C to 315 deg. C (Table 5). The greater fraction of wood tar is pitch.

CONCLUSION

1. The carbonization of ipil-ipil wood, at the conditions used in this study, produced charcoal that may be suitable for industrial application. This charcoal had an average volatile matter content of 10.45 per cent, which is much lower than the limiting value of the contained-volatile-matter requirement of industrial-grade charcoal.

2. If the smoke that escapes during the carbonization of ipil-ipil wood is condensed, it is possible to recover 254 kilos pyroligneous liquor and 92 kilos wood tar and wood-tar oils, per ton of oven-dry wood.

3. The pyroligneous liquor may be processed to yield about 17.60 kilos acetic acid and 8.10 kilos methanol, per ton of oven-dry wood.

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Table 1. *Some common industrial outlets for charcoal in the form of lumps, screenings, powder and briquettes.*

Metallurgical	*Chemical*
Aluminum metal	Activated carbon
Armor plate	Black powder
Case hardening	Brake linings
Cobalt metal	Carbon disulfide
Copper, brass and bronze	Carbon monoxide
Electro manganese	Catalyst reactor
Foundry molds	Electrodes
Magnesium metal	Fertilizer
Mining	Galvanizing
Molybdenum	Gas cylinders
Nickel	Glass
Pig Iron	Glues
Powdered iron	Graphite
Special alloys	Molding resins
Steel	Nursery mulch
	Pharmaceuticals
Specialized Fuel	Plastics
Citrus growers	Poultry and stock feeds
Foundries	Potassium cyanide
Meat and fish curing	Rubber
Tobacco curing	Sodium cyanide

Source: Beglinger, E. 1952. Charcoal production. U. S. Forest Products Laboratory Report No. R1666-11. Madison, Wisconsin.

Table 2. *Carbonization products of ipil-ipil wood*

NOTE: All samples were carbonized in an electrically-heated retort at a maximum temperature of 900 deg. F. The carbonization time was 8 hours.

Sample	Moisture content[a] per cent	Oven-dry Weight of wood kg.	Charcoal[b] per cent	Pyroligneous liquor[c] per cent	Settled tar[b] per cent	Uncondensible gases and losses[d] per cent
A	22.87	17.49	36.30	20.89	4.17	38.64
B	17.80	15.04	31.00	22.40	6.05	40.55
C	25.30	13.56	33.82	30.60	6.25	29.33
D	25.00	16.50	36.81	28.60	5.35	29.24
E	23.51	15.36	34.20	24.80	5.60	35.40
Average	22.90	15.59	34.42	25.46	5.48	34.64

[a] Percentage was based on the weight of wood as received.

[b] Percentage was based on the oven-dry weight of wood charge.

[c] The weight of water in the wood charge was subtracted from the total weight of liquid product recovered.

[d] Percentage of uncondensible gases and losses = [100 — (% charcoal ÷ % pyroligneous liquor ÷ % settled tar).]

Table 3. *Proximate chemical analysis of charcoal of ipil-ipil wood*[e]

Sample	Moisture[f] per cent	Volatile matter[g] per cent	Ash[g] per cent	Fixed carbon[g] per cent
A	0.44	9.20	1.93	88.87
B	5.00[h]	13.20	2.30	84.60
C	1.74	10.58	2.78	86.64
D	4.78[h]	8.80	2.46	88.74
E	0.97	10.45	2.12	87.43
Average	—	10.45	2.32	87.23

[e] Unless otherwise stated, the charcoal samples were obtained immediately after opening the retort.
[f] Percentage was based on charcoal as received.
[g] Percentage was based on moisture-free charcoal.
[h] Charcoal samples were obtained after a stabilization period of at least 24 hours at room temperature.

Table 4. *Pyroligneous liquor analysis*[i]

Samples	Methanol per cent	Acidity as acetic acid per cent	Soluble tar per cent
A	0.65	1.28	3.66
B	0.74	1.32	3.50
C	0.86	2.16	3.56
D	0.96	2.30	3.94
E	0.84	1.74	4.01
Average	0.81	1.76	3.73

[i] All percentages are based on the oven-dry weight of wood charge.

Table 5. *Fractional distillation of settled tar*[j]

Temperature range deg. C	Average weight Percentage of fraction	Average specific Gravity of fraction	REMARKS
150—210	3.41	0.913	straw-yellow oil
210—235	3.73	1.010	orange oil
235—270	4.76	1.025	reddish-orange oil
270—315	5.15	1.031	reddish-brown oil
(Residue)	64.40	xxxxx	waxy, black oil

[j] All percentages are based on the weight ofsettled tar.

(*Continued on page* 52)

Forest Tree Improvement Research in the Philippines

by

FOR. BERNARDO C. SINUES[1]

INTRODUCTION

Unquestionably, the forest resources of the Philippines benefit the people in terms of tangible and intangible values. Indeed, the forests play an important role in the economy of the nation; it being the second ranking dollar-earner among the natural resources. However, the rapid and unwise exploitation of our God-given forest heritage is now gaining an uncontrollable momentum creating an imbalance between production and utilization. Shifting agriculture and other destructive agencies have compounded the forest problem. These are now evidenced by the existence of critical watershed areas which have been rendered treeless and illegally encroached by squatters. Noticeably observable in the forest regions are predominantly second growth forests that are now questionably left as the only potential source of timber. Day by day the best and finest timbers are extracted in the various logging operations. Several thousand board feet of logs have been brought out of the country to supply foreign wood-using industries. This unfortunately has been draining much of the timber supply that the Philippines is now becoming ridiculous of its prestige as beneficiary of such finest and inexhaustible tropical hardwood forest. All these contributing factors have amplified the insecurity problem of the wood using industries and perhaps not a few decades from now the second growth timber stocks would not even suffice our local consumption.

With the present rate of reckless cutting of timber and the apathetic attitude of those involved in forest destruction, there has been a trend of ever-decreasing timber supply in the country. Besides, the timber that are extractable from the second growth forests and in some of the forest plantations have been degrading tremendously in wood quality due to the cumulative effects of undesirable hereditary characteristics and adverse environmental factors. Timber improvement with the application of silvicultural and management practices is not sufficient to eradicate the mechanical injuries, pests and diseases, and other inherent elements that give rise to inferior tree qualities. Oftentimes, such trees are slow-growing, limby, with crooked or forky bole, which render them not potentially of commercial value.

The future of forestry in the Philippines is, however, not yet entirely doomed that hope should be totally shattered. The problem is still not very serious although it would become critical if it remains unchecked. Corrective attitude of those who deal directly on forest production must be developed to create and save the valuable forest for the stabilization of the Philippine economy. Forest tree improvement research should be planned and carried out now for the benefit of the logging business in particular and the public in general. Otherwise, the procrastination of this long-range activity would only yield an unsatisfactory result.

In order to have a systematic program and a better coordination of activities, the forestry agencies should go hand in hand in carrying out the different phases of the research program. It is, therefore, the object of this paper to present and discuss some

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of the pertinent aspects of forest tree improvement in order to know the research areas which should be given top priority. The genetic aspect would be discussed considerably since a greater percentage of the tree improvement process is based on sound genetic principles. Many tree characteristics are also inherently controlled. The research program would endeavor to produce hybrids of desirable characteristics to be able to raise commercial stocks that are genetically fast-growing and of high-quality wood products. This could possibly be attained through proper selection and hybridization of extraordinarily superior trees that are free of diseases and of wide adaptability to adverse environmental conditions. The research materials which could be accumulated together with the improved varieties or species would eventually serve as the future foundation of scientific knowledge in the field of forest genetics and tree breeding in the Philippines.

Discussion

In order to attain the objectives of the tree improvement program a scientific knowledge on the principles of genetics, plant breeding, cytology, silviculture, physiology and pathology should be possessed by the technical men to carry on the activities. Unfortunately, this poses a problem due to the dearth of forest geneticists, cytologists, and tree breeders in the country. However, there are still lots of possibilities to remedy the situation, as discussed elsewhere in this paper.

The scientific approaches in tree improvement research are suggested as follows: (1) genetic approach; and (2) silvicultural approach. Of these approaches, the former is urgently needed in Philippine forestry; hence, several proposals are hereunder discussed for consideration and action.

The Genetic Approach

This approach involves the following: selection of plus trees; introduction of exotic species; clonal multiplication of superior trees; establishment of seed orchards; cytologic and cytogenetic research; provenance studies; and forest tree breeding research. All these activities converges to the production of certified seeds of genetic superiority for commercial tree planting.

Selection of Plus Trees. — In order to determine the desirable as well as the undesirable tree characteristics, such as those of the benguet pine, mahogany, narra, molave, acle, and the dipterocarps, a progeny test which simultaneously includes inheritance studies should be conducted. Seeds of the promising trees are separately collected, sown, grown, transplanted, and finally established in a given site. The rate of growth, form of the bole, mode of branching, and other inherent characteristics are then taken to be able to establish the criteria for the selection of mother trees. In this process, the plus or superior trees could be pinpointed as sources of seeds for planting in the interim that seed orchards are not yet available. Unluckily this method has not been employed by those concerned in the selection of mother trees to supply the seed demand of the reforestation projects. One great opportunity which was missed in this respect is that of the elite parental stock of benguet pine in Bukidnon and Cebu which should have been preserved as seed sources for today's forest planting. The pioneers of these projects must have been very repentant of such irretrievable loss.

Introduction of Exotic Species. — Meanwhile, the desirable species from foreign countries that could easily acclimatize in the different forest regions should be introduced, such as the strikingly fast-growing *Gmelina arborea* Roxb. Other exotic species or hybrids possessing exemplary characteristics should also be preserved and multiplied to supplement the important endemic tree species. These could be utilized as possible sources of valuable germplasms, which are of great value in forest tree breeding.

Clonal Multiplication of Superior Trees. —Many plus or superior trees could be found in the various plantations as well as in the virgin forest. However, very little effort has been exerted on the asexual propagation of the elite seed trees with the ultimate objective of accumulating them in a given site for inheritance analyses. In cases where marcotting, grafting, cutting, or layering have been done, no specific pedigree record as to the sources of the scion or stock is taken. Consequently, no effective research are conducted to evaluate their performance in terms of qualities and potentialities.

Observation on the rooting of *Albizzia falcata* (L.) Back, and the dipterocarps revealed no significant result. This indicates the need of exploiting the possibility of using some rooting media such as rootone, indoleacetic acid, indolebutyric acid, naphthaleneacetic acid and other root-inducing chemicals. Otherwise, the various methods of vegetative reproduction such as grafting, layering and budding should be availed of to preserve the elite mother trees that are found in the plantations as well as in the virgin forests. For example, in Basilan where rubber trees are found very promising, budding should be intensified. Budwoods of superior quality should be obtained at all costs and asexually multiplied for future use. In the reforestation projects, the practice of using wildlings should be discouraged. Instead, the better varieties or high latex yield should be acquired and used in forest planting. The established plantations of the U.P. Land Grant and the Menzi Corporation could be a model to pattern our reforestation plan. Should the existing practice continue it is anticipated that the derivable product would be of unreasonable economic return due to inherently low yield of latex at commercial age. Another instance could be cited as possible source of genetic material, such as the man-made forest of either Osmeña or Impalutao Reforestation Project where some of the best pines are found. Their exemplary characteristics of having long and straight boles justify the need of preserving them through the process of vegetative propagation. This should be given ample attention inasmuch as they are now ready for harvest. Otherwise, history would repeat itself and unknowingly they would be missed again in the same manner as their valuable parents were lost two or three decades ago.

Establishment of Seed Orchards. — Seed orchards are indispensable in forest tree improvement since they serve as sources of certified seeds and laboratory for genetic and breeding experiments.

In their establishment, the desirable species should first be surveyed which involves the cataloguing of superior or plus trees from nearby plantation or virgin forest in each region. Only the varieties or species of interest should be tested for genetic superiority in order to specifically determine which of the existing tree species are to be preserved. Then the plant characters are classified quantitatively and qualitatively to facilitate experiments on tree hybridization. In order to insure the continuous productivity of the seed orchards, the necessary maintenance and protection should not be neglected.

In the Philippines, there is an urgent need of establishing a seed orchard in every region. This would pave the way to the accumulation of essential research materials besides serving as a temporary source of relatively superior seeds. Otherwise, it would be economically advisable to maintain a small seed orchard that is manageable by every reforestation project. This is now a dire necessity inasmuch as the climax species are already being planted to some areas. Besides, such a great investment should be fruitful that a genetically superior seed should be used for every seedling raised in the nursery and planted in the field. In places, therefore, where certain species thrive well seed orchards should be established and maintained. An initial project could be demonstrated with the establishment of a pilot seed orchard for benguet pine in Baguio,

Cebu, and Bukidnon. Subsequently, other projects of a variety of commercial species could be established in strategically situated places.

Cytologic and Cytogenetic Research. — A knowledge on the cytological features of the genetic materials is of paramount importance in the process of hybridization. This calls, therefore, for a systematic cytological study on every varietal strain or species found in the orchard which involves studies on chromosome numbers, chromosome aberrations, pollen storage, fertility and sterility, polyploidy, and other cellular characteristics, including a cytogenetic study of the mutants produced through natural and artificial irradiation. These studies would provide the basic information to enable one to initiate and lay the foundation of tree breeding experiments. Moreover, the derivable results would yield the necessary taxonomic data for the phylogenetic classification as well as nomenclature of the breeding stocks and progenies.

Provenance Studies. — Having collected the valuable materials within a specific region, it is important to test the adaptability of such materials to other regions. A study, therefore, on the ecological aspect of the different breeding materials should be conducted to include geographical, altitudinal, and other climatic variations. Simultaneously, field trials could be conducted to study heritability, combining ability, and progeny relationships. In this case, the environmental effect could be assessed to furnish the essential data for determining the genotypic variation of every commercial species. Eventually the mode of inheritance for a specific character or the applicability of the mendelian principles on different tree characteristics could be properly evaluated.

Forest Tree Breeding Research. — The creation of new strains of species possessing desirable characteristics could be possible through the cross-breeding of superior trees followed by drastic selection of individuals with good characters. Controlled or uncontrolled breeding could be employed which necessitates a thorough knowledge on the floral morphology, phenology, incompatibility systems, pollenology, and breeding methods. Hybrid production could be further materialized by modifying the conventional breeding method such as the application of heterosis breeding, mutational breeding, breeding of introduced species, breeding for resistance to pests and diseases, including wood properties. Finally, the performance of the selected strains or hybrids should be compared with the normal variety to critically evaluate their economic potentialities. In this process, one could bring forth tree hybrids that foresters could be proud of. In the course of time, fast-growing strains coupled with superior wood qualities could be commercially produced and made available to the public in answer to the scarcity problem of high-quality wood.

A specific case on tree breeding problem in the Philippines is worthwhile investigating such as the transfer of a desirable character from one species to another. Accordingly, *Cinchona ledgeriana* Moens. has a very high alkaloid content but is slow-growing. On the other hand, *Cinchona succirubra* Pav. has a very low alkaloid content but is very fast-growing. Hence, if the growth or the alkaloid content of either of the species could be transferred to the right parent through reciprocal crosses or backcrosses, a hybrid could be produced which is fast-growing and simultaneously of high alkaloid content. This process is paralleled to the production of high-yielding rubber trees in Basilan which are undoubtedly the result of breeding experiments abroad. Similarly, the long-boled, fast-growing benguet pine at Cebu and Bukidnon could be further improved to increase their diameter growth. Supplemental genetic investigation should also be conducted to unmask the inheritance pattern of some distinctive features such as long internodes, branchiness, and dominance of the crown. Likewise, breeding other species like

mahogany, narra, molave, acle, and the dipterocarps should be given ample attention and action.

The Silvicultural Approach

A genetically and physiologically superior seed would not normally grow into an elite tree unless it is given the proper care for its establishment and development. Silvicultural studies especially on the various site factors should, therefore, be conducted to be able to specify the silvical requirements of our forest trees. Seed storage, germination, root-prunning, spacing, and other nursery practices should be scientifically studied or re-investigated to be able to assess their effects on the phenotype and genotype of each species. At the plantations, the different silvicultural systems should be thoroughly studied to determine their specific relation to tree improvement. A basic knowledge on these systems would provide the needed information as to which is the most feasible system in bringing forth a high-quality timber stand. In the logging areas, the residuals possessing superior qualities should be discriminately left to regenerate the future stands. Subsequently, they should be treated in accordance with the existing Timber Stand Improvement of the Bureau of Forestry.

Silvical researches should also be geared towards the relation of tree physiology to genetics and breeding. This is important because the relationship is necessary to categorically determine the specific characters that are genetically controlled. This calls for a thorough knowledge on the basic metabolic processes involved in the phenomenon of tree growth. Studies are, therefore, necessary on the induction of flowering, photoperiodism, photosynthesis, transpiration, and others. The prospect of using growth regulators should warrant investigation to determine any positive response of the commercial species. In this connection, growth substances such as indoleacetic acid, gibberellic acid, kinetin, and other known auxins should be exploited. Fertilizer studies should be similarly conducted to determine the food requirements of our forest trees for proper nutrition. Atomic energy in the form of radioisotopes or atomic rays such as ultraviolet rays, x-rays, gamma rays, alpha rays, and beta rays should be availed of to enable the silviculturist and geneticist evaluate the silvical data as early as possible.

The Participating Agencies

A coordination of activities for a well-planned timber improvement program is a dire necessity for an effective and successful research. This calls for the cooperation of the following forestry agencies together with their probable research areas and activities. The U.P. College of Forestry should institute courses in forest genetics, plant breeding, and tree physiology to overcome the lack of technical personnel to implement the program. Graduate courses should be offered and if possible a program leading to the master's degree be planned on forest genetics. Meanwhile, technical guidance should be offered voluntarily to receptive investigators or collaborators of existing or proposed tree improvement research. Basic researches on forest genetics, silvics and silviculture, tree physiology and pathology should be encouraged and given the necessary support in this institution. The Reforestation Administration should endeavor to establish regional seed orchards. Field or progeny trials should be conducted in addition to hybridization studies on forest trees. With the cooperation of the different Forest Experiment Stations of the Bureau of Forestry, progeny testing, introduction of exotic species, and ecological studies should be conducted to know categorically the effect of environment on the growth of commercial trees. The Forest Products Research Institute could contribute a great deal in terms of scientific investigations on the wood properties of the breeding stocks and progenies. The pulp characteristics, fiber length, grain and texture, strength, durability, specific gravity, cellulose yield, ex-

tractives, and other important characteristics of potential hybrids should be known through an effective research of the institute. The wood-using industries should also conduct studies on the quality and saleability of the finished products, together with the economics of the improved varieties and species, like the inbreds and hybrids. An alternative but a philanthropic contribution would be a financial support to the various projects within the scope of the program.

SUMMARY

The Philippines today is destroying its forest faster than any country in the world. Illegal kaiñgin, timber smuggling, and indiscriminate logging have drained much of the forest resource. However, no immediate measures of tree improvement are taken to check this critical forest problem. Agriculture has long developed high-yielding varieties of rice, corn, abaca, and other crops but practically no improved tree varieties or hybrids could be brought to light yet, after more than half a century of forestry practice in the Philippines.

A solution to the foreseeable problem of timber shortage has been proposed through the implementation of a well-planned forest tree improvement research. This involves studies on the genetic and silvicultural aspects of improving the quality of existing tree species that are of commercial importance. Efforts would be exerted to create a population of genetically superior trees that are expected to answer the dire needs of the wood-using industries. Attainment of this objective calls for the production of hybrids that are characteristically fast-growing, resistant to pests and diseases, of wider ecological adaptation, and superior wood quality. The castle of this dream could be built up through the cooperative efforts of the various forestry agencies that would undertake the different phases of the research program. Most possibly, the creation of a Committee on Forest Tree Improvement could be an incendiary step to keep the ball rolling. To begin with, the committee would explore the possibilities of securing the necessary research fund which is considered as the lifeblood of the proposed undertakings.

On the whole, the time is already ripe; hence, the Filipino Foresters should appropriately act now in order to create and perpetuate better trees for tomorrow and a greener Philippine forest.

Industrial Charcoal . . .

(*Continued from page* 46)

Table 6. *Calorific value of coke, coking coal and wood charcoals*

Kind of Fuel	Volatile matter per cent[k]	Fixed carbon per cent[k]	Heating value per cent[k]
Coking coal[l]	19.0	76.0	7500
Coke[l]	5.0	87.0	7100
Black charcoal (Japan)[m]	12.0	86.0	7158
White charcoal (Japan)[m]	5.0	93.0	7235
Spruce wood charcoal (U.S.A.)[l]	14.4	83.6	7310
Coconut shell charcoal (Philippines)[n]	18.8	77.4	6700
Ipil-ipil wood charcoal (Philippines)[o]	11.0	86.7	7472

[k] Based on moisture-free charcoal.

[l] Anonymous. 1955. Wood burning. Food and Agricultural Organization of the United Nations, Rome, Italy. p. 4

[m] Kishimoto, S. 1961. Firewood and charcoal. Chemical utilization of wood. Overseas Technical Cooperation Agency, Ministry of Agriculture and Forestry, Japan. pp. 272-273.

[n] Coconut shell charcoal was obtained from a commercial sample.

[o] Average of 6 distillation runs. The calorific values of coconut shell and ipil-ipil charcoals were determined by the sodium peroxide method at the Institute.

Plate. 1. Anabiong tree No. III-1, under 40-50 cm. diameter class, shows complete callus at the end of 3 years from stripping. Callus was completed in 8 months and 26 days after stripping.

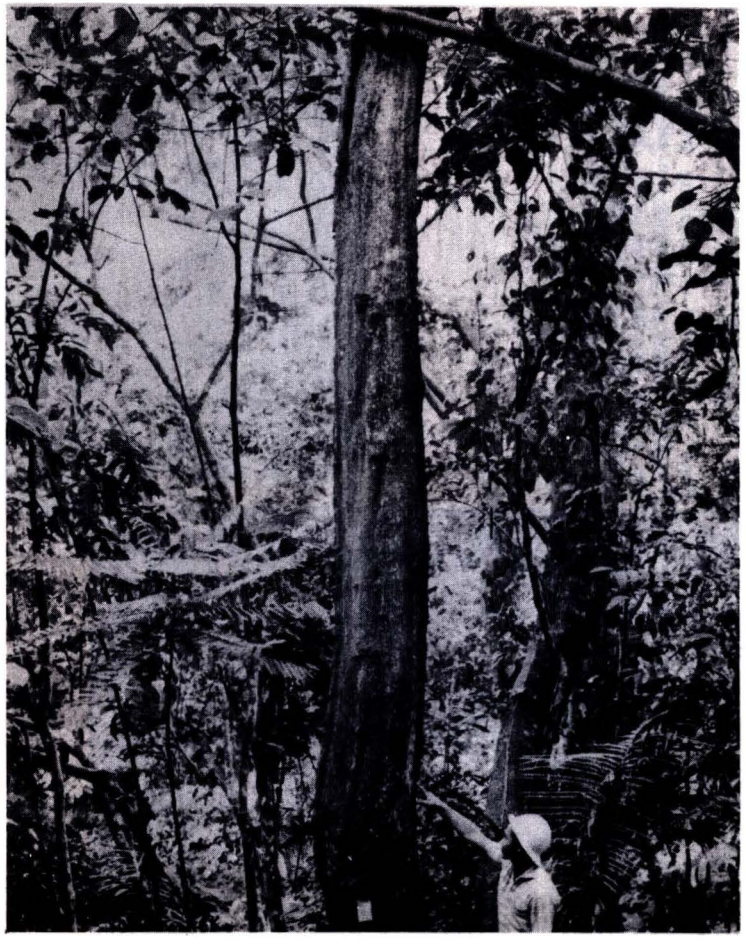

Plate. 2. Anabiong tree No. III-2, under 4050 cm. diameter class, shows complete callus at the end of 3 years from stripping. Callus was completed in 4 months and 2 days after stripping.

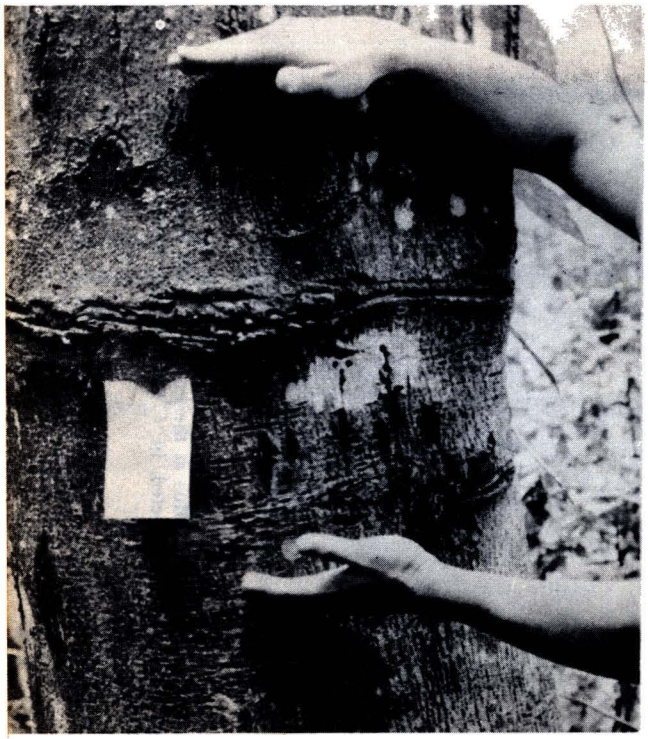

Plate 3. Close-up of anabiong tree No. III-2 (Ulate 2) showing the callus which became flush with but smoother than unstripped bark. The bark above the ring is the callus.

Plate 4. Bitaog tree No. II-1, under 40-50 cm. diameter class, shows the complete callus at the end of 2½ years from stripping. Callus was completed in 10 months after stripping. Note the uneven formation of the callus which is almost flush with old bark (pointing hand).

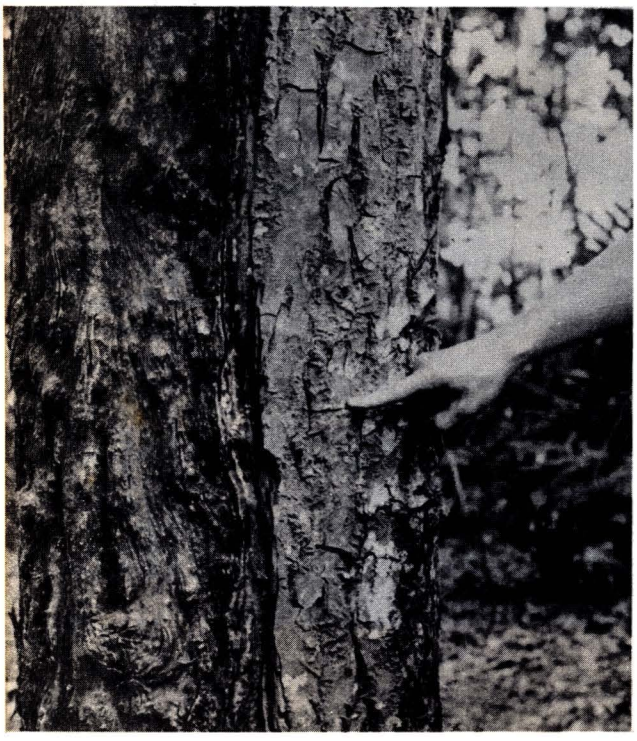

Plate 5. Kamachili tree No. III-1, under 30-40 cm. diameter class, shows only fair callus formation at the end of 3 years and 3 months after stripping.

Plate 6. Close-up of kamachili tree No. III-1 (Plate 5) showing callus which was swollen with smooth surface but unevenly formed.

Plate 7. Kupang tree No. II-1, under 50-60 cm. diameter class, shows only fair callus at the end of 2 years and 2 months from stripping. Note the swollen callus along edge of wound. The exposed wood was attacked by wood-decaying fungi and termites.

Plate 8. Kupang tree No. III-1, under 50-60 cm. diameter class. Very little callus was formed on this tree after a lapse of 2 years and 2 months from stripping. At the end of this period the bole was broken by typhoon. The bole is decaying.

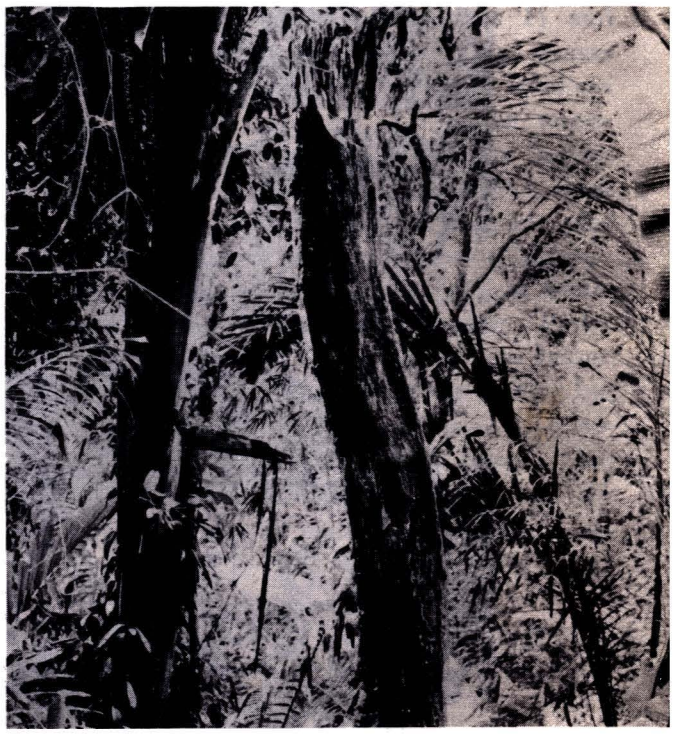

Plate 9. Kupang tree No. IV-1, under 70-80 cm. diameter class. shows complete callus after a lapse of 2 years and 14 days from stripping. Note the irregular and swollen nature of the callus.

Plate 10. Narra tree No. IV-1, under 50-60 cm. diameter class. Vry little callus developed on this tree after a lapse of 2 years and 8 months from stripping. Exposed wood is whitish and roots develoned around the upper girdle below the forked branch. Tree is thrifty.

Plate II. Sakat tree No. I-1, under 50-60 cm. diameter class, shows almost complete callus after a lapse of 4½ years from stripping. Note that callus almost met midway axially.

Collection and Yield of Philippine Tanbarks

by

F. R. LOPEZ & I. T. ZAMUCO[1]

SUMMARY

Seven upland tanbark species consisting of anabiong, bitaog, kalumpit, kamachile, kupang, narra, and sakat were studied for tanbark yield using four stripping methods for the collection of the bark. Except in one method, where the bark was completely peeled, the other three left continuous strips of bark along the trunks of experimental trees.

Bitaog had the thickest bark (1.53 cm.) and gave the highest average tanbark yield in green weight (9.7 kg./sq.m.), followed by kamachile (8.9 kg./sq.m.). Bitaog also had the highest air-dry yield (5.9 kg./sq.m.), followed by kalumpit (4.7 kg./sq.m.). The lowest average green and air-dry yields were obtained from narra (5.6 kg./sq.m. and 2.3 kg./sq.m., respectively). Of the species studied, the bark of narra was the thinnest (0.63. cm.).

Results indicated that callus formation was influenced by (a) extent of damage inflicted on the cambial layer in the process of stripping, (b) moisture content of the bark (season of stripping), and (c) species.

INTRODUCTION

In the Philippines, the barks of kamachile, an upland tanbark species, and some mangrove species are the main sources of tanning materials (4).[2] Among the common swamp tanbark species that were used for tanning leather are busáing (*Bruguiera gymnorrhiza* (L.) Lam.), langárai [B. *parviflora* (Roxb.) W. & A. ex. Griff.] pototan [B. *sexangula* (Lour.) Poir.], and tangál [*Ceriops tagal* (Perr.) C.B. Rob.]. Because of their high tannin content, these species provided tanbark for a group of tanneries that processed animal hides into finished leather (5). Today, kamachile [*Pithecellobium dulce* (Roxb.) Benth.] bark is used almost exclusively because of the light-colored leather it produces. The mangrove species are no longer used extensively as a source of tanbark because they produce hard, dark-red leather. This drawback, however, can be overcome by blending mangrove tanbark with other tanning materials.

Baens, *et al.* (1) and Gana (4) reported many native trees the barks of which have a fairly high tannin content (Table 1) and produce good leather. Among the species mentioned are anabiong [*Trema orientalis* (L.) Blume], kalumpit (*Terminalia microcarpa* Decne.), narra (*Pterocarpus indicus* Willd.), pili (*Canarium ovatum* Engl.), sakat (*Terminalia nitens* Presl), Benguet pine (*Pinus insularis* Endl.), bitaog (*Calophyllum inophyllum* L.), kariskis [*Albizia lebbekoides* (DC.) Benth.] and kupang (*Parkia roxburghii* G. Don). The tannin from kalumpit bark has been used in leather tanning but is not popular. The bark of narra is a potential source of commercial tannin, but since the trees are widely scattered in the forest the cost of bark collection seems uneconomical.

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[2] Numbers in parentheses refer to Literature Cited.

According to Brown (2), the name "cutch," which has been used for mangrove tanbark and bark extract, was originally applied to heartwood of *Acacia catechu* Willd. and was known all over India and Burma. It has gained recognition in foreign countries for processing heavy shoe sole and belting leather. For sometime, the "cutch" industry in the Philippines flourished. Unfortunately, however, the exportation of cutch from the Philippines became unprofitable because most of the good stands of mangrove species were considerably reduced by indiscriminate cutting. Botanically unsound methods of bark collection also resulted in the death of many trees.

This study was designed (a) to determine the yield of tanbark by diameter class and species, and (b) to determine the best method of stripping the bark without impairing the health of the trees.

MATERIALS AND METHODS

Selection of Trees (6, 7, and 8)

The species reported by Baens (1) as having high tannin content, and which were available in the Makiling Forest and vicinity, were selected for this study. A total of 64 trees, represented by seven upland tanbark species of different diameter classes. were studied as follows:

SPECIES	DIAMETER CLASS (cm.)	NO. OF TREES
Anabiong [*Trema orienatlis* (L.) Blanco]	30—40	9
	40—50	9
Bitaog (*Calophyllum inophyllum* L.)	40—50	4
Kalumpit (*Terminalia microcarpa* Decne.)	50—60	9
Kamachile (*Pithecellobium dulce* Roxb.)	20—30	4
	30—40	4
Kupang (*Parkia roxburghii* G. Don)	50—60	4
	70—80	4
Narra (*Pterocarpus indicus* Willd.)	50—60	8
	60—70	4
Sakat (*Terminalia nitens* Presl)	50—60	5

Preparation, Stripping and Labeling of Trees (6, 7, and 8)

Four experimental methods of stripping the bark were employed, designated as methods I, II, III and IV, which are illustrated in Figure 1. Generally, the stripping commenced from the base (at breast height or about one meter or less above the ground) up to the first branch of the tree. A sharp bolo, a hatchet and an improvised wooden debarking tool were used for the purpose. A bamboo ladder and a rope (ladder-fashioned) were used to reach the first branch of the tree. Except in method IV, where the bark was totally stripped or peeled, all other methods left unbroken strips of bark along the trunk or bole. Unbroken strips of bark left an uninterrupted pathway between roots and leaves to provide for a continuous supply of elaborated food materials. This enabled the tree to carry on its physiological functions more or less unimpaired, and afforded a good chance for bark regeneration. Each stripped tree was tagged with galvanized iron sheet (8 by 10 cm.) painted black, which indicated the method of stripping, species, tree number, diameter class and date of stripping.

Determination of Tanbark Yield (6, 7, and 8)

Freshly collected barks were bundled and weighed according to species and diameter class. To prevent fungal infection, the barks

collected from each tree were then sun-dried to almost air-dry condition. After sun-drying, the barks were again securely bundled and further air-dried indoors until the bark had attained constant air-dry condition.

RESULTS AND DISCUSSION

Table 2 gives data on the yield of tanbark by diameter class of the seven upland tanbark species found in the Makiling Forest and its vicinity. The comparative yield and bark thickness by diameter class are shown in Table 3. The comparative over-all average yield, moisture content of bark samples, average calculated area of bark stripped and average thickness of the bark are shown in Table 4. Callus formation, mortality and health condition of the experimental trees are presented in Table 5.

Over-all Tanbark Yield (Table 4)

The average yields of tanbark are expressed in kilogram per square meter (kg./sq.m.) of bark, based on green and air-dry weights. Based on over-all average tanbark yield, bitaog gave the highest, both in green and air-dry weights, 9.7 kg./sq.m. and 5.9 kg./sq.m., rsepectively. The lowest yield was obtained from narra, 5.6 kg./sq.m. (green weight) and 2.3 kg./sq.m. (air-dry weight).

Comparative Tanbark Yield and Bark Thickness by Diameter Class (Table 3)

In the present study, it was not possible to compare the tanbark yield and bark thickness of all the species by diameter class because of the limited number of experimental trees available in the sampling area.

In the 30-40 cm. diameter class, only anabiong and kamachile were studied. The latter species gave a higher yield than the former. Kamachile yielded 11.2 kg./sq.m. (green weight) and 5.2 kg./sq.m. (air-dry weight), while anabiong gave a yield of 7.6 kg./sq.m. and 2.5 kg./sq.m. in green and air-dry weight, respectively. In bark thickness, kamachile (1.05 cm.) had a thicker bark than anabiong (0.84 cm.).

In the 40-50 cm. diameter class, anabiong and bitaog were investigated. Bitaog gave a higher yield in green and air-dry weights (9.7 kg./sq.m. and 5.9 kg./sq.m., respectively) as compared with 7.8 kg./sq.m. and 2.8 kg./sq.m., respectively for anabiong. The bark of bitaog (1.53 cm.) was thicker than that of anabiong (0.87 cm.).

Four species were studied in the 50 to 60 cm. diameter class. Their yields, green and air-dry, in descending order were as follows: kalumpit (8.8 and 4.7 kg./sq.m.), sakat (8.1 and 4.5 kg./sq.m.), kupang (6.9 and 2.5 kg./sq.m.), and narra (5.6 and 2.0 kg./sq.m.). In bark thickness, kalumpit (0.96 cm.) and sakat (0.95 cm.) produced the thickest bark, followed by kupang (0.73 cm.). Narra had the thinnest bark (0.56 cm.).

Observation Notes by Species (Table 5)

Anabiong. — In the 30 to 40 cm. diameter class, two trees each stripped by Methods I and IV, and one tree treated under method II, completely regenerated their barks. The period of complete callus formation ranged from eight months and 23 days (Method IV) to one year and ten months (Method II). Of these trees only two are still living (Methods I and IV); the other three died (Methods I, II and IV). One of the surviving trees (Method IV) was healthy and the other tree (Method I) was very sickly probably because one of the main branches was broken by strong winds. Of the three dead trees, one was broken by strong winds (Method II), one was felled by kaiñgineros (Method IV), and one died because of an unknown malady (Method I). Very little to fair callus was formed on the other four trees (one tree in Method II and three trees in Method III), but they were either broken or uprooted by strong winds.

Of the nine trees in the 40 to 50 cm. diameter class, four trees stripped by Methods III (Plates 1 and 2) and IV had complete callus formation, the period of callusing ranged from four months (Method III) to 1-1/2 years (Method IV.) Three of these

trees were still healthy, but one had been uprooted by strong winds. The complete callus formed on the trees was flush with the old unstripped bark (Plate 3). One tree (Method I) had almost complete callus formation after a lapse of 2-1/2 years from date of stripping and was still vigorous. The remaining four trees (two each, under Methods I and II) were either broken by wind or died from an undetermined cause. These trees had callus which ranged from none to fair.

Bitaog. — All the four trees debarked by the four stripping methods completely regenerated their bark. The period of callusing ranged from 9-1/2 months (Method IV) to 10 months for Methods I, II and III. All the trees were healthy but two of them were purposely felled. In all instances, callus was unevenly formed (Plate 4) but flush with the old bark.

Kalumpit.—None of the trees stripped by the four methods completely regenerated its bark four years from the date of stripping. Callus formation ranged from very little (Method III) to almost complete (Methods I and II). All surviving trees were healthy. The two trees, stripped by Method IV died from damage inflicted on the cambial layer in spite of the care taken during the process of stripping.

Kamachile. — Except for one tree (30 to 40 cm. diameter class), stripped by Method IV which died six months after stripping because of severe termite infestation, all other trees (7) were healthy. Of these seven surviving trees, six have fair callus formation (Plate 5) and one has almost complete callus formation three years after stripping.

Kupang.—In the 50 to 60 cm. diameter class, only the tree stripped by Method I completely regenerated its bark after more than two years. Callus tissue was smoother than the old bark. The tree stripped by Method II had only fair callus and was healthy, and the exposed sapwood had been attacked by wood-decaying fungi (Plate 7). The tree treated under Method III was broken at the bole by a typhoon (Plate 8). No callus was formed on the tree under Method IV at the time it died from a broken bole after one year and ten months from stripping.

In the 70 to 80 cm. diameter class, callus formation was complete on the tree stripped by Method IV. Callus formed was irregular and swollen (Plate 9). Two trees had callus which ranged from very little (Method II) to almost complete (Method I). The three trees were healthy. The bole of the tree stripped by Method III was broken by strong winds.

Narra. — The trees stripped by the four methods in the 50 to 60 cm. and 60 to 70 cm. diameter classes were healthy, except one in Method II of the 60 to 70 cm. diameter class. Callus formation ranged from very little (Plate 10) to almost complete approximately 2-1/2 years after stripping. It was noted that the trees which developed very little callus in patches were those in which the cambial layer was damaged in the process of stripping.

Sakat. — Only two, one each under Methods I and III, out of the five trees stripped by the four methods were still vigorous. The tree stripped by Method I had almost complete callus at the end of 4-1/2 years from stripping (Plate 11), whereas under Method III only very little callus was formed almost three years from stripping.

General Observations

The form and soundness of the trunk or bole of the tree exerts some influence on the facility of stripping or peeling of the bark. Trees with bark relatively free from knots and other imperfections were easier to debark. Easy stripping was also noted when the trunk had more moisture content on account of recent rain (6, 7, and 8).

Of the four experimental stripping methods employed, Methods I and II required longer time in debarking because more strips

of bark have to be stripped than in Methods III and IV. The latter two methods, however, were decidedly easier and faster than the first two methods for the bark stripper.

Apparently, Method IV which completely removed the bark of the experimental trees did not seriously impair the health of anabiong and bitaog. All the trees of these two species stripped by Method IV were able to regenerate their bark completely and remain healthy.

As shown in Table 5, it appears that the different stripping methods had no significant effect on callus formation. It will be noted that the number of trees that were able to regenerate their bark partially or fully was nearly the same regardless of the method of stripping.

From this study, it was not possible to determine the factors that really affected the callus formation and health of the trees. Some factors, which obviously influenced the regenerative capacity of the bark, such as season of stripping and damage to cambial layer, were beyond experimental control. However, the over-all results tended to show that the most important factor that affected the health of the stripped trees was the extent of callus formation. Bark regeneration may be influenced by the following factors (6, 7, and 8):

1. *Extent of damage to the cambial layer in the process of stripping.* — It was generally observed that callus formation was, to some degree, dependent upon the extent of damage inflicted on the cambial layer. This damage was characterized by the scraping of the thin layer of meristimatic cells, thereby exposing the woody tissue. Generally, trees that were easy to debark were less prone to cambial injury, hence enhancing the regenerative ability of the bark.

2. *Moisture content of the bark.* — Trees with bark of high moisture content were generally easy to debark. Variation in moisture content is an inherent characteristic of the species. Anabiong was found to have a relatively high moisture content (240.41 per cent on the oven-dry basis) while narra and kalumpit had relatively low moisture contents of 74.00 and 75.31 per cent, respectively. Anabiong was comparatively much easier to debark than the latter two species.

The moisture content of the bark may be dependent also on the season when stripping was made. It was observed that stripping or peeling of the bark was easier during the rainy season than during the dry season.

3. *Species.* — It appears that the ability of a tree to regenerate its bark is characteristically inherent to the species. Bitaog, irrespective of the stripping method used, was able to regenerate its bark completely. Other species, like kalumpit, narra and sakat, even with the apparently much less harmful methods of stripping (Methods I and II), failed to regenerate their bark fully.

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Table 1. *Philippine tanbarks*[1] *as compared with Australian tanbark.*

Species	Tannin content in per cent[2] based on oven-dry weight
Black wattle[3]	42.50
Kalumpit	42.00 (20.0)
Narra	30.70
Kamachile	30.10 (31.8)
Sakat	27.38
Kariskis	21.90
Kupang	20.60 (9.2)
Bitaog	19.20
Kulatingan	19.00
Dalinsi	17.80
Yakal	17.17
Anabiong	17.10 (8.1)

[1] Baens, L. et al. Tannin content of Philippine barks and woods. Phil. Jour. Sci. 55: 177-180.

[2] The species with low or no tannin content were deleted from the list. Figures in parentheses represent tannin content determinations by FPRI.

[3] This Australian species is included for comparison with indigenous species.

Table 2. *Yield of tanbark by diameter class of seven upland tanbark tree species found in the Makiling National Park, College, Laguna and Bayog, Los Baños, Laguna.*

Species	Method of stripping	No. of trees stripped	Av. height of stripped bole	Av. calculated area of bark stripped	Av. bark thickness	Average yield (kg./sq.m.)	
						Green wt.	Air-dry wt.
			(meters)	(sq.m.)	(cm.)		
			(30-40 cm. diameter class)				
	I	2	3.61	1.88	0.80	7.4	2.0
	II	2	7.25	3.43	0.83	7.3	3.0
Anabiong	III	3	7.30	3.74	0.86	7.4	2.4
	IV	2	4.06	4.01	0.85	8.2	2.6
	Average		5.56	3.27	0.84	7.6	2.5
			(40-50 cm. diameter class)				
	I	3	8.36	4.84	0.93	8.5	3.2
	II	2	7.15	4.26	0.90	7.6	2.7
Anabiong	III	2	5.00	3.04	0.80	6.3	2.0
	IV	2	5.52	6.70	0.83	8.8	3.4
	Average		6.51	4.71	0.87	7.8	2.8
			(40-50 cm. diameter class)				
	I	1	1.47	1.04	1.50	9.5	7.5
	II	1	1.63	1.07	1.60	12.6	5.9
Bitaog	III	1	4.50	3.13	1.50	7.2	4.5
	IV	1	1.50	2.14	1.50	9.6	5.8
	Average		2.55	1.85	1.53	9.7	5.9

Species	Method of stripping	No. of trees stripped	Av. height of stripped bole	Av. calculated area of bark stripped	Av. bark thickness	Average yield (kg./sq.m.)	
						Green wt.	Air-dry wt.
			(meters)	(sq.m.)	(cm.)		
			(50-60 cm. diameter class)				
	I	2	9.20	6.55	0.85	8.4	4.6
	II	4	8.35	6.05	1.04	8.9	5.2
Kalumpit	III	1	10.38	8.10	1.00	8.6	4.3
	IV	2	6.81	10.37	0.95	9.3	4.5
	Average		8.69	7.77	0.96	8.8	4.7
			(20-30 cm. diameter class)				
	I	1	0.86	0.38	0.80	5.8	2.4
	II	1	0.96	0.33	0.70	5.5	1.8
Kamachile	III	1	1.00	0.44	1.50	9.1	3.6
	IV	1	0.70	0.72	0.60	6.0	2.5
	Average		0.88	0.47	0.90	6.6	2.6
			(30-40 cm. diameter class)				
	I	1	1.14	0.64	1.30	10.6	4.7
	II	1	1.72	1.02	1.30	10.8	5.6
Kamachile	III	1	1.10	0.70	1.00	8.6	3.7
	IV	1	0.70	0.77	0.60	14.8	6.9
	Average		1.17	0.78	1.05	11.2	5.2
			(50-60 cm. diameter class)				
	I	1	3.81	3.18	0.60	6.8	2.4
	II	1	8.10	5.72	0.70	7.1	2.3
Kupang	III	1	4.18	3.23	0.90	7.1	2.5
	IV	1	4.29	8.46	0.70	6.8	2.7
	Average		5.35	5.15	0.73	6.9	2.5
			(70-80 cm. diameter class)				
	I	1	12.80	13.72	1.20	9.9	4.2
	II	1	11.27	11.44	0.90	7.6	3.2
Kupang	III	1	10.32	9.50	0.80	6.8	2.3
	IV	1	4.80	11.50	1.00	9.6	3.8
	Average		9.80	11.54	0.98	8.5	3.4
			(50-60 cm. diameter class)				
	I	2	3.49	2.57	0.55	4.2	1.8
	II	2	4.39	3.34	0.65	6.8	2.2
Narra	III	2	2.76	2.19	0.60	5.3	1.8
	IV	2	3.11	4.64	0.50	5.6	2.3
	Average		3.44	3.18	0.56	5.5	2.0

Species	Method of stripping	No. of trees stripped	Av. height of stripped bole	Av. calculated area of bark stripped	Av. bark thickness	Average yield (kg./sq.m.)	
						Green wt.	Air-dry wt.
			(meters)	(sq.m.)	(cm.)		
			(60-70 cm. diameter class)				
	I	1	2.65	2.40	0.60	6.1	2.7
	II	1	3.68	3.10	0.80	6.3	1.9
Narra	III	1	3.50	3.10	0.70	5.8	2.4
	IV	1	2.69	4.80	0.70	4.7	2.8
	Average		3.13	3.35	0.70	5.7	2.5
			(50-60 cm. diameter class)				
	I	2	7.15	5.78	1.00	9.7	5.1
	II	1	14.82	11.90	1.00	6.5	4.2
Sakat	III	1	8.43	6.97	1.00	9.6	5.3
	IV	1	8.93	12.64	0.80	6.5	3.3
	Average		9.86	9.42	0.95	8.1	4.5

Table 3. *Comparative yield and bark thickness by diameter class of certain upland tanbark species found in the Makiling National Park and vicinity.*[1]

Species	Av. yield (kg./sq.m.)		Av. calculated area of bark stripped	Average bark thickness
	Green wt.	Air-dry wt.		
			(sq. m.)	(cm.)
		(30-40 cm. diameter class)		
Anabiong	7.6	2.5	3.27	0.84
Kamachile	11.2	5.2	0.78	1.05
		(40-50 cm. diameter class)		
Anabiong	7.8	2.8	4.71	0.87
Bitaog	9.7	5.9	1.85	1.53
		(50-60 cm. diameter class)		
Kalumpit	8.8	4.7	7.77	0.96
Kupang	6.9	2.5	5.15	0.73
Narra	5.6	2.0	3.18	0.56
Sakat	8.1	4.5	9.42	0.95

[1] Insufficiency of experimental trees did not permit representation of all species in the different diameter class.

Table 4. *Comparative over-all average tanbark yield, moisture content of bark samples, average calculated area of bark stripped and average bark thickness.*

Species	Av. yield (kg./sq.m.)[1]		Av. calculated area of bark stripped	Av. thickness of bark	Av. moisture content[2]	
	Green wt.	Air-dry wt.			Green condiiton	Air-dry condiiton
			sq.m.	cm.	Per cent	Per cent
Anabiong	7.7	2.6	3.99	0.86	240.41	12.27
Bitaog	9.7	5.9	1.85	1.53	86.00	12.40
Kalumpit	8.8	4.7	7.77	0.96	75.31	14.63
Kamachile	8.9	3.9	0.63	0.98	152.90	13.00
Kupang	7.7	3.0	8.35	0.86	195.29	12.74
Narra	5.6	2.3	3.25	0.63	74.00	30.40
Sakat	8.1	4.5	9.42	0.95	107.61	12.60

[1] Yields are over-all averages for all trees of each species by all methods of stripping.
[2] Moisture percentages based on oven-dry weight.

Table 5. *Callus formation, mortality and health condition of experimental upland tanbark trees in the Makiling National Park and vicinity.*

Species	Method of stripping	Tree No.	Callus formation[1]	Period from date of stripping to complete callus formation or last observation	Health condition of tree[2]	Remarks
			(30-40 cm. diameter class)			
	I	1	complete	1 yr. 8 mo. & 21 days	very unthrifty	one main branch broken due to strong winds.
		2	complete	1 yr. 8 mo. & 26 days	—	tree was thrifty after 1 year and 10 months from stripping but died at the end of 3½ years.
	II	1	complete	1 yr. 9 mo. & 26 days	—	tree was thrifty up to 3 years from stripping, but broken by wind.
		2	—	—	—	fair callus formation, 2 yr. 1 mo. & 18 days after stripping, but tree was broken by wind.
Anabiong	III	1	very little	4 yr. 7 mo. & 23 days	unthrifty	bole broken and severely attacked by termites.
		2	—	—	—	fair callus formation, 2 mo. & 27 days after stripping, but tree was uprooted by wind at the end of 2 years.
		3	—	—	—	no callus formation and broken by wind, 2 mo. & 27 days after stripping.
	IV	1	complete	8 mo. & 29 days	thrifty	—
		2	complete	8 mo. & 23 days	—	felled by kaingineros, 1 yr. & 2 monhts after stripping.

[1] Callus formation was rated as follows: very little — callus over approximately 5 to 15 cent of stripped surface; fair — callus 20 to 40 per cent of srtipped surface; almost complete — callus 90 to 95 per cent of stripped surface; and complete — callus 98 to 100 per cent of stripped surface.

[2] Observation of health condition was made at date of last observation.

Species	Method of stripping	Tree No.	Callus formation	Period from date of stripping to complete callus formation or last observation	Health condition of tree	Remarks
				(40-50 cm. diameter class)		
Anabiong	I	1	—	—	—	fair callus formation, 22 months and 15 days after stripping but broken by wind.
		2	—	—	—	fair callus formation, 2 months and 21 days after stripping but broken by wind.
		3	almost complete	2 yr. 6 mo. & 25 days	thrifty	—
	II	1	—	—	—	no callus formation, 2 months and 12 days after stripping, but tree died at end of 22 months.
		2	—	—	—	very little callus, 21 months & 25 days after stripping, but tree was uprooted by wind.
	III	1	complete	8 mo. & 26 days	thrifty	callus was flush with, and smoother than old bark.
		2	complete	4 mo. & 2 days	thrifty	- ditto -
	IV	1	complete	1 yr. 7 mo. & 24 days	—	uprooted by wind at end of 1 year and 9 months after stripping.
		2	complete	8 mo. & 27 days	thrifty	callus was flush with and smoother than old bark.
				(40-50 cm. diameter class)		
Bitaog	I	1	complete	10 mo. & 1 day	thrifty	callus was flush with older bark but was unevenly formed.
	II	1	complete	10 mo. & 1 day	thrifty	callus was almost flush with old bark but unevenly formed.
	III	1	complete	10 mo. & 1 day	—	tree was thrifty but it was felled to give way to building construction.
	IV	1	complete	9 mo. & 19 days	—	- ditto -

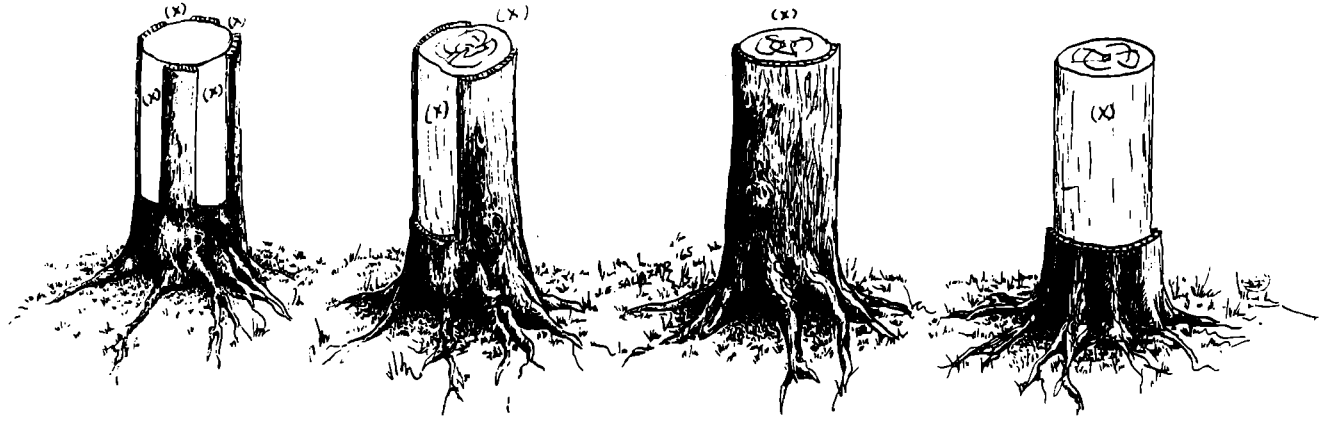
Species	Method of stripping	Tree No.	Callus formation	Period from date of stripping to complete callus formation or last observation	Health condition of tree	Remarks
			(50-60 cm. diameter class)			
	I	1	fair	4 yr. 5 mo. & 28 days	thrifty	—
		2	almost complete	4 yr. 5 mo. & 28 days	thrifty	callus smoother than old bark.
	II	1	fair	4 yr. 6 mo. & 19 days	thrifty	exposed sapwood severely attacked by termites and wood-decaying fungi.
		2	fair	4 yr. 6 mo. & 18 days	thrifty	- ditto -
Kalumpit		3	almost complete	4 yr. 6 mo. & 17 days	thrifty	—
		4	almost complete	4 yr. 6 mo. & 10 days	thrifty	—
	III	1	very little	3 yr. and 20 days	thrifty	callus along margin of wound swollen.
	IV	1	—	—	—	no callus was formed until tree died 1 yr. 9 mo. and 23 days after stripping.
		2	—	—	—	very little callus was formed until tree died 3 years after stripping.
			(20-30 cm. diameter class)			
	I	1	fair	3 yr. 3 mo. & 3 days	thrifty	callus along margin of wood swollen.
	II	1	fair	- ditto -	thrifty	- ditto -
Kamachile	III	1	fair	- ditto -	thrifty	- ditto -
	IV	1	fair	- ditto -	thrifty	thick callus was formed along margin of wood. Sprouts developed at base.

Species	Method of stripping	Tree No.	Callus formation	Period from date of stripping to complete callus formation or last observation	Health condition of tree	Remarks
				(*30-40 cm. diameter class*)		
	I	1	almost complete	3 yr. 3 mo. & 3 days	thrifty	callus was swollen and surface smooth but irregular.
	II	1	fair	- ditto -	thrifty	—
Kamachile	III	1	fair	- ditto -	thrifty	callus was swollen and surface smooth but irregular.
	IV	1	—	—	—	tree died 6 months after stripping due to severe termite infestation.
				(*50-60 cm. diameter class*)		
	I	1	complete	2 yr. 2 mo. & 20 days	thrifty	callus smoother than old bark.
	II	1	fair	- ditto -	thrifty	callus along edge of wound swollen; exposed wood attacked by wood-decaying fungi and termites.
Kupang	III	1	—	—	—	callus formation was very little after a lapse of 2 years and 2 mo.; bole broken by typhoon.
	IV	1	—	—	—	no callus was formed until tree died due to broken bole 1 yr 10 mo. and 23 days after stripping.
				(*70-80 cm. diameter class*)		
	I	1	almost complete	3 yr. 11 mo. & 2 days	thrifty	callus smooth but swollen.
	II	1	very little	2 yr. 10 mo. & 2 days	thrifty	exposed wood drying-up
Kupang	III	1	—	—	—	very little callus formation after 1 mo. and 18 days; tree was broken by wind.
	IV	1	complete	2 yr. and 14 days	thrifty	callus formation was irregular and swollen.

Species	Method of stripping	Tree No.	Callus formation	Period from date of stripping to complete callus formation or last observation	Health condition of tree	Remarks
				(50-60 cm. diameter class)		
	I	1	almost complete	2 yr. 7 mo. & 1 day	thrifty	callus flush with old bark.
		2	fair to complete	2 yr. 5 mo. & 27 days	thrifty	callus formation was complete at the lower 1/3 portion of stripped bole and only fair on the upper 2/3 portion.
	II	1	fair	2 yr. 2 mo. & 3 days	thrifty	—
Narra		2	fair to complete	2 yr. and 6 mo.	thrifty	callus formation was complete in one of the two stripped areas; the second has fair callus.
	III	1	very little	2 yr. 7 mo. & 7 days	thrifty	—
		2	very little	2 yr. 8 mo. & 14 days	thrifty	callus along edge of wound swollen; small patches of callus scattered over the exposed wood.
	IV	1	very little to complete	2 yr. 7 mo. & 2 days	thrifty	callus formation was complete in one of the two stripped areas; the second has very little callus.
		2	very little	2 yr. 8 mo. & 27 days	thrifty	exposed wood whitish; roots developed on callus around the upper girdle.
				(60-70 cm. diameter class)		
	I	1	fair	2 yr. 6 mo. & 22 days	thrifty	callus formed along edge of wound swollen.
	II	1	very little	2 yr. 6 mo. & 21 days	unthrifty	—
Narra	III	1	very little	2 yr. 6 mo. & 15 days	thrifty	—
	IV	1	fair	2 yr. 6 mo. & 10 days	—	tree beginning to shed its leaves (normal summer shedding of leaves).

Species	Method of stripping	Tree No.	Callus formation	Period from date of stripping to complete callus formation or last observation	Health condition of tree	Remarks
			(50-60 cm. diameter class)			
Sakat	I	1	almost complete	4 yr. 6 mo. & 8 days	thrifty	—
		2	—	—	—	very little callus was formed until the tree died 1 yr. and 8 months after stripping.
	II	1	—	—	—	fair callus formation after 1-1/2 years from stripping but tree died at end of 1 yr and 11 mo.
	III	1	very little	2 yr. 11 mo. & 5 days	thrifty	—
	IV	1	—	—	—	very little callus formation 26 days after stripping, but tree died at end of 10 mo.

Figure I
Experimental methods of stripping. (X) showing bark sections to be stripped.



Chemical Control of Anabiong in Forest Plantations

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A weed is a plant that is out of place, a plant growing where it is desired that something else should grow, or a plant whose potentialities for harm is more than its potentialities for good. It can be a grass, vine, shrub, tree or any plant (Ahlgreen, Klingman and Wolf, 1961.) In Forestry, a weed tree is one that has no known value or it may be a useful tree but growing in a place where it is not supposed to grow.

Anabiong (*Trema orientalis* Linn. Blume) is in that category. The wood can be used for wallboards (Lopez, 1953) and for pulp but this tree usually grows in the plantations, competing with the favored species. In many instances, it dominates the planted trees. It grows and reproduces very fast. It is surprising indeed how fast and thickly it grows even if there are no mother trees in the vicinity (Figure 1).

No previous studies have, as yet, been made on how to control this species. Consequently, something should be done. There should be a way by which this species can be controlled. This study was conducted to determine its response to 2, 4 — Dichlorophenoxyacetic acid, popularly known as "2, 4-D".

REVIEW OF LITERATURE

"2, 4-D" is widely used in the United States and other countries as a tree poison (Brinkman, 1959; Grano, 1956; Halls and Burton, 1951; Jemison, 1949; McQuilkin, 1957; Peevy, 1951; Stephenson and Gibbs, 1959; Walters, 1959).

In the Philippines, 2, 4-D as a tree poison was first tested in 1959 when the study reported in this paper was made. It was also in 1959 when it was first tested as a vine poison. Between 1959 and at this writing (September, 1964), a few experiments have already been conducted on the use of 2, 4-D in the control of weed tree species. The results are briefly discussed below:

Busa (1959) tested the effectivity of 2, 4-D on Uoko (*Mikamia scandens* Willd.), which is a weed vine that is both a creeper and a climber, using three concentrations, *i. e.*, 1/2, 1, and 2 ounces per gallon of water. The solutions were sprayed over several plots at the rate of 1/4 to 1/3 gallon. All the solutions were effective although the killing period varied with the concentration. The 1/2 ounce concentration exterminated the vines on the 10th day after application and the 1- and 2- ounce concentrations on the fifth and third day, respectively. There was no regrowth of the vines.

Bikal stems (*Schizostachyum diffusum* Blanco, Merr.) were affected when treated with four different concentrations (1, 2, 3, and 4 ounces per gallon of diesel oil) of 2, 4-D (isoproyl ester). All the affected bikal stems, however, recovered. This suggested that 2, 4-D was effective on bikal but a higher concentration was needed (Baniqued, 1960).

A few species of *Ficus* were also treated with 2, 4-D and 2, 4, 5- Trichlorophenoxyacetic acid (2, 4, 5-T) by Seguritan (1960) in a few studies conducted in the Makiling Forest. The main study involved treatment of hagimit [*Ficus minahassae* (Teijsm,. & De Vr.)] of various sizes with 1% (by weight) solutions of 2, 4-D (isopropyl ester, 3.34 lbs. acid equivalent per gallon) and 1% (also by weight) of 2, 4, 5-T (butoxy ethanol ester, 4 lbs. acid equivalent per gallon), using diesel oil as carrier. These solutions were applied in frills and in basal sprays. He found out that after 22 weeks, 2, 4, 5-T at 1% concentration was effective (90% kill) but 2, 4-D with the same concentration was not (only 3% kill). For hagimit, the frill method of application was more effective (100% kill) than the basal spray method (80% kill).

Seguritan's supplementary studies showed very promising results: (1) 2, 4-D was effective as a basal spray on hagimit when the concentration was raised to 8 per cent; (2) 1 per cent solution of 2, 4, 5-T was effective as a basal spray on malatibig (*Ficus congesta* Roxb.) and (3) small-and large-leaved balete trees (*Ficus* spp.) of small or medium sizes could be killed using 2, 4-D and 2, 4, 5-T in diesel oil solutions at 1 per cent and

2 per cent concentrations but concentrations higher than 2 per cent seemed necessary for very big trees.

For a detailed review of literature and an annotated bibliography on chemical control of vegetation in Forestry (as of 1959), Gerardo's work (1959) is very useful.

No studies have yet been made on the control of anabiong in forest plantations or in other areas.

MATERIALS AND METHODS

Materials

Description of 2, 4-D. — 2, 4-D is a synthetic plant hormone capable of killing or greatly retarding growth of some plants. It is usually absorbed into the leaves or stems but also enters through the roots. It tends to accumulate at places like the growing tips or roots where sugar is being used or stored. Once inside the plant, it is translocated to all parts of the plants. Physiological processes are also interrupted (Dahms and James, 1950; Frear, 1948).

The pure 2, 4-D acid is only slightly soluble in water and in petroleum oils. It should, therefore, be changed into a salt formulation. The following are its most common formulations: sodium salts, amine salts, ammonium salts, ester formulations and dusts. The ester formulations are generally considered the most toxic to plants. These formulations are usually sold as liquids which form emulsions with water and other carriers. They are synthesized by the reaction between 2, 4-D acid and an alcohol, with the elimination of one molecule of water. The name of the formulation is identified by the name of the alcohol, *i.e.*, methyl ester, isopropyl ester, etc. (Ahlgreen, Klingman, and Wolf, 1951).

Methods

Selection and preparation of materials.—Healthy anabiong trees used in the study were selected in the plantations in the Makiling Forest. They were within four diameter classes, with mid-points of 10, 20, 30, and 40 cms. Each diameter class was represented by 30 trees making a total of 120 trees. Every tree was marked with two numbers, one for the diameter class and below it was the number of the tree in that diameter class.

Three clean gasoline cans were each filled with a gallon of diesel oil. Then, by the use of a graduated cylinder, three measurements of an emulsible concentrate of isopropyl ester of 2, 4-D containing 3.34 lbs. 2, 4-D acid equivalent per gallon were made, *i.e.*, 1, 2, and 3 ounces. Each of these was mixed with the diesel oil contained in each of the cans. These were the solutions with different concentrations that were used in the study.

Experimental Design. — The study was a two-factor experiment with tree size (diameter) as the main factor and concentration of solutions as the other factor.

The 30 trees of the 10 cm. diameter class were divided into three groups of 10 each. One group was treated with the solution having the first concentration, another group with the second concentration, and the last group with the third concentration. The same was true with the trees belonging to the other three diameter classes. To avoid biased results, the allocation of the trees to each of the concentrations was done by drawing lots to attain randomness.

Application of solutions. — The frill method of application was used in this sutdy. The tree was encircled with a single row of overlapping bolo cuts deep enough to penetrate a short distance into the wood. The frills had about 45° angle from the axis of the tree and were made as uniform as possible in depth by exerting a uniform force to every stroke of the bolo. The solution was introduced into the wood through these frills by means of a tin can oiler with a spout. The spout was inserted a little in a frill, then pressure was applied at the back of the can and stopped only when the frill was saturated and the solution was about to drip. The amount of solution applied to each tree was, therefore, about the same per unit tree circumference.

Data Collection. — The trees were visited once a week after application of the solution until the 24th week when all the trees were already dead.

For each tree, the date at which the effect of the poison was first noticed, like wilting of a few leaves of twigs on the bole or in the crown, and turning of the bark of the trunk or roots to red, was recorded. A tree was said to be completely killed when all the leaves, the bark of the trunk and roots had become dried. The roots examined were those exposed on the soil surface. The number of weeks the solution took to affect each tree (pre-killing period) and the number of weeks it took to completely kill each tree (killing period) were the data gathered for analysis.

Data analysis. — The data were analyzed by the analysis of variance method. The degrees of freedom for each variable were partitioned into their components to allow orthogonal comparisons of treatments within each variable.

FIG. 1. Natural stand of young anabiong trees in an open area where there were no other trees around.

FIG. 2. Anabiong trees, 16 weeks after treatment with 2, 4-D showing the conditions of the crowns of the 10 cms. and 40 cm. diameter trees.

FIG. 3. The frilled trunk of a 10 cm. diameter tree showing the condition of the bark at 16 weeks after treatment with 2, 4-D.

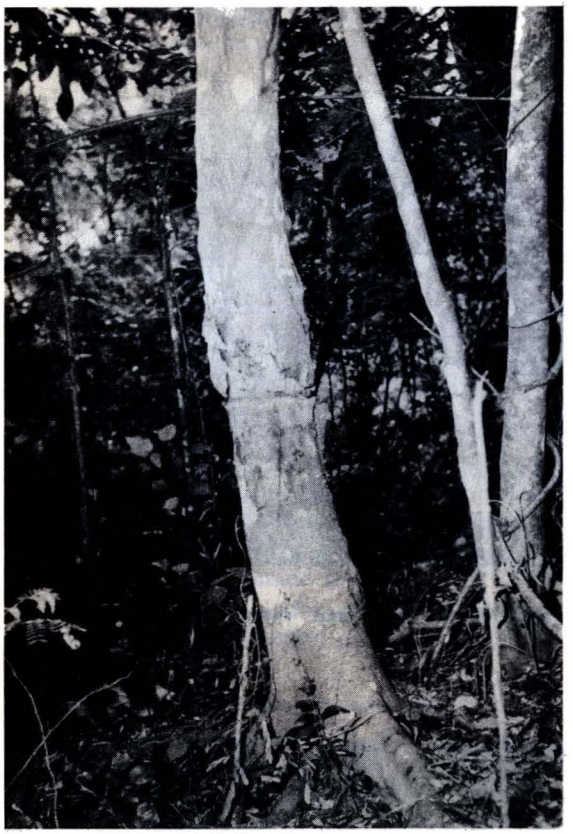

FIG. 4. The frilled trunk of a 20 cm. diameter tree, 16 weeks after treatment with 2, 4-D.

FIG. 5. The frilled trunk of a 40 cm. diameter tree, 16 weeks after treatment with 2, 4-D.

RESULTS AND DISCUSSIONS

The results of this study are summarized in Tables 1 and 2. The analyses of variances are summarized in Tables 3 and 4.

a. *Effects of 2, 4-D.* — The trees took an average of 5.57 weeks (39 days) to be affected by the poison (Table 1).

Table 1. Average number of weeks between date of application of 2, 4-D and date of occurrence of first damage to trees (pre-killing period). Bases of means: 10 trees for each combination of diameter class and concentration, 30 trees for each concentration, and 40 trees for each diameter class.

Concentration (oz./gal.)	Diameter classes, cms. 10	20	30	40	All diameter classes
1	5.5	5.1	5.7	8.9	6.3
2	3.4	5.6	4.6	11.5	6.3
3	1.3	3.4	3.7	8.1	4.1
All Concentrations	3.4	4.7	4.7	9.5	5.57

The first sign of the effect of the poison was the wilting and dropping of the leaves of the small twigs at the bole of the trees. Then the crown became less dense. In some cases, there was a gradual decrease in crown density until all the leaves dropped. In other cases, shortly after crown density decreased, all the remaining leaves had wilted and dropped at about the same time. Sometime after the effect of the poison on the leaves was noticeable, the bark and/or the roots began to be affected by first turning to a red color inside and eventually had become dried and had peeled off (Figures 3 and 5).

In cases where the treated trees were not affected early, the diameter of the tree above the frills became larger than the diameter below the frills (Figure 4). This is logical considering the passage of food materials in the tree. The raw food materials from the roots pass through the xylem to the leaves and the manufactured foods pass through the phloem from the leaves to all parts of the tree. Since the solution was not injected or introduced completely into the sapwood and the bark (at the frills) was completely saturated with the solution, it is logical to assume that at the early period of killing, the raw materials from the roots were able to pass to the leaves and the manufactured foods could not go down bleow the frills. As a result, the base below the frills was starved so that it had ceased to grow while the trunk above the frills continued to grow because it had the manufactured foods to use.

In a few cases, sprouting occurred below the frills near the ground during the middle part of the observation period. However, in all sprouting cases, all the sprouts had died shortly after the roots began to be affected by the poison by turning red.

After application, the poison took an average of 19.3 weeks (135 days) to kill the trees (Table 2). At the end of the 24th week after application, all the treated trees were already dead.

Table 2. Average number of weeks between date of application of 2, 4-D and date of complete killing of trees (killing period). Bases of means: 10 trees for each combination of concentration and diameter class, 30 trees for each concentration, and 40 trees for each diameter class.

Concentration (oz./gal.)	Diameter classes, cms. 10	20	30	40	All diameter classes
1	16.7	19.4	21.1	22.2	19.8
2	17.2	19.0	20.0	21.0	19.3
3	14.2	18.1	20.5	21.1	18.5
All Concentrations	16.0	18.8	20.5	21.4	19.3

b. *Effect of tree size.* — The mean pre-killing period or the date of application to date of occurrence of first damage for the 10 cm. diameter class (3.4 weeks) was significantly shorter than either of the 20 and 30 cm. diameter classes (4.7 weeks each) or of the 40 cm. diameter class (9.5 weeks). The pre-killing period for the 40 cm. diameter class was the longest. The pre-killing periods of the 20 and 30 cm. diameter classes were intermediate (Tables 1 and 3).

Table 3. Analysis of variance of pre-killing period data.

Source of Variation	d.f.	SS	MS	F
Treatments	11	849.87	77.26	5.10**
Diameter, D	3	651.80	217.27	14.35**
10 vs. rest	1	187.78	187.78	12.40**
40 vs. 20 & 30	1	464.00	464.00	30.65**
....20 vs. 30	1	0.02	0.02	— n.s.
Concentration, C	2	124.72	62.36	4.12*
3 vs. 1 & 2	1	124.71	124.71	8.24**
1 vs. 2	1	0.01	0.01	— n.s.
D x C	6	73.35	12.22	0.81 n.s.
Error	108	1635.60	15.14	
Total	119	2485.47		

* — Significant at the 5 percent Level.
** — Significant at the 1 percent Level.
n.s.—Not significant.

The killing period, or the date of application to the date of complete killing for diameter classes and concentrations, followed the same trend as the per-killing period (Tables 2 and 4). Therefore, it can be said that the smaller trees were affected and killed earlier than the bigger trees. The resistance of the tree to the effect of the poison increased with increase in tree size. This conforms to the findings of McQuilkin (1957).

Table 4. Analysis of variance of killing data.

Source of Variation	d.f.	SS	MS	F
Treatments	11	583.29	53.03	6.75**
Diameter, D	3	507.82	169.27	21.50**
10 vs. rest	1	403.22	403.22	51.30**
20 vs. 30 & 40	1	92.45	92.45	11.76**
30 vs. 40	1	12.15	12.15	1.56 n.s.
Concentration, C	2	38.31	19.16	2.44 n.s.
3 vs. 1 & 2	1	32.26	32.26	4.10*
1 vs. 2	1	6.05	6.05	0.77 n.s.
D x C	6	37.16	6.19	0.79 n.s.
Error	108	848.50	7.86	
Total	119	1431.79		

* Significant at the 5 per cent level
** Significant at hte 1 per cent level.
n.s.—Not significant.

c. *Effect of Concentration.* — Pre-killing period for the 3-ounce concentration (4.1 weeks) was significantly shorter than either of the 1-ounce or 2-ounce concentrations (both 6.3 weeks). The latter two are the same and, therefore, not significantly different (Table 1 and 3).

The same was true for the killing period. The killing period for the 3-ounce concentration (18.5 weeks) was significantly shorter than either of the 1-ounce (19.8 weeks) or of the 2-ounce (19.3 weeks) concentrations. Again there was no significant difference between the killing periods for the 1-ounce and 2-ounce concentrations.

The result of this study means that the effectiveness of the poison was the same whether the concentration was 1-ounce or 2-ounces per gallon of diesel oil. When the concentration was increased to 3-ounces per gallon, however, there

was an advantage both in the length of time required for beginning of damage and the length of time required for complete killing over the two lower concentrations. It is recommended, therefore, that the 1-ounce concentration be used if there is no hurry in killing but the 3-ounce concentration should be used if fast killing is desired especially for big trees.

d. *Interaction.* — The interaction of tree size and concentration, if any, was not great enough to be significant. Therefore, the effect of tree size on both pre-killing and killing periods and of concentration on pre-killing period are independent of each other, meaning, the effect of tree size does not depend on concentration and *vice versa.*

SUMMARY

This study was conducted to test the effectiveness of 2, 4-D diesel oil solutions on anabiong trees which have been observed to be a problem in plantations and in second growth forests. In addition, the effects of concentrations (1, 2, and 3 ounces per gallon of diesel oil) and of tree size (diameter) were determined.

The results showed that 2, 4-D was effective in killing anabiong trees, all treated trees being killed at the end of the 24th week after application. Resistance to the poison increased with increase in tree size. The 2-ounce concentration had no advantage over the 1-ounce concentration but the 3-ounce concentration had a definite advantage both in the length of time required for beginning of damage and the length of time required for complete killing over the two lower concentrations.

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NATIONAL FOREST . . .
(*Continued from page* 30)

7) Adequate training should be provided for all concerned with the management of forests or the utilization and processing of forest products. In particular, foresters and allied technicians should be trained in sufficient numbers to staff public services and other interests concerned with forestry and forest products. For the higher grade personnel, such training should be provided at schools or university standard, established, to the extent that this is possible, in the country concerned. Subordinate personnel should receive suitable basic training to enable them effectively to fulfill their duties.

Formulation and adoption of the Philippine national forest policy.— There are various ways of formulating and adopting a national forest policy. The most convenient would be to have one formulated and then have it adopted by joint resolution of the Congress of the Phiilppines. Or, since there is as yet no NATIONAL FORESTRY CODE, it is possible to make the forest policy a sort of introduction or "preamble" to the code, and all the codal provisions should give substance to the policy statements.

In this connection, the urgency of the codification of the forest laws of the Philippines has long been felt. Our various forestry laws are scattered in pieces of legislation and these have never been put together, nor have some of their inconsistencies been reconciled. It is really high time for all laws relating to the administration of the public forests, national parks, game sanctuaries, reforestation plantations, including the utilization and enjoyment of their products and services be codified. All previous attempts to do this — by Congress, forestry associations, trade groups, government agencies, planning units — had been half-hearted and desultory. Over the years the services of a number of foreign forestry experts had been engaged by the United Nations, the U.S. Agency for Internation Development (AID) to help out in our forest policy formulation but there is no adopted policy to show for all of these efforts.

Who will formulate the policy? Congress will eventually have to adopt it and it might just as well take the initiative in its formulation. The Committee on Forests of the House of Representatives could initiate this. The goal should be a National Forest Policy as an integral part of a National Forestry Code. It is believed that all the forestry agencies and associations would be more than willing to participate in so worthy an undertaking.

Range Lands-Its Importance to Philippine Economy

by

NEPTALE Q. ZABALA

INTRODUCTION

The Philippines is increasing its population by a million a year. This phenomenon will adversely affect the unstable economy of the island. We are producing less food than we are increasing our population. Unemployment, hunger, poverty, skyrocketing prices of commodities, crimes and other evils continue to plague the country and an immediate solution must be sought less we find it too late to solve them. There are many approaches to tackle these problems and one basic solution would be to increase food production. To attain this goal, we have to utilize our natural resources wisely. And the range lands of the Philippines invite a challenge for proper conservation to help bolster its economy.

If properly developed, utilized, and managed, the 5.5 million hectares of range lands in the country will certainly be more than enough to support and raise animals that will supply us with milk, meat, and other dairy products and materials that can be derived from them. The hundred of million ot pesos that we are spending every year for the importation of these products can then be used instead for the development of the livestock industry.

SOIL COVER OF THE PHILIPPINES

According to the annual report of the Bureau of Forestry for the fiscal year 1962-63, on land classification, the soil cover of the Philippines are: cultivated lands, 11,210,-050 (37.70%); commercial forest, 8,257,556 (27.76%); non-commercial forest, 4,102,021 (13.80%); openland, 3,475,299 (11.68%); brushland, 2,033,917 (6.83%); and swamps and marshland, 662,447 (2.23%).

PHYSICAL CONDITION OF RANGE LANDS

As mentioned in the preceding section, openlands has an area of 3,475,299 hectares and brushlands, 2,033,917 or the total present and potential range lands is 5,509,216 (18.51%) hectares of the total land area of the Philippines. These range lands are distributed in the provinces of Bukidnon, Cotabato, Nueva Ecija, Nueva Vizcaya, Isabela, Ilocos, Negros, Masbate, Samar, Tarlac, Palawan, Mindoro etc. The elevations of these range lands varies from province to province and its topography is from rolling to steep. Most of these lands are situated in an area where the climate is really favorable for forage growth and for animal health.

The dominant forage that can be found on these range lands is cogon except on some other improved pasture where a variety of palatable grass and legumes were already introduced. The cogon grass is palatable when young to the animals but become less preferred when mature. Brush and trees are also found on these lands and a number of these plants are also palatable to some animals.

To the Philippine ranges, livestock as sheep, goats, or cattle can be grazed. Beef is in great demand in the market and so cattle can be raised more profitably than other livestock. Cattle generally prefer grassy range but will take considerable amount of

browse, especially when the grass is dry. They do best on flat or rolling ranges, with easy access to water and are not well suited to ranges with high altitude. Sheeps and goats can also be raised as they are browser. They prefer ranges with abundant forbs. So that they can be grazed on these brushlands. With smaller body size, they can climb higher ranges than cattle.

Forage grows abundantly throughout the year, except in some provinces in Central Luzon where there is a pronounced dry season when grasses became dormant or ceases to grow. One hectare of natural pasture can sustain one cattle.

MANAGEMENT PRACTICES

Although the ranges are mostly found on areas where there is favorable conditions for forage growth and animal health, the livestock industry in the country is still considered inadequate as manifested by the importations of millions of pesos worth of meat, milk, and other dairy products. In 1960, we have imported ₱62 million worth of meat, and ₱115.5 million of dairy products. According to the NEC estimate, a person should at least eat 33 kilos of meat per year. And we are producing less than what actually is needed. The inadequacy of our livestock industry may be attributed to the lack of incentives on the part of the government and the poor management of our range lands. If we are to succeed in the livestock industry, the basic and foremost consideration among other things, should be to secure maximum sustained supply of natural forage crop for the grazing animal without serious damage to other resources or use of the land. And this involves (1) an inventory of existing and potential forage resources and (2) adjusting and maintaining grazing use in balance with these resources.

Inventory of Range Lands:

The Bureau of Forestry have already classified some of the public lands and delineated such lands into different uses. However, no attempt has been made yet to go into the inventory of our range lands; to determine its suitability for grazing purposes; because of lack of personnel who have the technical know-how to carry on the job. Such inventory usually requires the collection of basic information as (1) the principal kinds and communities of range vegetation, their characteristics, and responses to grazing; (2) delineation of the different kinds of rangelands, into range sites; (3) determination of range condition on each kind of range land; and (4) determination of stocking rate to suit the correct degree of grazing. After all these facts are gathered then we can make workable plans for the proper utilization of our range lands.

Control and maintenance of grazing use:

The first step would be to control and maintain proper grazing use. This involves four basic principles: (1) the kind of animals grazed should be suited to the range; (2) they should graze at the proper season and for a proper length of time; and (3) their numbers should not be large enough that they eat more than the forage production capacity of the land, and (4) they should be properly distributed over the range.

Kinds of Animals:

The kind of animals or livestock to be raised would depend on such factors as (a) local demand for grazing a certain kind of livestock; (b) the kind of animals for which the range is most suitable, and (c) benefits to the range by changing to another kind of livestock. In the country, demands for meat and dairy products are high so that cattle may be the preference. However, the topographic condition of the ranges may not only be suitable to cattle, that other livestock like sheep and goat, hogs or even horses can also be raised to graze the area.

Season of use:

Unlike temperate countries where there is a definite season for grazing during the year, the Philippines as a tropical country

doesn't have any except in some parts where there is a pronounced dry and wet season. It is better if animals are not held too long in any one place and if they are moved on or before the range become dormant during the dry season. Range plants, particularly perennials, grasses and shrubs, should not be grazed before they have made considerable growth or at least have produced seeds. Too early grazing prevent plants from reaching the point where seed is formed. Rotation grazing would be a sound practice. A ranch can be divided into blocks and the blocks will grazed once at a time. This will give the forage of the other block enough time to rejuvenate until it will be grazed again.

Number of animals:

The number of animals which is grazed on any range largely determines how closely the forage is utilized. If plants are grazed too early, they will gradually die out. The more resistant, undesirable forage plants will recover first filling the range with less desirable species. Finally, the hungry animals will graze the less desirable species and a barren range may result. As the plant cover is destroyed, the unprotected soil is washed away and the usefulness of the range is completely lost. The number of animals must always be balanced with the sustaining capacity of the rangeland.

Distribution:

Animals should be evenly distributed over the range in order to avoid overgrazing in some areas and light or no use in others.

Improvements:

The necessity for providing enough food for domestic consumers and in so far as possible, for foreign people, is self evident. Increased food consumption necessitates increased food production. Range improvements is considered a vital undertaking to increase the production of the land. The present carrying capacity of one head of cattle per hectare is considered very poor and subsequently would not guaranty to produce more goods. If a pasture is improved, it can carry as much as seven to ten head per hectare. And with the 5.5 million hectares of rangeland, the country can sufficiency supply the local market with meat and dairy products.

Some of the worthwhile range improvements, in addition to proper range management are those which compliment good management. They are: (a) water development in areas of unused or little used feed where water is a principal limiting factor, or where such development will result in better range use in the surrounding area; (b) fencing to make possible rotation grazing, or to eliminate trespass; (c) range pitting and contour furrowing to conserve and utilize all water in contact with the soil; (d) access roads and trails to make otherwise unused range forage available and usable; and (e) control of poisonous and undesirable plants.

Range improvement measures are sometimes costly but the benefits compensate the cost. In some areas where there is a pronounced dry and wet season, water is a great problem especially during the dry season. Streams dry and forage wilts. Digging of wells is the usual measure taken by the local farmers. But this endeavor is costly and solve the problem sometimes only partially. The most practical approach is to protect and preserve the watershed. Watersheds should not be overgrazed. If an area is located in a nearby forest, the trees in that forest should not be cut indiscriminately.

Another measure would be to improve the forage. Forage improvement can be accomplished by reseeding; planting of more nutritious and palatable plants, and the application of fertilizer. Many range have been so depleted by overgrazing that they need reseeding to bring them back into production. The common method used in the coun-

try now, in case of ranch whose dominant forage is cogon, is by burning the area. This practice is both destructive and hazardous. It will cause damage to the soil and most often results in the encroachment by undesirable species of plants. The best thing to do is to plant the area with another species that can outgrow the cogon grass. Legume-grass combination is an excellent forage.

ECONOMIC IMPORTANCE

In the United States and some other countries, the production of livestock is a big business by any standard. Pasture or rangelands is the source of the cheapest feed that can be grown. Livestock feed in general is 55 percent forage and 45 percent concentrates. Dairy cattle consumes 74 percent forage and 26 percent concentrates; beef cattle, 82 percent forage and 18 percent concentrates; horse and mules, 68 percent forage and 32 percent concentrates; hogs, 3 percent forage and 96 percent concentrates; poultry, 5 percent forage and 95 percent concentrates; and sheeps and goats, 94 percent forage and 6 percent concentrates. Livestock convert these forage and concentrates into human food with the gratest efficiency.

Aside from being the cheap source of livestock feed, our range lands plays an important role in the conservation of soil and water.

CONCLUSION

As population increases the need for more lands is obvious. It is the duty of the government to accelerate the classification of lands, so that it can be put into productive use. Misuse of these lands can then be avoided. Range lands should not be alienated and disposed as agricultural lands once classified as such, so as not to deprive the country of its material for the production of more meat, milk, and other dairy products.

It is through information and education that we can open the minds of our people to the importance of our rangeland as a source of food. There is a great need for men who can carry out these job in the country. The reason why we are lagging behind in the livestock production is the lack of men who have the technical knowledge and know-how in this special field of endeavor. Surely, many are yet to be done for the perpetuation and use of our rangeland.

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Plywood Exposure Tests. (Sixth Progress Report)

by

EMILIO JARANILLA

SUMMARY

This report covers the results of tests and observations on red lauan and bagtikan plywood bonded with melamine-type adhesive after two years of exposure to outdoor conditions.

The study showed that the adhesive was not durable and therefore could not be considered suitable for use in the manufacture of Type I plywood.

INTRODUCTION

The study presented in this report is a continuation of a previous study[1] conducted on a melamine-type adhesive submitted by a certain chemical company. As per original agreement, the adhesive was to be tested in accordance with the requirements for Type I plywood bond.

This investigation was conducted to evaluate the performance of this adhesive as it is exposed to the changing weather conditions in the Philippines. Its performance would indicate the extent to which it can be considered serviceable for exterior use.

MATERIALS

Laboratory-prepared panels, made of red lauan and bagtikan heartwood, were used. They were of the three-ply constructions, consisting of 1/16-inch veneer for faces and backs, and 1/8-inch for cores.

The melamine-type adhesive used has the following components:

COMPONENTS	PARTS BY WEIGHT
Liquid	100
Powder	46
Total	146

EXPERIMENTAL PROCEDURE

A panel was randomly taken from each of the triplicate panels previously manufactured under the following experimental variables:

1. Spread: 30 and 40 lbs/M sq. ft. SGL
2. Pressing time: 2 and 4 minutes
3. Assembly time: 10, 30 and 90 minutes
4. Moisture content: 6 and 12 per cent.

Thus, a 2 x 2 x 3 x 2 factorial design was used, with each variable represented in the 24 panels that were studied.

All the panels were nailed at two selected points on the center of each panel to a veritcal test fence facing south. The lowest row was 24 inches above the ground. A distance of 2 inches separated each test piece.

The test panels were removed after two years. It was observed that delamination was present in nearly all the test specimens. Delamination was measured. Bond strength was evaluated by means of the dry shear test.

Analysis of results

1. The shear strength and wood failure (bond strength) obtained after two years was compared to the corresponding shear

[1] Manzo, P. M. and I. M. Laroya. 1962. A study on melamine-type adhesive for Type I plywood.

strength and wood failure after fabrication. The comparison was expressed quantitatively as the per cent reduction in bond strength given in the following formula:

$$\text{Bond strength reduction, per cent} = \frac{\text{Original bond strength} - \text{bond strength after two years}}{\text{Original bond strength}} \times 100$$

The formula was based on the assumption that the original bond strength was the maximum value that could be attained under the combination of variables used. The values obtained are tabulated in Table 2.

2. An analysis of variance was employed to test the hypothesis that the variables used have an effect on the amount of shear strength reduction. The F-test values are shown in Tables 3 and 4.

3. Delamination was evaluated by classifying the panels as either failed or have not failed. Failure was attained when the total delamination exceeded four inches in length, or 4 per cent of the glue line. The delamination presented in Table 1 was expressed as a per cent of the total glue line.

RESULTS AND DISCUSSIONS

The comparison between the panels which were originally fabricated and those exposed after 2 years showed that there was a significant reduction of bond strength after two years. On the average, the shear reduction of red lauan and bagtikan was 24 per cent and 18 per cent, respectively. The average reduction in wood failure was 77 per cent for red lauan and 69 per cent for bagtikan. This reduction in bond strength indicates that tension and compression stresses, set up on the width and thickness of the plywood panels, were sufficiently great to cause degradation of the glue line.

The analysis of variance showed that the main variables used during the fabrication of the panels have no effect on the reduction of shear strength. This also includes their first order and second order interactions. The result shown by the analysis of variance could be interpreted in two ways. The first interpretation assumes that the effect of the variables has been confined only to the manufacturing operation and that the variables have no more effect as far as the service performance of the plywood is concerned. The second interpretation assumes that the effects of other factors, such as weathering, stressing of the glue line due to moisture content changes, were far greater than the effects of the variables used in the study, in degrading the glue line. The latter interpretation is believed to be better because of the physical and chemical changes that is inherent in weathering which probably occurred simultaneously with mechanical degradation.

Wood failure was not treated statistically in the same manner as the shear strength because of the semi-subjective method of evaluating it from the shear specimens. No conclusion as to the effect of the processing variables on the reduction of wood failure could therefore be made.

The evaluation of delamination showed that 17 out of 24 or about 71 per cent delaminated in red lauan. In bagtikan, 16 out of 24 or 67 per cent delaminated. The specimens which failed were 10 out of 24 or about 42 per cent for red lauan and 9 out of 24 or about 38 per cent for bagtikan. These results show that there was excessive delamination after only two years of exposure to outdoor conditions.

CONCLUSIONS

In assessing the performance of an adhesive, both its strength and durability must be taken into consideration. In most cases, durability is considered as the better criterion.

The results of the exposure test showed that the service performance of the melamine-type adhesive submitted by the chemical company concerned was not satisfactory The reduction in bond strength is moderate, but the excessive number of delaminated panels and the number of specimens that failed because of delamination within a span of only two years, pointed out that the adhesive was not durable. Hence, the adhesive is considered not suitable for use in the manufacture of Type I plywood based on the aforementioned findings.

Table 1. *Bond strength and delamination of red lauan and bagtikan panels after two years outdoor exposure.*

TREATMENTS	RED LAUAN			BAGTIKAN		
	Shear strength (psi)	Wood failure (per cent)	Delamination (per cent)	Shear strength (psi)	Wood failure (per cent)	Delamination (per cent)
$M_1A_1S_1t_1$	169	4	3.1	249	20	1.0
$M_1A_1S_1t_2$	231	44	1.0	280	23	13.5
$M_1A_1S_2t_1$	172	10	None	274	25	4.2
$M_1A_1S_2t_2$	189	10	None	241	32	None
$M_1A_2S_1t_1$	179	8	5.7	245	12	1.0
$M_1A_2S_1t_2$	236	18	None	240	12	0.5
$M_1A_2S_2t_1$	209	14	None	242	38	None
$M_1A_2S_2t_2$	179	10	None	266	60	1.0
$M_1A_3S_1t_1$	156	23	0.5	256	34	9.4
$M_1A_3S_1t_2$	181	18	2.1	236	26	26.0
$M_1A_3S_2t_1$	210	31	None	283	39	1.0
$M_1A_3S_2t_2$	211	43	None	274	35	None
$M_3A_1S_1t_1$	240	41	26.0	238	17	14.5
$M_3A_1S_1t_2$	172	11	26.0	273	28	14.5
$M_3A_1S_2t_1$	204	18	18.2	270	59	None
$M_3A_1S_2t_2$	225	34	19.8	280	36	None
$M_3A_2S_1t_1$	215	27	26.0	266	12	15.6
$M_3A_2S_1t_2$	254	25	9.4	274	14	6.2
$M_3A_2S_2t_1$	203	21	3.1	250	22	None
$M_3A_2S_2t_2$	192	22	12.5	236	19	None
$M_3A_3S_1t_1$	160	6	26.0	275	51	7.0
$M_3A_3S_1t_2$	165	9	7.3	242	29	2.6
$M_3A_3S_2t_1$	206	26	0.8	262	16	3.1
$M_3A_3S_2t_2$	203	19	1.5	279	40	None

Legend:

M_1 = 6 per cent moisture content
M_3 = 12 per cent moisture content
A_1 = 10 minutes assembly time
A_2 = 30 minutes assembly time
A_3 = 90 minutes assembly time
S_1 = 30 lbs. spread, MSGL
S_2 = 40 lbs. spread, MSGL
t_1 = 2 minutes pressing time
t_2 = 4 minutes pressing time

Table 2. *Reduction in bond strength after two years exposure.*

Panel No.[1]	RED LAUAN		BAGTIKAN	
	Reduction in shear strength (per cent)	Reduction in wood failure (per cent)	Reduction in shear strength (per cent)	Reduction in wood failure (per cent)
1	35.5	95.9	25.4	78.9
2	8.7	55.6	15.2	74.7
3	36.8	89.9	19.6	72.8
4	22.2	89.6	26.5	63.6
5	26.0	91.9	21.5	87.6
6	16.9	81.8	21.0	87.8
7	21.4	85.8	27.3	57.8
8	26.0	89.8	18.4	37.5
9	39.3	76.0	11.7	64.2
10	27.6	81.6	27.2	71.7
11	20.4	67.7	6.9	59.8
12	14.2	56.6	17.7	62.0
25	0	40.6	22.2	81.5
26	38.3	87.8	18.8	70.5
27	28.4	77.5	12.3	37.2
28	18.5	63.4	9.1	63.2
29	19.5	70.6	11.9	87.2
30	8.3	70.9	13.8	85.1
31	23.7	78.4	20.9	77.3
32	31.4	76.1	22.4	80.2
33	38.9	93.9	18.6	45.7
34	28.6	90.0	22.7	67.8
35	16.2	64.9	15.2	83.0
36	24.0	80.0	17.0	58.8

[1] Panel numbers designate the same treatments as shown in Table 1.

Table 3. *Analysis of variance of red lauan.*

Source of Variation	D. F.	Sum of squares	Mean square	F
M	1	9.88	9.88	N.S.
S	1	14.72	14.72	N.S.
t	1	34.08	34.08	N.S.
A	2	99.07	49.53	N.S.
M x S	1	46.93	46.93	N.S.
M x T	1	224.48	224.48	N.S.
M x A	2	37.04	18.52	N.S.
S x T	1	2.16	2.16	N.S.
S x A	2	535.57	267.78	N.S.
A x T	2	41.94	20.97	N.S.
M x S x T	1	43.58	43.58	N.S.
M x S x A	2	134.00	67.00	N.S.
M x T x A	2	431.58	215.79	N.S.
S x T x A	2	277.50	138.75	N.S.
Error	2	473.67	236.83	
Total	23	2406.20		

(*Continued on page* 84)

In the Heart of a Seed -- There's Money

by

JOSE A. RAYOS[1] AND CARLOS V. GLORI[2]

The prolonged droughts during the past years will surely create adverse effects on the country's economic growth. This situation should arouse our people to think seriously about the evil effects of this far-reaching problem. We have plenty of water, even more than what we need during the rainy season, yet, we still find our rivers dry when we are in dire need of irrigation water. Millions upon millions of pesos are spent for engineering purposes to control the rampaging flood waters during the rainy season, still millions of pesos in the construction of irrigation dams and ditches to water the thirsty farms, but it seems that all of these have been to no avail, because of undue neglect on the unfavorable conditions of the rugged terrain upstream.

In spite of all the efforts that have been exerted to minimize the occurrence of destructive floods; despite all efforts to harness water for irrigation purposes, our country has not yet attained an appreciable level of success. Still our rivers overflow their banks, taking away with them their ever-mounting toll of human lives and property. During the dry season, everything is dry, including the irrigation dams and ditches. The hydro-electric power plants could only deliver half or just one-third of their rated power capacity during the lean months because of lack of water pressure that would turn the turbines which produce the energy to generate electrical power.

These are glaring signs indicating that somewhere there are mistakes which should be corrected if our country ever expects to move forward. Engineering ingenuity alone is not enough to solve the problems posed by floods, drought, and brown outs. The construction of dams, dikes and irrigation canals are just short-time remedial measures. The cure to this national illness is something more. It is the proper husbanding of engineering and reforestation that is needed to check the existing adverse conditions right in the heart of the problem.

The soil on the steep mountain sides that have been exposed to the elements are rapidly eroding towards the agricultural lands. The trees that were cut down and removed or burned should be replaced so that the soil could be kept in place and the water storing capacity or these mountains be restored, maintained and improved. This must be done as an adequate solution to the problem of floods and droughts that are perenially pestering the country. The construction of dams and canals alone are not enough. More weight and emphasis should be given to the preventive measures. It should be remembered that an ounce of prevention is better than a pound of cure.

The Philippines is primarily an agricultural country. The prevailing situation of its natural resources are the determining factors to this effect. If our country is agricultural, why is it that there is a great lack of even the most fundamental staple food? Why is the Philippines still importing rice from other countries when most of its ricefields are idle and unproductive during the greater portion of the year? Do these conditions

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[2] Forester, Reforestation Administration.

mean that it does not have the needed resources that will enable its people to produce enough food for themselves?

According to the latest findings, there is enough area of land wherein food can be produced. There is more than enough manpower and an abundance of the needed technical know-how in carrying out the objectives of self-sufficiency. Again, the question bounces back. Why can't the country raise enough rice? Why is it that most of its ricefields are idle and unproductive?

Then again, the answer to this question is — lack of irrigation water. Rice is essentially a water-loving plant. We can hardly produce rice during the dry season simply because there is no water to tap for irrigation purposes. Why is it that there is no water? Because the forest, which is the best guardian of this much needed water is not there anymore. Much of our forests have long been gone due to the combined forces of forest vandals.

Meanwhile, on top of these adverse national conditions which are brought about by our inability to raise enough food for ourselves, the population of our country is rapidly increasing. According to the latest statistics, our population is increasing by about 20,000 heads a week. In the year 2000, the population of our country is expected to be somewhere around 40 million. To feed this population, agriculture and industry should start increasing its production tempo, now!

Unemployment is also one of the biggest national problems. This can be easily proven anywhere in this country. In a city or a busy town, seven out of ten strong and able-bodied persons are jobless.

Such are the prevailing unfavorable conditions in our country today. Lack of food, rapidly increasing population and a big mass of unemployed man-power, which stays idle and unproductive for perhaps, an indefinite period of time. Is it because there is really nothing worthwhile that can be done? Some people claim that one of the aggravating circumstances that contribute to the immensity of the national problem of mass unemployment is the tendency of our people to flock to over-populated cities and there look for jobs .They seem to have overlooked the fact that if it is the productive job that they want, they don't have to leave the farm. Most of these people who flock to the cities are disappointed because they cannot find good job. It would have been better if they stayed in the farm.

On the other hand, even the farmers who have chosen to stay in the farm are themselves idle too, most of the time. Our farmers are busy only during the planting and harvesting seasons. In between these periods of activities, they are inactive. Is it because there is no one around to lead them and show them that right on their very doorsteps there are plenty of things that can be done? There are leaders. We have able representatives of good offices like the PACD, PRRM, NACIDA, and the Commission on Agricultural Productivity who can do a lot to help them in the barrios.

While the picture before us are far from satisfactory, while all the things around us appear hopeless, there is no need to despair. The Philippines is a rich counrty. We can make our country as progressive as we want it to be, provided we act. Our country has the capacity to support even more than twice our present population. This is more than possible. Japan and other densely populated countries, especially those that are in Asia and the Far East have survived and proven their ability to support their teeming populations. We can do the same. We can do even better than these countries. It is not as hard as it seems. A well planned and unified nationwide activity is the key to national progress.

Unemployment is only an apparent problem. Actually there is no such thing as unemployment. There are always plenty of

things that can be done and from them profits can be derived. Poultry, piggery, gardening, fish culture, dairy-farming, and other related domestic activities can be productive ventures. There are so many things that an enterprising person can gainfully pursue even with very small capital. Cottage industries for men, women, and even children are successfully thriving in many towns and barrios in our country. There is no reason why other barrios and towns cannot do the same. They can produce commodities other than the ones that are already flooding our markets. Home industries, like the bakya and sash factories of Cainta and Paete, the production of wooden novelties in Mountain Province, the weaving industries of Ilocos Sur, duck raising and balut production in Pateros and other towns along the banks of the Pasig River are very good examples of what an average family can engage into. Even a very unconspicuous business — yet very profitable, like the production of bagoong and bucayo in some of the towns in the province of Pangasinan are gainfully thriving. In addition to these, it is worthwhile trying to find the gems of truth that are embedded in the twisted rhyme: "In the heart of a seed" . . . there is money.

Extra money can be earned just by collecting and selling viable seeds of trees like narra, teak and mahogany. There are interested buyers of these seeds and the prices they offer are reasonable. People who are raising ornamental plants like palosanto, various species of palms, agoho, Benguet pine, pink shower, golden shower, the Bauhinias, or even the "acacia" or raintree are certainly in great need of seeds of these ornamental plants. Big timber concessioners like the Aguinaldo Development Corporation, Nasipit Lumber Company, the Aras-Asan Timber Company and others, are in need of big amounts of mahogany, narra, teak, and Albizzia falcata seeds. Paint factories, like the Elizalde are buying lumbang nuts for the production of paint and varnish. Match and toothpick factories are interested to buy seeds of gubas, kupang, and lanete. The Reforestation Administration buys plenty of seeds of forest tree species for reforestation purposes.

Offers from abroad come to the Reforestation Administration every now and then. Most of the time, these offers are turned down because there are no legitimate forest tree seed collectors to whom these offers can be referred. Exportation of seeds to foreign buyers is very lucrative because the importers pay in U.S. dollars so that there are times when the profit is multiplied as high as four times, depending upon the current rate of exchange from dollars to pesos.

There is really money in the collection of seeds. This is a good small business because it can be started even without capital. This can be used as a good "sideline" during the time when farmers are not occupied in their farming activities. Seed collection can be a family enterprise. Practically, all the members of the family can participate in this work. The grown-up boys and men can climb, if the trees are tall, while the women and children can gather the seeds as they fall on the ground.

Aside from selling these seeds to the different interested buyers, seeds can also be used for the propagation of ornamental plants. Selling ornamental plants is a profitable business. With the rapid development of suburban areas, people have started to be landscape-conscious. This can be easily noticed from the overnight mushrooming of ornamental gardens along the Epifanio delos Santos Avenue and the Super Highway.

Seeds can also be manufactured into toys and novelties. The seeds of pitogo, chesa and pili, for instance, can be cleaned and painted or varnished and made into key chain markers. Ipil-ipil seeds are made into different fancy necklaces, bracelets, chockers and earrings.

According to Mrs. Adela Gutierrez, the proprietress of a Gift Shop in Escolta, Manila, she is exporting to the United States

₱45,000.00 worth of fancy articles made of ipil-ipil seeds every month. She said that these articles have become a craze among the American ladies. Necklaces, earrings and bracelets sell like hot cakes at $10.00 to $20.00 a set.

The cones of Mindoro pine and Benguet pine can be painted and sold as decorations. These are good substitutes for mistletoes for Christmas trees. There is indefinite number of articles and novelties that can be made out of these seeds. Perhaps, the only limit to this is the inventive ingenuity and resourcefulness of man.

The profitableness of seed collection has been proven in Arayat, Pampanga and Mount Makiling, Laguna. There are persons who would prefer to collect seeds rather than be employed temporarily at ₱4.00 a day. These people claim that they are earning much more in seed collection and on top of this, they are not under the command of anybody. In other words, they are their own boss.

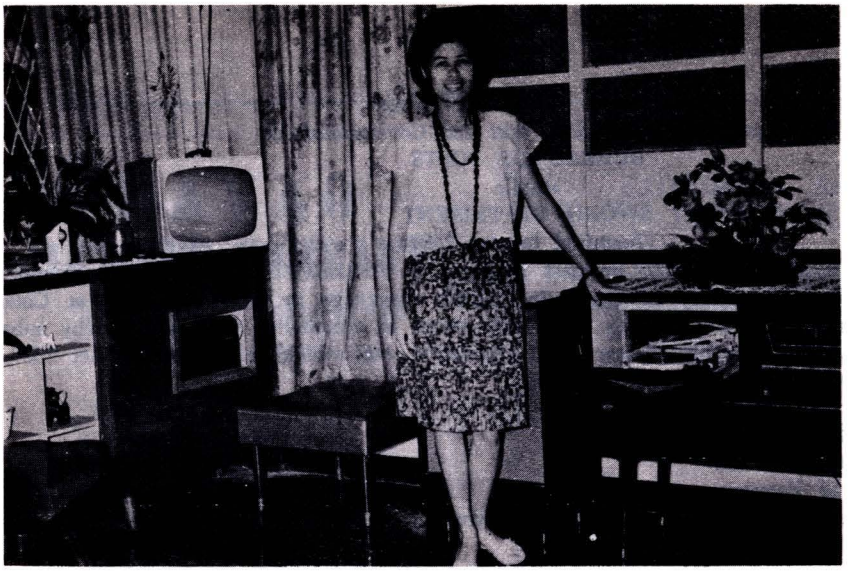
Those who are interested to make additional income by collecting seeds of forest tree species, they are welcome for consultation at the Reforestation Administration in Diliman, Quezon City, or any of the Reforestation projects which is nearest their place. They will be told what to do, what seeds to collect, and how much they are going to be paid for the seeds that they will be able to collect. They will also be instructed how to treat, dry and store these seeds so that what they will collect will be fresh and viable.

This coming dry season, many people will have nothing to do. At the same time, many economic trees will also be bearing fruits. They could make their spare hours profitable by collecting forest tree seeds. It will not only be financially rewarding but they will also feel a sense of accomplishment in the thought that they are also doing their share in helping restore the forest that have been destroyed by unthinking people.

Plywood Exposure . . .
(*Continued from page* 80)

Table 4. *Analysis of variance of bagtikan.*

Source of Variation	D. F.	Sum of squares	Mean square	F
M	1	44.01	44.01	N.S.
S	1	10.27	10.27	N.S.
T	1	9.75	9.75	N.S.
A	2	23.56	11.78	N.S.
M x S	1	1.76	1.76	N.S.
M x t	1	4.09	4.09	N.S.
M x A	2	83.71	41.85	N.S.
S x T	1	0.27	0.27	N.S.
S x A	2	142.43	71.22	N.S.
T x A	2	138.23	69.11	N.S.
M x S x T	1	2.33	2.33	N.S.
M x S x A	2	102.82	51.41	N.S.
M x T x A	2	73.10	36.55	N.S.
S x T x A	2	50.88	25.44	N.S.
Error	2	40.20	20.10	
Total	23	727.41		



Miss Josefina Rayos wearing ipil-ipil necklace, bracelet and earrings.

Young ladies at the Gift Shop making ipil-ipil necklaces. Fancy ipil-ipil jewelries exported to the U.S. net ₱45,000 monthly to exporter.

For. Jose Rayos, Forestry Supervisor of the Reforestation Administration Office, author of this article, at Montalban Nursery.

Republic of the Philippines
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The undersigned, CELSO P. DIAZ, Business Manager of FORESTRY LEAVES (title of publication), published quarterly (frequency of issue) in English (language in which printed), at College, Laguna (office of publication), after having been duly sworn in accordance with law, hereby submits the following statement of ownership, management, circulation, etc. which is required by Act 2580, as amended by Commonwealth Act No. 201.

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Please send in your bio-data, photo and reservations for the Golden Jubilee Memorabilia.

The Committee

Project No. 80-1-1
Corrected Moisture Content For Philippine Species When Using Resistance-Type
Electrical Moisture Meter Calibrated For Douglas Fir

Common and scientific name	No. of trees tested	No. of species	Moisture Meter Reading Percent																								
			7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
			Actual Moisture Content, Percent																								
1. Acacia (Acacia spp.)	1	6	8.0	9.2	10.3	11.4	12.6	13.7	14.9	16.0	17.1	18.3	19.4	20.6	21.7	22.8	24.0	25.1	26.3	27.4	28.5	29.7	30.8	32.0	33.1	34.2
2. Afu (Antiaphiera leucosa)	1	96	11.4	12.0	12.7	13.3	13.9	14.6	15.1	15.8	16.4	17.0	17.6	18.2	18.9	19.5	20.1	20.7	21.3	22.0	22.6	23.2	23.8	24.4	25.1	25.7
3. Alnasiga (Agathis philippinensis)	1	49	11.0	11.9	12.9	13.8	14.7	15.6	16.6	17.5	18.4	19.3	20.2	21.2	22.1	23.0	23.9	24.8	25.8	26.7	27.6	28.5	29.4	30.4	31.0	31.9
4. Almon (Shorea almon)	7	273	7.7	8.5	9.2	10.0	10.7	11.5	12.2	13.0	13.7	14.5	15.2	16.0	16.7	17.5	18.2	19.0	19.7	20.5	21.2	22.0	22.7	23.5	24.2	25.0
5. Anabiong (Trema orientalis)	1	29	9.2	10.0	10.7	11.4	12.2	12.9	13.7	14.4	15.2	15.9	16.7	17.4	18.2	18.9	19.7	20.4	21.2	21.9	22.7	23.4	24.2	24.9	25.7	26.4
6. Anang (Diospyros pyrrocarpa)	2	28	7.4	8.4	9.4	10.3	11.3	12.3	13.3	14.3	15.2	16.2	17.2	18.2	19.2	20.1	21.1	22.1	23.1	24.1	25.0	26.0	27.0	28.0	29.0	29.9
7. Anang-gulod (Diospyros ingulsa)	4	25	9.2	9.8	10.4	10.9	11.5	12.1	12.7	13.3	13.8	14.4	15.0	15.6	16.2	16.7	17.3	17.9	18.5	19.1	19.6	20.2	20.8	21.4	22.0	22.5
8. Anonego (Turpinia ovalifolia).	1	9	8.0	8.9	9.8	8.7	9.6	10.4	11.3	12.2	13.1	13.9	14.8	15.7	16.6	17.5	18.4	19.2	20.1	21.0	21.9	22.8	23.6	24.5	25.4	26.3
9. Anubing (Artocarpus ovata)	1	29	9.2	9.9	10.7	11.4	12.2	12.9	13.7	14.4	15.2	15.9	16.7	17.4	18.2	18.9	19.7	20.4	21.2	21.9	22.7	23.4	24.2	24.9	25.7	26.4
10. Apamit (Vastidia philippinensis)	1	4	11.6	12.3	12.9	13.6	14.4	14.9	15.6	16.3	16.9	17.8	18.3	18.9	19.6	20.3	21.0	21.6	22.3	23.0	23.6	24.3	25.0	25.6	26.3	27.0
11. Apitong (Dipterocarpus grandiflorus)	10	189	8.1	8.9	9.7	10.5	11.3	12.0	13.0	13.8	14.6	15.4	16.2	17.0	17.8	18.6	19.4	20.3	21.1	21.9	22.7	23.5	24.3	25.1	25.9	26.7
12. Apitong, Mound-leafed (Dipterocarpus orbicularis)	1	50	9.4	10.0	10.8	11.2	11.8	12.5	13.1	13.7	14.3	14.9	15.6	16.2	16.8	17.4	18.0	18.7	19.3	19.9	20.5	21.1	21.8	22.4	23.0	23.6
13. Ata-ata (Diospyros kinduensis)	1	6	4.6	5.9	7.5	9.1	10.7	12.3	13.9	15.5	17.1	18.7	20.2	21.8	23.4	25.0	26.6	28.2	29.8	31.4	33.0	34.6	36.1	37.7	39.3	40.9
14. Bagarbas (Hydrocarpus sumatrana)	1	4	6.5	7.1	7.8	8.4	9.1	9.7	10.3	11.0	11.6	12.3	12.9	13.5	14.2	14.8	15.5	16.1	16.7	17.4	18.0	18.7	19.3	19.9	20.6	21.2
15. Bagtikan (Parashorea plicata)	12	225	8.0	8.9	9.9	10.9	11.9	12.9	13.8	14.8	15.8	16.8	17.8	18.7	19.7	20.7	21.7	22.7	23.6	24.6	25.6	26.6	27.6	28.5	29.5	30.5
16. Balakat-gubat (Sapium luzonicum)	1	8	8.2	9.1	10.1	11.0	11.9	12.9	13.9	14.8	15.8	16.7	17.7	18.6	19.6	20.5	21.5	22.4	23.4	24.3	25.3	26.2	27.2	28.1	29.1	30.0
17. Bayok-bayokan (Pterospermum niveum)	1	8	4.5	5.8	7.1	8.4	9.6	10.8	12.2	13.5	14.8	16.0	17.3	18.6	19.9	21.2	22.5	23.7	25.0	26.3	27.6	28.8	30.1	31.4	32.7	34.0
18. Benguet pine (Pinus insularis)	5	45	11.4	12.5	13.6	14.7	15.8	16.9	18.0	19.1	20.2	21.3	22.4	23.5	24.6	25.7	26.8	27.9	29.0	30.1	31.2	32.3	33.4	34.5	35.6	36.7
19. Bingtoc (Terminalia citrina)	1	6	5.1	6.5	7.9	9.2	10.6	12.0	13.4	14.7	16.1	17.5	18.8	20.2	21.6	22.9	24.3	25.7	27.1	28.4	29.8	31.2	32.5	33.9	35.3	36.6
20. Binuang (Octomeles sumatrana)	1	15	6.5	7.1	7.8	8.6	9.3	10.1	10.8	11.6	12.3	13.1	13.8	14.6	15.3	16.1	16.8	17.6	18.3	19.1	19.8	20.6	21.3	22.1	22.8	23.6
21. Bitanghol (Calophyllum blancoi)	2	12	7.4	8.2	9.1	9.9	10.8	11.6	12.5	13.3	14.2	15.0	15.9	16.7	17.6	18.4	19.3	20.1	21.0	21.8	22.7	23.5	24.4	25.2	26.1	26.9
22. Bitoon (Calophyllum inophyllum)	1	29	8.0	8.8	9.7	10.5	11.3	12.2	13.0	13.8	14.6	15.5	16.3	17.1	18.0	18.8	19.6	20.5	21.3	22.1	22.9	23.8	24.6	25.4	26.3	27.1
23. Bolon (Alphonsea arborea)	1	8	9.0	9.6	10.1	10.7	11.3	11.9	12.4	13.1	13.7	14.3	14.9	15.4	16.0	16.6	17.2	17.8	18.4	19.0	19.6	20.2	20.8	21.3	21.9	22.5
24. Bunang (Antocistare aurea)	8	198	9.8	10.3	11.0	11.7	12.3	13.0	13.7	14.4	15.1	15.7	16.4	17.1	17.8	18.5	19.1	19.8	20.5	21.2	21.9	22.5	23.2	23.9	24.6	25.3
25. Calantipayan (Mora toxorrhyl)	1	41	6.0	7.0	7.9	8.9	9.8	10.8	11.7	12.7	13.6	14.6	15.5	16.5	17.4	18.4	19.3	20.3	21.2	22.2	23.1	24.1	25.0	26.0	26.9	27.9
26. Camagsalan (Calophyllum obliquinervum)	1	20	12.8	13.8	13.9	14.6	15.2	15.8	16.5	17.1	17.8	18.4	19.0	19.7	20.3	21.0	21.6	22.2	22.9	23.5	24.2	24.8	25.4	26.1	26.7	27.4
27. Cao (Dracontomelon dao)	1	45	6.8	7.6	8.2	8.9	9.6	10.3	11.0	11.7	12.4	13.1	13.8	14.5	15.2	15.9	16.6	17.3	18.0	18.7	19.4	20.1	20.8	21.5	22.2	22.9
28. Dita (Alstonia scholaris)	2	21	9.4	10.1	10.9	11.7	12.5	13.3	14.1	14.9	15.7	16.5	17.3	18.0	18.8	19.6	20.4	21.2	22.0	22.8	23.6	24.4	25.2	25.9	26.7	27.5
29. Duhus (Endosperman peltatum)	2	18	8.2	8.9	9.7	10.4	11.2	12.0	12.7	13.5	14.2	15.0	15.8	16.5	17.3	18.0	18.8	19.6	20.3	21.1	21.8	22.6	23.4	24.1	24.9	25.6
30. Dulit (Shorea gulso)	4	110	9.9	10.8	11.7	12.4	13.3	14.1	14.9	15.8	16.6	17.4	18.2	19.1	19.9	20.7	21.6	22.4	23.7	24.1	24.9	25.7	26.0	27.4	28.3	29.1
31. Elaan (Dipterocarpus vriesenanus)	11	20	9.0	9.7	10.4	11.0	11.7	12.4	13.1	13.8	14.4	15.1	15.8	16.5	17.2	17.8	18.5	19.2	19.9	20.6	21.2	21.9	22.6	23.3	24.0	24.6
32. Gagatkak (Dipterocarpus warburgii)	2	13	8.8	9.7	10.6	11.6	12.4	13.3	14.3	15.2	16.1	17.0	17.9	18.8	19.7	20.7	21.5	22.5	23.4	24.3	25.2	26.1	27.0	27.9	28.8	29.7
33. Gubasac (Illigenthus luzonicus)	1	6	11.2	11.9	12.6	13.2	13.9	14.6	15.3	16.0	16.6	17.4	18.1	18.8	19.5	20.1	20.8	21.5	22.2	22.9	23.6	24.3	25.0	25.7	26.4	27.0
34. Ilang-ilang (Cananga odorata)	4	66	9.1	9.8	10.4	11.1	11.7	12.3	13.0	13.6	14.3	14.9	15.5	16.2	16.8	17.5	18.1	18.7	19.4	20.0	20.7	21.3	21.9	22.6	23.2	23.9
35. Kalumpit (Terminalia microcarpa)	1	8	5.5	6.0	6.8	7.6	8.4	9.1	10.0	10.7	11.4	12.2	13.0	13.7	14.5	15.4	16.1	16.8	17.6	18.4	19.1	19.9	20.7	21.4	22.2	23.0
36. Kamagong (Diospyros discolor)	1	8	4.5	5.8	7.2	8.5	9.8	11.2	12.6	14.0	15.3	16.7	18.1	19.4	20.8	22.2	23.5	24.9	26.2	27.6	28.9	30.3	31.7	33.0	34.4	35.7
37. Kamatog (Erythrophleum densiflorum)	2	26	7.9	8.6	9.2	9.9	10.6	11.2	11.9	12.5	13.2	13.9	14.6	15.2	15.8	16.5	17.2	17.8	18.5	19.1	19.8	20.5	21.1	21.8	22.4	23.1
38. Katilma (Diospyros nitida)	2	31	11.7	12.0	12.4	12.7	13.1	13.4	13.7	14.1	14.4	14.8	15.1	15.4	15.8	16.1	16.5	16.8	17.1	17.5	17.8	18.2	18.5	18.8	19.2	19.5
39. Katmon (Dillenia philippinensis)	1	15	7.9	8.8	9.8	10.8	11.7	12.7	13.6	14.6	15.6	16.5	17.5	18.4	19.4	20.4	21.3	22.3	23.2	24.2	25.2	26.1	27.1	28.0	29.0	30.0
40. Lanipau (Terminalia copelandii)	4	100	9.3	10.1	10.9	11.8	12.6	13.5	14.3	15.1	16.0	16.8	17.7	18.5	19.3	20.2	21.0	21.9	22.7	23.5	24.4	25.2	26.1	26.9	27.7	28.6
41. Lanuten-bagyo (Canarium macrophyllus)	5	61	10.7	11.5	12.2	12.9	13.7	14.5	15.3	16.0	16.8	17.5	18.3	19.1	19.8	20.6	21.3	22.1	22.9	23.6	24.4	25.1	25.9	26.7	27.4	28.2
42. Lanuten-vinal's (Lombrocidendron vidalianum)	1	4	6.8	7.7	8.9	10.0	11.1	12.2	13.3	14.5	15.6	16.7	17.8	18.9	20.1	21.2	22.3	23.4	24.5	25.7	26.8	27.9	29.0	30.1	31.2	32.3
43. Lumbang (Aleurites moluccana)	1	6	5.4	7.6	9.7	11.9	14.1	16.2	18.4	20.5	22.7	24.9	27.0	29.2	31.3	33.5	35.7	37.8	40.0	42.1	44.3	46.5	48.6	50.8	52.9	55.1
44. Malasanonang (Shorea polita)	1	29	7.1	8.0	9.0	9.9	10.8	11.8	12.7	13.6	14.6	15.5	16.4	17.3	18.3	19.2	20.1	21.1	22.0	22.9	23.9	24.8	25.7	26.6	27.6	28.5
45. Malaruhan (Tristania decorticata)	1	8	8.0	8.9	9.8	10.7	11.7	12.6	13.5	14.4	15.3	16.3	17.2	18.1	19.0	19.9	20.9	21.8	22.7	23.6	24.5	25.5	26.4	27.3	28.2	29.1
46. Malebitis (Sadinea oblongifolia)	1	22	9.9	10.4	10.9	11.5	12.0	12.5	13.0	13.5	14.1	14.6	15.1	15.6	16.1	16.7	17.2	17.7	18.2	18.7	19.3	19.8	20.3	20.8	21.3	21.9
47. Malapanau (Dipterocarpus kerrii)	2	16	6.0	7.2	8.5	9.7	11.0	12.2	13.5	14.7	16.0	17.2	18.5	19.7	21.0	22.3	23.5	24.8	26.0	27.3	28.6	29.8	31.1	32.3	33.7	34.9
48. Malatapi (Ilmenium longiflorum)	1	4	7.4	8.4	9.4	10.4	11.5	12.5	13.5	14.5	15.5	16.6	17.6	18.6	19.6	20.6	21.7	22.7	23.7	24.7	25.7	26.8	27.8	28.8	29.8	30.8
49. Malugai (Gomalia pinnata)	3	52	10.4	11.4	12.4	13.5	14.5	15.5	16.5	17.5	18.6	19.6	20.6	21.6	22.6	23.7	24.7	25.7	26.7	27.7	28.8	29.8	30.8	31.8	34.0	35.1
50. Manuvenangal (Shorea squamata)	2	50	8.5	9.4	10.2	11.2	12.2	13.1	14.0	15.0	15.9	16.8	17.8	18.7	19.8	20.5	21.5	22.4	23.3	24.3	25.2	26.1	27.1	28.0	28.9	29.8
51. Manuvestinore (Shorea philippinensis)	7	182	6.8	8.0	9.2	10.4	11.5	12.7	13.9	15.1	16.3	17.5	18.7	19.9	21.1	22.3	23.4	24.6	25.8	27.0	28.2	29.4	30.6	31.8	33.0	34.2
52. Mayapis (Shorea squamata)	7	126	8.7	9.4	10.2	10.9	11.8	12.5	13.0	13.8	14.5	15.2	15.9	16.6	17.4	18.1	18.8	19.5	20.2	21.0	21.7	22.4	23.1	23.8	24.6	25.3
53. Mes (Dysoxylum euphlebium)	2	50	8.4	9.2	10.0	10.9	11.7	12.5	13.3	14.1	14.9	15.7	16.5	17.3	18.1	19.4	19.8	20.6	21.4	22.2	23.0	23.8	24.6	25.4	26.2	27.1
54. Meric (Vatica mangachapoi)	3	68	9.0	9.7	10.3	10.9	11.6	12.2	12.8	13.5	14.1	14.7	15.3	16.0	16.6	17.2	17.9	18.5	19.1	19.8	20.4	21.0	21.6	22.3	22.9	23.5
55. Mora (Terminalia lucida)	1	8	10.9	11.5	12.0	12.5	13.1	13.5	14.0	14.5	15.0	15.5	16.0	16.6	17.1	17.6	18.1	18.6	19.1	19.6	20.1	20.6	21.1	21.7	22.2	22.7
56. Nato-ville-ella (Calophyllum luzoniense)	2	155	6.2	6.7	7.2	7.7	8.2	8.7	9.3	9.8	10.3	10.8	11.3	11.8	12.3	12.8	13.3	13.8	14.4	14.9	15.4	15.9	16.4	16.9	17.4	17.9
57. Nahutan (Syzygium albissima)	1	47	10.1	11.1	12.1	13.0	14.0	14.9	15.9	16.9	17.8	18.8	19.7	20.7	21.7	22.6	23.6	24.5	25.5	26.4	27.4	28.4	29.3	30.3	31.3	32.2
58. Nanan (Dipterocarpus grandis)	1	6	7.1	8.0	8.9	9.8	10.8	11.7	12.6	13.6	14.5	15.4	16.4	17.3	18.2	19.1	20.1	21.0	21.9	22.9	23.8	24.7	25.7	26.6	27.5	28.4
59. Naran (Erythrina subumbrans)	1	20	9.1	9.8	10.1	10.8	11.1	11.8	12.1	12.8	13.1	13.8	14.1	14.8	15.1	15.8	16.1	16.8	17.1	17.8	18.1	18.8	19.1	19.8	20.1	20.8
60. Red Lauan (Shorea negrosensis)	11	319	8.2	9.2	10.1	11.1	12.0	12.9	13.9	14.8	15.8	16.7	17.6	18.6	19.5	20.5	21.4	22.3	23.3	24.2	25.2	26.1	27.0	28.0	28.9	29.9
61. Spanish cedar (Cedrela odorata)	2	98	9.4	10.1	10.9	11.7	12.6	13.4	14.2	15.0	15.8	16.6	17.4	18.2	19.0	19.8	20.7	21.5	22.3	23.1	23.9	24.7	25.6	26.4	27.1	27.9
62. Tanile (Shorea polysperma)	10	234	8.2	9.1	10.0	10.9	11.7	12.6	13.5	14.4	15.3	16.1	17.0	17.9	18.8	19.7	20.5	21.4	22.3	23.2	24.1	24.9	25.8	26.7	27.6	28.5
63. Toog (Semecarpodendron quadrialatum)	1	35	6.3	7.6	8.9	10.2	11.6	12.9	13.2	15.5	16.8	18.2	19.5	20.1	22.1	23.4	24.8	26.1	27.4	28.7	30.0	31.4	32.7	34.0	35.3	36.6
64. Tuki (Alphitonia philippinensis)	1	8	10.4	11.1	11.9	12.6	13.4	14.1	14.9	15.6	16.4	17.1	17.9	18.6	19.4	20.1	20.9	21.6	22.4	23.1	23.9	24.6	25.4	26.1	26.9	27.6
65. White Lauan (Pentacme contorta)	12	268	7.4	8.3	9.3	10.3	11.3	12.3	13.3	14.3	15.3	16.3	17.3	18.2	19.2	20.2	21.2	22.2	23.2	24.2	25.2	26.2	27.2	28.1	29.1	30.1
66. Yakal (sack) (Shorea ciliata)	4	24	9.0	10.0	11.0	11.9	12.9	13.9	14.9	15.8	16.8	17.8	18.7	19.7	20.7	21.6	22.6	23.6	24.6	25.5	26.5	27.5	28.4	29.4	30.4	31.3
67. Yakal-sabele (Shorea ciliata)	1	29	7.4	8.2	9.1	9.9	10.8	11.7	12.5	13.4	14.2	15.1	16.0	16.8	17.7	18.5	19.4	20.3	21.1	22.0	22.8	23.7	24.6	25.4	26.3	27.1

Prepared by: Jesus V. Feliciano - 5/29/63

THE USE OF RESISTANCE-TYPE MOISTURE METERS AND THE CORRECTION FIGURES FOR PHILIPPINE WOODS[1]

Two methods are commonly used in determining the moisture content of wood in wood-seasoning operations such as air-drying, predrying and kiln-drying, and in wood processing in manufacturing plants and wood-working factories. They are: (1) the oven-drying method and (2) the electric-moisture-meter technique.

1. *Oven-drying method.* — The moisture content of the wood is calculated from weight values before and after the specimen is dried to constant weight in an electric oven. This method, however, has certain disadvantages. First, it involves the cutting of specimens from representative pieces of wood randomly selected from the stock and, therefore, a time consuming. Second, it has limited accuracy when testing wood that contains volatile extractives and wood that had been treated with wood preservatives. Third, it requires the use of laboratory facilities such as an oven that can be maintained at a temperature of $103 \pm 2°C.$ ($217.4 \pm 3.16°F.$), an accurate thermometer to check the temperature inside the oven, a sensitive balance, and some carpentry tools to prepare the specimens. Despite these disadvantages, this method is the most universally accepted for determining moisture content, even in research and for purposes already enumerated. It is comprehensively discussed in F.P.R.I. Technical Note No. 19.

2. *Electric-moisture-meter method.* — The use of electrical devices is rapid and does not involve the cutting of wood. However, it is not as accurate as the oven-drying method. Its use has gained popular acceptance among local wood producers and wood users because electrical moisture meters are designed to provide a quick, easy and non-destructive quantitative test for moisture in wood. Instruments now available are being used satisfactorily for approximating the moisture content of wood in the lumber, veneer and plywood industries, and in plants manufacturing wood products.

Electrical instruments used in determining the moisture content of wood can be classified into two main groups: (a) Those that are based on the relation of the moisture content to the electrical resistance of the wood (resistance-type) and (b) those that are using radio-frequency power-loss type (capacity-type meters). Although both types of electric moisture meters are found in wood-using industries, the resistance-type is more commonly used. The following discussions concern mainly the use of the resistance-type moisture meter.

In wood-using industries, the resistance-type moisture meter is commonly used. This type uses the relation between moisture content and the direct-current electrical resistance of wood. Although it is generally known that oven-dry wood is an extremely good electrical insulator, its electrical resistance falls rapidly as the moisture content increases, until a moisture content of about 25 to 30 percent is reached. Above this range, the decrease in resistance is relatively small.

The most reliable range for resistance-type moisture meters for lumber is between 7 to 30 percent moisture content. Within this range, the accuracy of the resistance-type meter, when properly calibrated and correctly used, approximates within ± 1 percent. Some instruments are calibrated for moisture values from 4 to 120 percent, but it is not expected that readings above 30 percent will be as accurate as those in the lower range.

Correction figures for the resistance-type electrical moisture meter, calibrated for Douglas fir (*Pseudotsuga menziessii*)[2], have been prepared and studied by the Forest Products Research Institute for different Philippine wood species. The accompanying table presents the results so far obtained in this study. This table does not apply to meters calibrated for other species and should not be used with capacity-type moisture meter. Resistance-type moisture meter, manufactured in Australia and the USA, are generally calibrated for Douglas fir, while those of European origin are usually calibrated for beech. (*Fagus sylvatica*).

ASTM (D2016-62T) suggests the following procedures in the use of resistance-type moisture meters. These are general and should not supersede the instructions supplied by the instrument manufacturer.[3]

[1] This is Technical Note No. 56 of the Forest Products Research Institute, College, Laguna.

[2] Formerly *P. taxifolia* (Lamb.).

[3] Suggested procedures in the use of Power-Loss-Type meters, see ASTM (D2016-62T) 11(b) p. 101.

1. Test suitable specimens for moisture content according to the instructions for the particular meter being used. Use insulated needles if they can be obtained. Drive the needles into the wood oriented so that the current flows parallel to the grain.

2. If the reading drifts toward a lower moisture content, take the reading immediately after the needle electrodes are driven into the specimen.

3. When the meter is being used with uninsulated needles, note the moisture indication when the point of the needle just pricks the surface and as the needles are driven into the wood. If the meter reading at the time the needles just prick the surface is as high as when the needles penetrate 1/4 of the thickness of the specimen, that specimen may have a wet surface and the accuracy of the reading is doubtful. If the meter reading increases progressively as the needles are driven deeper, the specimen does not have a wet surface. In this case, uninsulated needles will give correct indications.

4. Wood or rectangular cross-section, that has been drying under reasonably constant equilibrium conditions, generally has a moisture distribution across its thickness such that, at a depth below the surface of 1/4 to 1/5 of the thickness, the moisture content is equal to the average for the entire piece. Correspondingly, for wood of circular cross-section, the average moisture content occurs at a depth below the surface of about 1/6 to 1/7 of the diameter. Therefore, to measure the average moisture content with resistance-type meter, drive the electrode needles to a depth of about 1/4 to 1/5 of the thickness of specimens with rectangular cross-section, and to about 1/6 to 1/7 of the diameter of cylindrical specimens. If the regular electrode needles are too short to reach the specified depth, use nails or other substitute electrodes. Drive the substitute electrodes to the proper depth and about the same distance apart as the needles on the standard electrode. The reading may then be obtained by touching the regular electrode needles to the exposed ends of the substitute electrode needles.

Therefore, to obtain the maximum benefit from the use of an electric moisture meter, the user should study the instructions furnished with the instrument and should be thoroughly familiar with its operation.

As a guide to the proper use and handling of these direct-reading instruments, some of the possible sources of errors are enumerated below:

1. *Species.* — Electrical resistance of wood at any moisture content varies between species; hence, a need for applying correction factors for different species. For example, in testing tañgile, if the meter reading is 9 percent, the approximate moisture content as given in the table is 10 percent.

2. *Temperature.* — As the temperature of the wood increases, the electrical resistance decreases. Meter readings will be too high if the lumber being tested is hot. Most resistance-type meters are calibrated to test at 70°F. (21.1°C.). For any variation of 20°F. (6.6°C.) above or below this temperature, there is an error of 1 percent in moisture-content reading. This point is of importance when using a resistance-type meter for testing lumber that is fresh from the kiln. For example, when testing sample board taken from a kiln with a temperature of 150°F. (65.5°C.), the meter reading must be reduced by 4 percent because there is a 1 percent decrease in moisture content for every increase of 20°F. (6.6°C.) above 70°F. (21.1°C.). This correction must be made if the temperature of the wood is different from the temperature at which the meter was calibrated. Correction figures for different temperatures are usually provided by the manufacturer. Together with the species correction, it should be used in correcting the readings of the instruments.

3. *Maintenance.* — The maintenance of a moisture meter consists largely of replacement of exhausted or broken components. Periodic inspections will minimize the probability of the moisture meter while in use.

4. *Testing of treated wood.* — Wood, treated with salts for preservative or fire-retarding purposes, becomes more conductive. Consequently, it may indicate in the electrical moisture meter a moisture content that is greater than the correct value. The hygrometric method as mentioned on page 96 of ASTM (D2016), is better adopted for this particular test.

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SOME PRACTICAL POINTERS IN SAWING PHILIPPINE HARDWOOD LOGS[1]

Almost all sawmills in the Philippines today are sawing logs of inferior quality. The better-quality logs are either exported or absorbed by local veneer and plywood plants. Such situation therefore calls for the sawmillers to improve their sawing methods and techniques in order to obtain the most out of the defective logs.

Log defects commonly found in Philippine commercial hardwoods, affecting lumber yield, may be classified into three general categories, namely: (1) interior or center defects, (2) side or surface defects, and (3) crook and sweep. The first group comprises of brash center, heart or ring shake, heart checks, center rot, and butt rot. The second category includes catface, season checks or split, rotten knot, wormy and unsound sap. The last group comprises of those logs that are not straight.

Sawing Logs with Interior or Center Defects

Logs with center rot, heart shake, and brash center. — The point of concentration of these defects, usually at the end of the log, is an important indication of how to open up the log on the headsaw. If these defects are confined within the center of the log, sound lumber is sawed around, i.e., by boxing the defective heart of the log. However, if these defects are restricted in the outer zone, thus affecting only one face, the better faces should be sawed first, confining the defects to the last face to be cut. If the rot is elliptical in shape, the sawcut should run parallel to the long axis of the rot. In case of incomplete heart shakes, the sawcut should be parallel to a line connecting the two ends of the arc of the shake.

Logs with heart checks. — Heart checks usually occur in apitong, guijo, yakal and other denser species. They appear as short radial cracks emanating from the pith, affecting sometimes the entire length of the log. In a log with well-center heart, this defect has no influence upon the manner in which the log is to be divided into cutting faces and the sequence of cutting them.

Sawing is done around the log for the purpose of obtaining wood lumber. The heart is then boxed into square timbers. Off-centered logs with heart checks should be sawed with the longest radius perpendicular to one of the cutting faces. The best faces are sawed first and the affected face is sawed last by boxing the heart.

Logs with butt rot. — This defect occurs in the butt log. It narrows abruptly from the butt end to the top or small end of the log. In sawing, this log should be taper-sawed with the sawcut parallel to the long axis of the rot. The small end of the log should be set out with the aid of a taper off-setting device until the entire log length is parallel to the sawline. All the merchantable materials are taper-sawed from the four faces. It is necessary to remove the taper upon reaching the central defective portion of the log.

Sawing Logs with Side or Surface Defects

Logs with catface. — If the catface is shallow, it should be removed in the first cutting face by sawing parallel to the defect. Sawing the remaining good faces can be better planned after the catface has been removed. However, if the catface is too deep, this should be the last face to be sawn.

Logs with season checks and splits. — The direction of split or crack in the log with respect to the saw line is an important factor to be considered before making the first cut. The split should almost or exactly be parallel with the sawcut and must be the first face to be cut. The log is sawed on this side until the split is reached or passed by the saw. If the split extends very close to the heart or center of the log, the defect should be parallel with the last side to be sawn.

Logs with rotten knot. — If the effect of the rotten knot is confined to one cutting face, only the slab is removed during the first cutting. The log is turned for successive cutting of better faces until sawing is completed on the defective side.

Knotty logs should be oriented on the carriage so that the knots, rotten or sound, would appear at the edges or corners of the sawed boards to facilitate edging them out. If this is not possible, the knots should be confined to one or two faces only, leaving the other faces free of knots.

[1] This is Technical Note No. 57 of the Forest Products Research Institute, College, Laguna.

Logs with wormy and/or unsound sap. — Usually these defects occur only in the sapwood. Faces affected by either of these defects should be slabbed first to determine the extent of the damage, after which the faces without defect are sawed to include all the good lumber. The slabbed face or faces are sawed last. If slabbing reveals that the heartwood is attacked by grub worms, the affected face should be sawed in such a way as to concentrate the holes at the edges of the boards.

Sawing Crooked Logs

In sawing crooked log, the crook must not be above or below the boltster but should face the saw. Short boards can be obtained from the sawed face until a full-length flat surface is attained. This flat surface is placed against the knees (log turned 180°) or laid down the bolster (log turned 90°). The faces beside or adjacent to the belly of the crook should be sawed deep to recover much of the full-length boards.

Other Important Points in Sawing Hardwood Logs

1. Big sound logs should be cut such that the high-grade lumber from all the four faces are obtained.
2. Generally, lumber thicker than 4/4 inch should not be sawn immediately after the slab is made in order to minimize the loss of good edging material.
3. The log should be turned to the next cutting face when this face will produce higher-quality material than the face being sawn.
4. Low-grade faces should be sawed as rapidly as possible in order to recover the low-priced lumber with the least cost.
5. Very inferior grade logs should be sawn "through-and-through" without such attention to turning. Slabs are usually cut from two sides, after which the log is turned 90° in either direction before sawing "through-and-through" to produce square boards on the headsaw.
6. Taper-sawing should be applied on high-grade faces while the poor faces should be sawed by the conventional method.

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CHEMICAL TREATMENT OF WOOD WITH BORON COMPOUNDS[1]

Extensive tests and experience in other countries have shown that boron compounds used in wood preservation are highly toxic to various species of fungi and insects. The minimum toxic load against fungi was found ranging from 0.4 to 3.0 kg. per cubic meter (0.025 to 0.187 lb/cu.ft.) of wood, depending on the method of tests, the species of fungi and the wood used. In Australia and New Zealand, boron treatment of wood at a minimum core concentration of 0.2 per cent boric acid equivalent (calculated as per cent of the oven-dry weight of the wood) has proven completely effective in the prevention of powder-post-bettle infestation in building timbers. As regards termites, boron concentration of 1.0 per cent of the oven-dry weight of the wood has also been found effective against certain termite species which depend on intestinal protozoa for the digestion of their food materials.

Boron compounds, used in wood preservation, compare favorably in properties with most water-borne preservatives now in use. They are very cheap and relatively harmless to human beings. Furthermore, they can be applied on green wood which reduces drying time and handling costs to a minimum, whereas, treatment of wood with water-borne preservatives usually requires the drying of the wood before treatment and before delivery to the end-user. The main disadvantage with boron compounds is their low resistance to leaching. However, in building timbers, plywood, and other wood products protected from rain and not in contact with the ground, high leaching resistance is not an essential requirement.

Boron compounds may be applied to wood by pressure or non-pressure methods. The most popular method in commercial use is by diffusion. The essential steps in diffusion treatment are (a) application of the preservative to the surfaces of the green wood, and (b) storing of the treated wood

[1] This is Technical Note No. 58 of the Forest Products Research Institute, College, Laguna.

under retarded drying condition. The former may be accomplished by soaking, dipping or spraying but, the latter, either by placing the treated wood within a shed where moisture movement is restricted or by covering the blockstacked lumber tightly with moisture-proof material or its equivalent, to prevent moisture loss. The difference in the concentration of the chemicals outside the green wood and the water in the wood tends to move the dissolved chemicals into the wood. It is, therefore, essential for the wood to be in the green condition because surface-dry timber will not permit diffusion to commence.

In Australia and New Zealand, commercial diffusion treatment is done either by steam heating the green wood, then immediately quenching in cold preservative solution, or by heating and cooling the green wood in the solution. Another method is by passing the lumber individually through a spray tunnel or a trough on a conveyor. In all of these methods, the treated timbers are placed under diffusion storage to complete the treatment. Where heating is used, 3 to 6 per cent toxic-acid-equivalent solution is usually applied. In momentary treatment, a srtonger solution (20 to 40 per cent boric acid equivalent) is used.

In developing boron compounds as wood preservatives, flourides, arsenic, and chromates have been used as additives to provide increased effectiveness against decay and insect attack. In mixtures, they have been found effective against termite infestation in building timbers in New Guinea. With sapstain fungi, it was reported that borax, added to chlorinated phenates, gives better or equal protection at lower costs than the use of chlorinated phenates alone. The recommended mixture for sapstain control in tropical countries is 9 kg. (19.8 lb) borax, 9 kg. sodium pentachlorophenate, and 34 kg. (74.8 lb) benzine hexachloride dispersable powder in 450 kg. (990.0 lb) water. Benzine hexachloride in the mixture is effective for the prevention of pinhole-borer infestation.

From the foregoing information, boron compounds appear to have some potential applicability in the Philippines as a wood preservative, particularly in the treatment of building timbers, plywood, and other wood products used where leaching conditions are not severe. They appear to be most suitable for powder-post-beetle control. However, they do not seem to be suited for subterranean termite control. They would rather require a high retention even with certain termite species which have been found susceptible to them. Under Philippine conditions, the addition of arsenic and flourides to borates may be necessary for increased effectiveness against decay and termite attack.

A major drawback in the development of the wood-preserving industry in the Philippines is the high cost of the treated wood. Boron compounds and the equipment required for treatment are very cheap and should be able to fill this gap.

The condition of use and the service required of the treated wood usually determine the choice of a preservative. As long as the preservative properties and their limitations are clearly understood, and the essential requirements of a good treatment are observed (adequate retention and deep penetration), there should be no problem in insuring a long service life. There are now many good wood preservatives commercially available, but a preservative is only good depending on how well it is applied. Most often, failure to recognize this point is the cause of many untimely failures of treated wood in service.

For more details about this subject matter, write to the Director, Forest Products Research Institute, College, Laguna, Philippines.

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NAILING AND NAIL-HOLDING QUALITIES OF WOOD[1]

Everyone who has used wood may have realized the problems of connecting two or more pieces, whether simply to hold them together or join them for the purposes of transmitting loads from one member to another. Of the many types of mechanical fasteners already developed for wood joints, nails are still most commonly used in wood construction, from the simple and crude boxes or crates to engineered structures of novel design.

The ease with which nails can be driven into and withdrawn from wood and, apparently, the strength and efficiency of a nailed joint may vary considerably. Such variation is influenced by a number of factors, the most important of which are *the species of wood, the kind of nail* and *the conditions of use*. The development of an efficient nailed joint would, therefore, require an understanding of the effects of these factors on the nail-holding qualities of wood.

Generally, there are two ways a nailed joint can be made to sustain external forces. When one member tends to slide over an adjacent one because of the loads acting on it, the strength of the joint depends mainly on the lateral resistance of the nails. On the other hand, when nails are used to resist forces tending to cause direct separation of the joined members, the strength is dependent on the wood's ability to resist direct withdrawal of the nails. In this case, the nails are subject to tension under loads acting parallel to their shank. This latter type of joint is not recommended for structural purposes, but there are instances when it could not be avoided. It is more often used in the construction of wooden boxes and crates for packaging, and sometimes in millwork and furniture manufacture.

Nail Withdrawal Resistance

The ability of wood to resist the force required to withdraw or to start withdrawal of a nail by pulling along its shank is known as the withdrawal resistance. Like the other strength properties of wood, it is closely related to specific gravity of the wood.

In general, the dense, heavy species have greater nail-holding power and offer more resistance to nail penetration than the softer woods. The less dense species, however, are sometimes preferred in spite of their low holding-power because of their greater ease in nailing. Furthermore, they do not split so readily as do the heavier woods and therefore allow the use of additional or larger nails to provide the required strength.

The nail-holding power also depends upon the amount of wood substance in contact with the nail shank. For common wire nails, it varies directly with the depth of penetration and diameter of the nail.

Tests at the U.S. Forest Products Laboratory showed that the force required to withdraw common wire nails from the side grain of seasoned wood immediately after driving is obtained by the following formula:

$$P = 6900\ G^{5/2}\ D$$

where P = load in pounds per inch of penetration
G = specific gravity of the wood on weight and volume when ovendry.
D = diameter of the nail in inches

Partial results of tests conducted, so far, at the Forest Products Research Institute, University of the Philippines, College, Laguna, indicate that for sixpenny (2" long) and eightpenny (2½" long) nails, the U.S. FPL formula aforementioned is more conservative for wood with a specific gravity not greater than 0.60

In designing nailed construction, an over-all reduction factor of about 6 is generally applied to the theoretical withdrawal load P.

Moisture Conditions

The seasoning condition of the wood has some effect on its nailing characteristic. For instance, it is easier to drive a nail into wet wood than into dry wood. Splits due to nailing are also less likely to occur in green than in seasoned wood.

Generally, the force required to pull nails immediatley after driving is about the same for both green and seasoned wood. However, if any seasoning takes place after the nails are driven or when driven into dry wood that is subsequently subjected to repeated cycles of wetting and drying, there is considerable loss in the wood's resistance to direct withdrawal. For seasoned wood that undergoes moisture changes due to normal atmospheric variations, the holding power of nails also diminishes with lapse of time.

Direction of Nailing

Wood offers its greatest resistance to withdrawal when nails are driven perpendicular to its grain (side grain, either radial or tangential), and the least resistance to withdrawal when nails are driven to its end grain. Thus, in designing struc-

[1] This is Technical Note No. 59 of the Forest Products Research Institute, College, Laguna.

tural assembles, it is a common practice not to subject nails to direct withdrawal loads from the end grain.

Studies in Canada on the effect of slant driving on the holding power of nails showed that nails driven vertically have higher withdrawal resistance over those driven at an angle. However, when driven into wet wood that is seasoned before the nails are pulled out, the slant-driven nails have greater withdrawn resistance than the nails driven in a direction perpendicular to the surface.

Character of Nail Shank, Point and Head

The nail-holding power of wood can be improved by various means. One method is to increase the area of the nail shank in contact with the wood without increasing the weight of the nail. Nails are therefore manufactured with different types of shanks such as square, triangular, barbed, and longitudinally or spirally grooved. Another method is to change the surface condition of the nail by employing various kinds of nail coating, or by subjecting the nail shank to special treatments. Cement coating increases the friction between the nail shank and the wood fibers, thereby augmenting the holding power of the nails especially when used with softer woods. After a month or so, however, only about one-half of the initial increase remains. Because of this particular behavior, cement-coated nails have been extensively used in boxes which are usually constructed for short-time service. Zinc-coated nails are used under conditions favorable to corrosion.

In general, nails with long sharp points have a higher holding power than those with the common diamond points. But when used with the harder species they are likely to cause splitting. A blunt-pointed nail reduces splitting but its resistance to withdrawal is less than that of the common nail.

The most common nail heads generally used in carpentry and joinery work are the flat head, the finishing head and the large flat head. An example of the latter type is the roofing nail.

Boring holes slightly less than the diameter of the nail shank not only reduces splitting but also increases the nail-holding power. Splitting of the wood may be reduced by staggering the nails. Another way to overcome splitting is to use nails of smaller diameter, increasing the number, if necessary, to give the required strength.

Nails which are clinched one-eigth to one-fourth inch at right angles to their shanks will obviously increase the holding power.

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FPRI Highlights

FPRI ANNUAL SYMPOSIUM: The November 12 symposium on "Forest products research, its status and role in our national economy," held in the FPRI conference room was a success.

Technical Consultant Eugenio de la Cruz delivered the welcome address and Director Manuel R. Monsalud briefed the visitors on the activities of the Institute with the aid of colored slides, exhibits and other visual aides. Commissioner Faustino Sy-Changco of the budget office was the guest speaker.

The five technical divisions presented papers on their accomplishments touching the problems met in the different aspects of wood utilization and what the Institute is doing to solve them. The papers read were as follows: Chemical Investigations Division — "tanning-bearing materials for wood adhesives," Industrial Investigations Division — "veneer & plywood, secondary wood use and saw-milling," Wood Preservation Division — "wood preservation," Timber Physics and Engineering Division — "timber-engineering" and Wood Technology Division — "wood technology."

Delegates from various government agencies, representatives of wood-using industries, lumber manufacturers and exporters, professors and students in forestry and private parties interested in the subjects actively participated during the panel discussion. The Director and staff played host to the delegates in the lunch that followed.

In his address, Honorable Sy-Changco averred that while other government entities receive cuts in their respective budgets, the FPRI has continuously received increases. He added that although the budget commission is willing to give the best support to the Institute, nevertheless what the Institute receives may not be sufficient to carry out its plans for expansion due to the unfavorable circumstances now affecting the nation's economy. However, since wood research is invaluable to the socio-economic prgoram of the present administration, he assured that the Institute will always be given top priority in the budget office.

The symposium was a success. All committee chairmen and members deserve that *"hit" on the hands.* Thanks are due to Cafe Puro, Cocoa-Ricoa, and Fibisco for the merienda. Grateful acknowledgment also goes to the Plywood Manufacturing Association of the Philippines, PACWOOD, Inc., Paper Industries Corporation of the Philippines, Metro Sawmill, Inc., Phil. Lumber Producers' Association of the Philippines and Chamber of Wood Industries for sponsoring the luncheon.

MODEL ACCOUNTANT OF THE YEAR: Cristobal H. Mamaril, Jr., FPRI accounting officer, added more prestige to the Institute when he brought home on December 18, 1964, the honor of being chosen as the "Model Accountant of the Year 1964."

The Association of Government Accountants of the Philippines (AGAP) conferred him the honor during its traditional Christmas Ball and Awarding Ceremonies held this year at the D & E Polar Room in Quezon City.

Our warmest congratulations Cris, and more power to you and your unit.

SPECIAL COMMUNICATION COURSE: A two-week special course on communication methods and techniques, participated by various forestry agencies was held December 7-19, 1964 at the DANR building, Diliman, Quezon City.

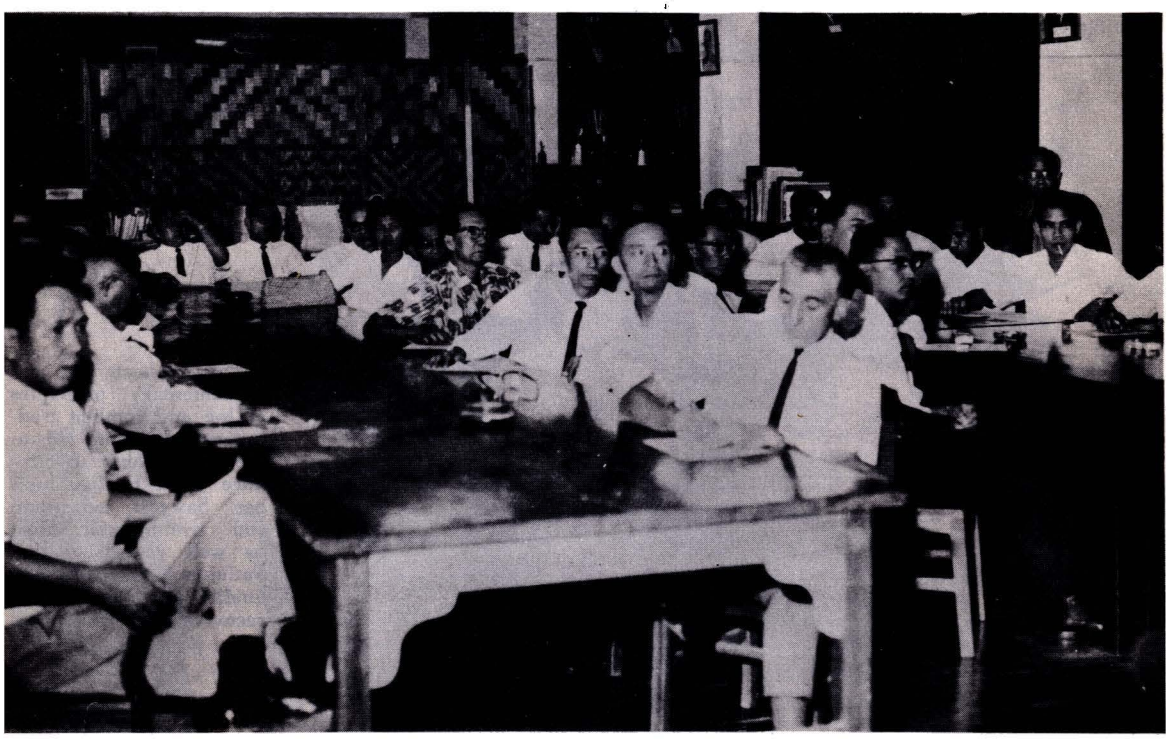
The training course was a Joint venture of the General Forestry Committee and the Joint Committee on Public Information and Education in Forestry, in their efforts to carry out a more extensive forestry informational work.

Chosen experts gave lectures and practical exercises in audio-visual, news and radio reporting, script writing, feature article writing, photography and public speaking.

The trainees received their certificates during the graduation exercises held December 19 at the Aristocrat Gold Room, Cubao, Quezon City. Prof. Francisco Arcellana of the University of the Philippines was the guest speaker.

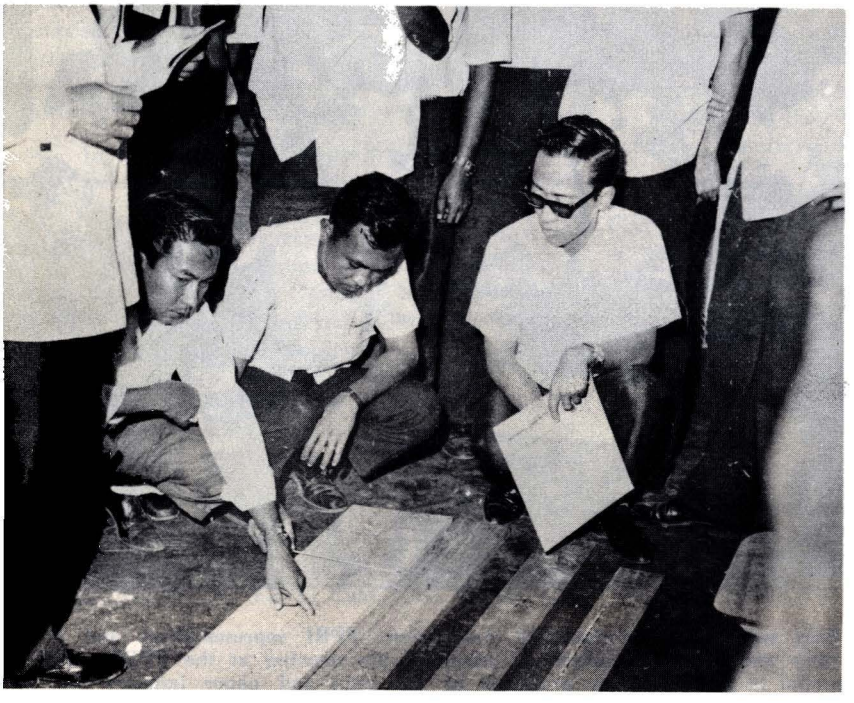
Prof. Jose Blando of the U. P. College of Forestry awarded prizes in public speaking. Of the 26 participants, FPRI's Santos A. Matibag and Corazon L. Bondoc copped the 2nd and 4th prizes, respectively. First place went to Pacifico Can-

Senator Gerardo Roxas, Chairman of the U.P. Alumni Association Board of Directors. listens attentively to Director Manuel R. Monsalud of the Forest Products Research Institute who briefed him and his party on the activities of the Institute, on wood seasoning in this particular instance, during their recent visit there. Looking on are FPRI technologists.



Some members of the Pulp and Paper Manufacturers Association, FPRI representatives and other industrialists interested in pulp and paper manufacture, attending the meeting at the FPRI presided over by Director M. R. Monsalud to thresh out the problems of the pulp and paper industry and to collaborate efforts for the promotion of an active industrial development in the Philippines.

Clinic coordinators D. G. Faustino (inset. left) and M. J. Sagrado (inset. right) said that the response of the participants in the discussion session is a good gauge to appraise the needs of the people in the lumber industry in their desire to coordinate efforts with the FPRI to improve their sawmilling techniques.



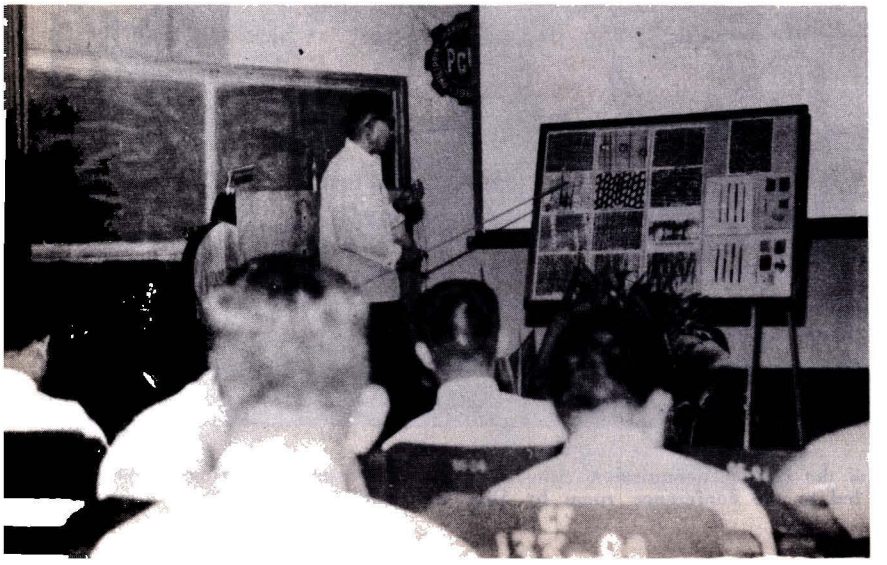
The importance and fundamental principles of log and lumber grading were emphasized to the participants to produce good quality lumber. Sawyers, edgermen and trimmermen must be well versed so that optimum volume and quality of logs can be recovered.

The Hon. Jose Sanvictores of the Forest Products Research Board is shown giving the closing remarks during the November 12 symposium sponsored by the Forest Products Research Institute.

Hon. Faustino Sy-Changco of the Budget Commission, who was the guest speaker during the FPRI November 12 symposium, was led to the conference room by Dir. Monsalud (left) and Tech. Consult. E. de la Cruz (right).

A part of the audience who attended the November 12 symposium sponsored by the FPRI on "Forest products research, its status and role in our national economy." Tech. Consultant E. de la Cruz is shown above delivering the welcome address.

Martin Lagrimas of the wood technology division, FPRI, is shown above talking on "Wood identification", at the Log Producers and Wood Processors' Convention held at the College of Forestry auditorium on April 9, 1965.



Mamerto L. Garcia of the wood preservation division. FPRI, is shown above answering inquiries from delgates to the Log Producres and Wood Processors Convention after presenting his paper on, "Economic significance of beetle infestations on logs and lumber."

las of the Bureau of Agricultural Economics, DANR, third place to Carlos Glori of Reforestation Administration and fifth place to Luz M. Castro of Parks and Wildlife Office. The theme of the extemporaneous speech was, "What my agency is doing for the socio-economic program of the present administration."

FPRI PLEDGES SUPPORT TO PAETE WOOD INDUSTRIES: Director Manuel R. Monsalud promised technical assistance, the best way the FPRI could give to remedy the sad plight of small wood manufacturers of Paete, Laguna. He pledged that the wood techonologists of the Institute would assist the wood workers in exploiting fair stands of unidentified wood species in the nearby hills of Paete as possible substitutes for the vanishing varieties. He also assured to furnish the wood industrialists a list of loggers and concessionaires from the different areas of the island from whom the Paete wood workers may be able to get their raw materials.

This was in answer to the many problems presented by the wood carving sector of the place in a meeting held at the Paete municipal hall. They pointed out the fast dwinding wood supply in their vicinities. They also bewailed the allegedly strict rules of the Bureau of Forestry on cutting of logs from alienable and disposable lands nearby, and the harassments from supposedly government agents imposing unnecessary "fines" along the highway, while the wood workers transport their products from Paete to Manila. Present during the meeting were representatives from the FPRI, Bureau of Forestry, U.P. Land Grant in Laguna, the Eastern Plywood Company and Paete municipal officials, sawmill operators, wood carvers, woodenshoe-makers, etc.

Upon invitation of Director Monsalud, a delegation of wood workers led by the Paete mayor and the municipal secretary later visited the Institute. They conferred with the technical staff and were shown the phyisical plants and laboratories of the Institute. Before them and forestry agents of Laguna, Mr. Monsalud reiterated: "This sad plight of the wood workers of Paete needs immediate government attention and help from all agencies concerned. All forestry agencies, private loggers and concessionaires should join their forces to remedy this situation."

PGEA OFFICIALS ELECTED: The Philippine Government Employees Association (PGEA) FPRI chapter, held an election of officers, November 3, at the conference room. Elected were: D.G. Faustino, chairman; F.V. Oamar, vice chairman; J.S. Gonzales, secretary; F.R. Lopez, treasurer; C.H. Mamaril, Jr., auditor; S.B. Bellosillo, F.V. Oamar, J.S. Gonzales, F.M. Lauricio, delegates. Chairman Faustino is also a delegate de officio.

PACE CODE COMMITEE: The Philippine Association of Civil Engineers (PACE) recently designated Dr. A.N. Ramos, Jr. and Engr. J.O. Siopongco to assist in the organization of the Timber Design Standard section of its code committee. Headed by Chief S.B. Bellosillo of the timber physics and engineering division, the section constitutes a working group in the association. The different working groups are assigned to brief the committee everytime they meet on the progress of their work.

During their last meeting, the section prepared a code based on the latest development in engineering design and construction of timber structures. It included among others, standard specification for glue-laminated construction, standards for utility poles and a provision for strength grouping of our construction lumber.

PPMAP Conference . . .

A conference with officials and members of the Pulp and Paper Manufacturers' Association of the Philippines and other representatives of the local pulp and paper industry was held by the FPRI staff last Saturday, February 26, at the Institute.

Director Monsalud, who presided over the meeting, appraised the group of the need of the Institute to conduct a more intensive research program on pulp and paper studies and solicited their cooperation to support the request of the Institute with the U.N. Special Fund Assistance, in putting up a Pulp and Paper Research and Training center. This can be considered when there is sufficient interest and collaborative support coming from the local pulp and paper industry in this country. In this way the U.N. could justifiably release some funds and assured of the promotion of an active industrial development in the Philippines.

The director further requested the members and non-members of the association to review the Institute's reports on the pulp and paper studies contained in the annual and semi-annual research programs and other reports sent to them. He said that the Institute will appreciate their sending in comments and suggestions regarding any particular line of study which is relevant to their interest. He defined the stand of the Institute in terms of technical services being rendered to the pulp and paper manufacturers.

Dr. Amando Clemente, president of the Pulp and Paper Manufacturers' Association endorsed the proposal of the director and suggested that the pulp

and paper industries consolidate their purposes and bring their specific problems to the FPRI so that it will be in a position to help them. He said that a committee should be formed to sit down with the PFRI staff to discuss and thresh out problems of our infant pulp and paper industry.

The FPRI entertained the guests with a luncheon at the International House, U.P.C.A.

MONSALUD TO CAIRO CONFAB

Dir. Manuel R. Monsalud of the Forest Products Research Institute, College, Laguna enplaned for Cairo, U.A.R., March 6. He attended the Pulp and Paper Development conference held there from March 8-20, 1965 under the sponsorship of FAO Rome and the Economic Commission for African Bureau of Technical Assistance Operations.

Monsalud, who was invited in a consultative capacity, presented a technical paper. He represented the FPRI and the National Research Council of the Philippines.

FPRI PUBLIC SERVICE SCHEME: According to numerous unsolicited letters, the Forest Products Research Institute has been winning public acclaim for the countless services it has been rendering to wood-using industries, sawmillers, woodworkers, lumbermen and the general public.

*Techonoligists R.F. Casin and T.G. Cuaresma, were recently delegated by the Director to determine the suitability of the copra dryer of the Thermal Industries, Inc. for lumber drying. The team found that a number of changes should be undertaken to regulate supply and control of the humidity inside the dryer; heat exchange system should be altered to attain a uniform temperature throughout the whole length of the dryer.

*The problem on drying materials for shoe manufacture at the Precision Last Company in Barangka, Marikina, Rizal was tackled by the same technologists whom Director Monsalud sent them for the purpose. The duo recommended that the company should use a conventional steam heated kiln instead of the chamber that they presently use. The use of chemical seasoning was also recommended.

*The Director commissioned a group consisting of Dr. A.N. Ramos, Jr. of the timber physics and engineering division and Engineers R.P. Saraos, I.M. Laroya and P.M. Manzo of the industrial investigations division to survey the laminating practices of Durabilt Structures, Inc. to appraise the company of innovations to improve their laminating plant. The group found that with the present condition of the glue spreader, it is hard to maintain a uniform glue spread on both sides of the laminate. They therefore recommended to match the bottom and top rolls of the spreader by making both rolls steel-built or better still, to use rubber-covered steel.

*Director Monsalud promised to give technical assistance to the NACIDA to improve their outmoded process of hand stripping rafia or "saguran" by mechanizing the process in order to increase output to cope with the public demand for these materials.

The Director sent D.G. Faustino and D. Micosa to Bohol to observe the stripping procedures in the locality so as to adopt ideas to design a mechanical stripper for the NACIDA.

*In a conference called by the Abaca Development Board for the purpose of boosting the pulp and papermaking industry by providing raw materials from abaca fibers, Chairman Teodoro de Vera announced that there are several industrialists willing to invest in pulp and papermaking of abaca, provided it can be shown that the venture would be economically feasible. He also advocated the establishment of abaca plantations to support the pulp and paper mills.

Director Monsalud made clear during the conference that the Institute is being requested to undertake research projects on the pulp and papermaking of low grade abaca fibers, which undertaking would cost the ABACACORP some ₱27.-000.

Over the objection of Director Eugenio E. Cruz of BPI as to the amount to be expended on the research projects, Chairman de Vera supported Director Monsalud on this score. He even planned to take Director Monsalud to see President Macapagal and the Cabinet on this proposal if he could make the proper arrangements.

The conference was held at the Concord Room, Penthouse, Bayview Hotel, Manila. Others present were A. Garcia and T. Magnaye of BPI, B. Catbagan and V.C. Bustos of MDA, Industrialists J. Cabarrus and a Japanese companion, and Tech. Consult. E. de la Cruz, L.A. Ynalvez, P.V. Bawagan, E.C. Amio, P.M. Nicolas, J.O. Escolano, J.V. Zerrudo and C.H. Mamaril, Jr. all of the FPRI.

*Report on rotary-veneer cutting and drying of white lauan and tangile logs was given to Mr. Gaudencio Juan, forestry executive of the Palanan Logging Enterprises, Inc. and the Sierra Madre Project, Inc., sister companies of the Bueno Enterprises, Inc. of Butuan City. Mr. Juan discussed with the IID staff the results of the tests and

(*Continued on page* 98)

REFORESTATION ADMINISTRATION Notes

Forester Vicente Caguioa, chief, Statistics and Extension Division of the Reforestation Administration, retired last November 5, after 45 years of public service. Starting as a temporary ranger in the Bureau of Forestry in 1919, he was promoted to different important positions like Forester, Chief of Section, Forestry Supervisor II, and Assistant Forestry Division Chief. When the Reforestation Administration was created in 1960 by virtue of Republic Act No. 2706, he was appointed as Plant Research Coordinator and subsequently became chief of the Statistics and Extension Division.

Forester Caguioa is a holder of a Ranger Certificate from the U. P. College of Foresrty, Bachelor of Science in Forestry from the University of Montana, and Master of Forestry from Yale University. He is affiliated to the National Research Council of the Philippines, Society of Filipino Foresters and Society for the Advancement of Science in which societies he made considerable contributions.

In line with the policy of the Reforestation Administration to plant useful economic trees for the self-sufficiency of the agency. Forester Buenaventura Vidad of the Amas reforestation project in Cotabato is reforesting the denuded and open lands to rubber trees. Recently, he reported that the project has reforested more or less 100 hectares already. He plans to cover about 500 hectares of his 1,115 project to rubber.

Forester Vidad informed Administrator Viado of the Reforestation Administration that after six years, the rubber trees would be ready for tapping.

Rubber trees, lumbang benguet pine, almaciga, paper mulberry, and *albizzia falcata* are among the species used for reforestation purposes which has economic values. Rubber trees are the source of latex, lumbang oil comes from lumbang, resins, populary known as Manila copal is derived from almaciga trees, silk cocoons from paper mulberry, and *albizzia falcata* is one of the most promising species now, as a material in the production and manufacutre of pulp and paper. *Albizzia falcata* is a fast growing species. It can be harvested in ten years more or less after planting for pulp production.

The planting of economic trees for reforestation is being undertaken by the Reforestation Administration through its various reforestation projects scattered all over the country.

Silviculture class students under Professors Teodoro Delizo and Irineo Domingo of the University of the Philippines, College of Forestry observed actual reforestation field activities and nursery operations recently at the various projects and nurseries of region I.

The more than 100 forestry students made an educational tour of the projects in Caniaw, La Union, Kennon, and the cooperative projects in Baguio.

A series of lectures and actual demonstrations on the upgraded and improved techniques in planting was conducted by regional officer Ciriaco A. Galutira for the benefit of the students.

The two-week guided tour was a requirement for the training of forestry students taking Silviculture courses at the U. P. College of Forestry.

RUBBER SEEDS REMAIN VIABLE IN PLASTIC BAGS

Rubber seeds stored in plastic bags for four months remained viable.

This was found after a series of experiments by Ong Thian Pa and Lauw Ing Koen of the Research Institute for estate crops in Bogor, Indonesia.

Rubber seeds are short-lived and it has not been possible to lengthen their period of viability. Ordinarily, the seeds lose their germination capacity after two weeks.

The Indonesian scientists have found it possible to conserve the viability of rubber seeds for 4 months by storing them in small sealed plastic bags in quantities of 50 to 180. They use fresh seeds just picked from the trees in their experiments.

Other methods tried were coating the fruits with paraffin, low temperature storage, storing in carbon dioxide, storing with damp quicklime and storage in water. Storage in plastic bags was found the most promising.

A short convocation and program marked the celebration of the Christmas holiday season at the Reforestation Administration.

The program was highlighted by several skits, special numbers, and a free luncheon. The Accounting Division was awarded the first prize in the skit contest with the Budget and Fiscal Division and the Statistics and Extension Division obtaining the second and third prizes respectively. The prizes were awarded by Mrs. Jose Viado, assisted by Forester Regulo Bala who played Santa Claus.

Documentary films which included the "Visit of Mrs. Kennedy to India, "Mass for Kennedy," and "The History of the White House" were shown.

Make Money with Ipil Ipil

The ipil ipil trees you plant today will assure you of continuous income three years after.

Administrator Jose Viado of the Reforestation Administration says that people who have followed this advice are now earning upward of ₱15.00 per day.

From Ilocos Norte in the north to Nueva Ecija in the south, disciples of the ipil ipil project are now supplying the more than 33,000 tobacco flue-curing barns with firewood conservatively valued at ₱10 million a year, according to the administrator.

An added beauty to the project is the complete lack of marketing problems. Firewood business is brisk business and at ₱8.00 per cubic meter, the bundle is sold before the wood gatherer can say "ipil ipil".

Administrator Viado explains that planting ipil ipil involves very little effort and a minimal sum of money. After cutting the thick grassess like cogon, the prospective investor can start spreading the seeds which now cost around ₱.50 per liter. Ordinarily, a hectare of barren land needs about one-half cavan of ipil ipil seeds. Consequently, the investment thrown into the project amounts to a little more than ₱18.00, according to him.

The growing ipil ipil trees can be left entirely to nature insofar as care is concerned. After all they can survive in the most sever climatic conditions obtaining in any region. However, they must be protected from stray animals like carabaos and goats since the leaves are too delicious to be ignored by them, administrator Viado warns.

Three years and the trees are ready for initial cutting. Every year hence, all the investor will do is to cut and sell and bag the money for the economic and social comfort of his family, the administrator says.

Roman B. Valera, Chief of the Technical Services Division was one of the Philippine delegates to the Fourth United Nations Regional Cartographic Conference for Asia and the Far East held at the Philamlife Building, Manila, recently. Twenty nine countries were represented in this conference including three observers from the United Nations Educational, Scientific and Cultural Organization, International Society of Photogrammetry and International Union of Geodesy and Geophysics.

The primary objective of this Conference, according to Forester Valera, is to exchange information especially among the developing countries regarding cartography. He emphasized the important role of cartography in modern society and in the economic development of the country. The Philippine will profit much from this conference since we have started to be more systematic in cartographic activities with the creation of the Board of Technical Surveys and Mapping which assists and coordinate different government agencies in surveying and map-making activities. Valera also pointed out that several countries have already organized training centers in surveying and mapping, and in Bangkok, there is a map Information Office. Several countries had already made headway along cartography viewed from their exihibits displayed during the conference. The conference will not only improve cartographic work but also achieve the establishment of standards for mapping, he concluded.

Nine foresters of the Reforestation Administration who participated in the seminar on Communication Methods and Techniques held at the DANR building completed the two-weeks training course last December 19, 1964. The seminar which started December 7 was sponsored by the General Forestry Committee on Public Education and Information in Forestry.

The participants, were Resureccion Astudillo, Guillermo Cabanero, Isidro Esteban, Antonio Glori, Carlos Glori, Oscar Hamada, Jose Rayos, Lope Reyes and Pedro Salazar.

The seminar was a part of a series of activities and programs planned by the Committee in effecting a more competent, adequate and comprehensive extension work in forestry.

It was expected that the two-weeks training course will give the participants a knowledge about the basic things involved in the use of the mass media employed in extension work, as in the field of writing, public speaking, newspaper work, radio work, audio-visual aids, and others.

The seminar was participated in by representatives of the different agencies under the Department of Agriculture and Natural Resources, namely; the Reforestation Administration, Bureau of Forestry, Parks and Wildlife Office, Forest Products Research Institute, U. P. College of Forestry, and the Bureau of Agriculture Economics.

The Reforestation Administration's research program is now going full blast following the establishment of the Montalban Research Center in Rizal.

Forester Roman B. Valera, Chief of the Technical Services Division has instructed forest scientists Jose Rayos, Leonardo D. Angeles, Isidro D. Esteban, and Carlos Villa Glori to intensify research work especially on the radiation of seeds for the production of beneficial atomic trees or mutants.

Valera said that his forest scientists are also conducting experiments on the propagation of forest species suitable for reforestation purposes. One of the goals now is the determination of the quantity of seeds needed to raise given number of seedlings, he said.

Insofar as atomic trees under experimentation are concerned, the researchers came out with a preliminary observation that irradiated seeds produce bigger seedlings and grow faster than those that are naturally raised in the nurseries. This is a good sign of success and if properly pursued, the experiments might still change the practice of reforestation in the Philippines, the scientists predicted.

Meanwhile, Forester Valera has urged Administrator Jose Viado to establish research centers in the eight regions under the Reforestation Administration. The plan will facilitate reforestation to a great extent since more studies on silvics and silviculutre, watershed management, and genetics will be conducted, he pointed out.

The practice of forestry in New Zealand is so far advanced that ours cannot even be compared.

This was the general impression gathered from Administrator Jose Viado upon his arrival from a two-week Asia Pacific Forestry Congress in that country.

According to the administrator, forestry as practiced by the New Zealanders is comparable to those of the United States and Germany insofar as modern techniques in forest management, silviculture, and forest research are concerned. They place great emphasis on these fields, hence they have already considerably progressed in covering their timberlands with forest vegetation consisting mostly of exotic species or forest trees of foreign origin, he said.

Administrator Viado also reported that forest conservation is one of the greatest concerns of New Zealand. The people value forest trees as much as the value their food crops. As a matter of fact, most of their forests are not what we term as virgin forests but are man-made ones. They are well protected and as a result, forest destruction which is sadly rampant in the Philippines is down to the minimum in New Zealand, he explained.

The administrator considered that the intensive forestry practice in that country is reaping economic returns for the government. The luxurious growth of their man-made forests have enabled the New Zealanders to export surplus timber to other countries, he pointed out.

Erosion, water lack, floods, and droughts which are commonly felt here in the Philippines are almost unknown in New Zealand. This is because the ills are checked immediately. Watersheds are constantly inspected for any sign of forest destruction after which reforestation is speedily implemented to correct the damage, he observed.

The areas which have already been denuded beyond the hope of natural restoration to forest growth must be rejuvenated through the process of reforestation, and these areas are of such extent that they constitute a long-range challenge to the Reforestation Administration.

Thus Secretary Jose Y. Feliciano of the Department of Agriculture and Natural Resources said during the recent convocation marking the fourth foundation anniversary of the Reforestation Administration.

Commending Administrator Jose Viado for the agency's past performance in the field of forest reclamation, Feliciano believed that the socio-economic program of President Diosdado Macapagal is depending greatly for its success on reforestation.

He said he is glad that with the administration's program as the immediate frame of reference, the Reforestation Administration is proceed-

ing in the direction. In 1961, with an appropriation of ₱4 million, it was able to reforest more than 12,000 hectares. In 1962, despite a slightly smaller appropriation of a little over ₱4 million, it increased its reforestation coverage by 14,000 hectares. In 1963, with an outlay of ₱7.4 million pesos, it boosted its production by 35,000 hectares.

"I understand that the accomplishments for the year 1964 promises to be more encouraging and for this, you deserve recognition because your task remains to be tremendous both in magnitude and importance," he said.

In behalf of the agency, administrator Viado told the DANR Secretary that given government and public support, the Reforestation Administration will be able to restore the country's barren areas to forest vegetation. It is the goal of the agency to implement the five-year socio-economic program of the administration by hastening forest reclamation. We know only well that if we succeed in reforestation, agriculture, industrial projects and other enterprises dependent upon water and electricity will be boosted. With the progress along these endeavors, through reforestation, the country faces a better life economically and socially, he concluded.

FPRI Highlights . . .

(*Continued from page* 94)

other information on veneer and plywood manufacture. It was gathered that the first two companies both located at Palanan, Isabela, have 50,000 hectares each of forest concessions bordering the Palanan Bay but located on the opposite sides of the Palanan river. Their present operations are confined to logging.

Timber inventory in the two consessions is still in progress, although the timber stand appears very poor even in the so-called Palanan valley. Ninety per cent of the timber consist of red lauan, tangile and white lauan which are almost of the sinker type, especially red lauan. Actual survey of the locality revealed that most of the trees are of noncommercial or of pulpwood sizes.

Red and yellow narra and a small quantity of dao are in good stand on the low altitudes, along the Palanan river, and almaciga, on the higher altitudes and ridges.

Timber inventory and further veneering and plywood manufacturing tests are necessary before the two companies could establish a processing plant as required of them by the Bureau of Forestry. This necessitated their seeking the Institute's service to conduct rotary veneer-cutting and drying studies as well as manufacturing tests.

VISITORS: Foreigners who visited the Institute were impressed by the progress of the work as well as by the hospitality of Director Monsalud and his staff. Among them were: Dr. Richard Hine, head, department of plant pathology, University of Hawaii, Honolulu; Gertrude Lienkaemper of Kansas State University who inquired about woods for interior decoration; Mr. & Mrs. Ray Bennet, Dr. A.J. Grant, Mr. Henneth Max Hawkins, American missionaries of Bethany Hospital, who inquired about Philippine woods suitable for boatmaking; Drs. Kenneth Turk and Herbert Everett of Cornell University, on detail at UPCA who made observations on the progress of the work at the Institute; Sri Octavi Baron of Djakarta, Indonesia, Tai Hyung Min of Seoul, Korea, Yueh-Eh Chen of Taipei, Taiwan, C.J. Lee of Taipei, Republic of China, William Chee Fook Onn of Singapore, J. Arumhinathan of Malaysia, and G.J. Thompson of Bangkok, Thailand, who made a general tour; Gunner Lofgren of Phya Thai Court who made inquiries on wood-base panel products; Mr. Robin Mackay of the American Hardwood Company who made inquiries on the properties of the different wood species; J.W. Martin of Washington, D.C., Tatsuo Ohira, Katsuhiro Suzaki, Masaru Iwani of Tokyo University of Agriculture, Arnold Wexler, UNESCO Consultant, Washington, D.C., Manil Foomfug, S. Choom Dunga, Tow Kumtake, O. Larn Sannana of Thailand, Helen Churchill of Hollins College, Virginia, U.S.A., and Tanoo Vicharangsan of Bangkok, Thailand.

Forestry in the News

NAWASA, FORESTRY ASSISTANCE ASKED

Malolos, Bulacan, Mar. 2 (PNS) — Gov. Jose M. Villarama has sought the help of Nawasa and bureau of forestry officials in his campaign against illegal loggers in the province.

Nawasa and forestry officials will accompany the governor and constabulary authorities in an inspection of forests in San Miguel, San Ildefonso, and San Jose del Monte this week.

Earlier, Villarama arranged with Philippine air force authorities for the use of a helicopter to view the place where illegal loggers operate. However, the governor's plan was not pushed through.

— *The Manila Times, Wednesday, March 3, 1965*

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43 LOGS SEIZED

Iba, Zambales, March 2 (PNS) — Col. Proceso J. Arevalo, provincial PC commander, has reported to Gov. Manuel D. Barretto the rampant illegal cutting of timber within the Olongapo watershed.

In his report, Arevalo said that 43 logs had been confiscated by the elements of hte 125th PC company and forestry personnel in this province.

Arevalo said that the logs, which were cut from Mt. Susung Dalaga and Sitio Panlibing both in Zambales, were taken to Dinalupihan, Bataan.

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EXPERT BARES KAINGIN MENACE

College, Laguna, Dec. 22 — (CNS) — Macid Gulcur, United Nations Food and Agricultural Organization watershed expert, has disclosed that kaingin, forest and grass fires, unsound logging operation, road construction, overgrazing, illegal cuttings are the major factors that destroy the country's natural resources.

According to him, kaingin, which usually follows logging operation and practiced with fire, is one of the most desrtuctive factors, especially if it is practiced in most type of forest areas, where water is to be stored and controlled during and after rainy season.

As the result of the above factors, vegetative cover and soil are destroyed and can not be reclaimed back again for a long period, he said.

"Since the virgin forest is destroyed, it is no longer protective for high intensity of rainful, resulting in soil erosion," Culcur revealed.

"A great part of rainful becomes surface runoff, rushing downhill especially in a very rough topography where average slope is about 50 per cent."

The UN FAO watershed expert cited the case of the Ambuklao watershed where 70 per cent of total rainful becomes surface runoff, according to analysis of rain and streamflow records. "This is why erosion is so severe in the whole Ambuklao watershed," he said. "Small creeks contributing water to main tributary, Agno River, are full of silt, sand, pebble and rocks." — wcd

— *The Manila Chronicle, Wednesday, Dec. 23, 1964*

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College, Laguna, Dec. 5 — (CNS) — The large scale planting of almaciga trees has been underscored by the U.P. college of forestry extension specialists here, it was learned from Prof. Domingo V. Jacalne, chairman of the department of forestry extension.

According to the forestry specialists, almaciga resin, the hardened sap of an almaciga tree known scientifically as an export product to Europe and the United States. Known commercially as Manila copal, almaciga resin has many uses.

It is used for making "katol", sealing wax, floor wax, and soap. It is also used in photogravure. Even the paint of the house, the varnish on table and chairs, and even shoe polish may have some Manila copal in it. Forestry specialists have regretted the fact that in the Philippines almaciga tree is usually found deep in the forests.

In gathering almaciga resin, men have penetrated thick jungles never before reached by other people. Yet, almaciga trees can be grown commercially. —wcd

— *The Manila Chronicle, Dec. 6, 1964*

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SOLON BLAMES LOGGERS FOR FOREST DESTROY

College, Laguna, Dec. 7 — (CNS) — Senator Manuel Manahan blamed some loggers for the rapid destruction of the Philippines forests, it was learned from Dean Gregorio Zamuco of the U.P. College of Forestry.

According to Manahan, these loggers, in their desire to get rich quickly, do not bother to put up adequate equipment, but instead practice indiscriminate cutting to acquire the most profit with the least investment.

"These loggers turn out worse than the Kaingineros," he said. "The genuine kaingineros take up to the forests to eke out a living, but the loggers destroy the forests to amass fortunes at the expense of our national wealth."

The senator said further that the worse thing is that, many of them ate absentee loggers. According to him after these loggers acquire a license, they let unqualified persons, usually aliens, make use of their concessions for a consideration.

As for loggers who observe selective cutting, Manahan said they must make it their responsibility to guard their concessions even after cutting the trees to prevent kaingineros from destroying what they left behind. — wcd.

— *The Manila Chronicle, Tuesday, Dec. 8, 1964*

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PROTECTION OF FORESTS URGED

College, Laguna, Dec. 5 — (CNS) — Assistant District Forester Gregorio L. Santos of Cagayan de Oro City disclosed today that the province of Misamis Oriental has still some ₱316.939 million worth of timber stock, it was learned from Anacleto C. Duldulao, extension officer of the U.P. College of Forestry here.

According to Santos, Misamis Oriental has 21,-952,957 cubic meters of standing timber scattered over 182,941 hectares of unclassified public forest.

He said this standing timber if exported will bring to the country $316,939,233 dollars.

"This will also accrue to the Philippine government coffer ₱47,313,413 in the form of forest charges, reforestation fund, forestry information fund, inspection fees and wharfage fees," he said.

Santos further revealed that the forest in an economic security which serves the people immensely during war and peace. Its daily growth in the interest for the coming generation to enjoy.

In this connection, Santos urged the people of Misamis Oriental to keep close watch and vigorously protect the forest in the province. — wcd

— *The Sunday Chronicle, Sunday, Dec. 6, 1964*

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FORESTRY BRASS SAYS BATAAN LOG OPERATIONS UNAUTHORIZED

Assistant Director of Forestry Juan L. Utleg of the bureau of forestry said yesterday the bureau of forestry has not authorized any logging operation in Bataan since July last year due to non-issuance and non-renewal of temporary and regular timber licenses.

Utleg said any logging operation now in the province is without permission from the bureau of forestry.

Forest officers in the province have been instructed to stop any such operation and apprehend and prosecute the violators inside public forests, he said.

Earlier, Rep. Jose R. Nuguid (N-Bataan) was reportedly planning to initiate congressional investigation of the alleged illegal logging in the province.

Utleg explained the bureau stopped logging operations through the licensing system in Bataan seven months ago. In fact, he added, the bureau of forestry is mulling the possibility of not renewing any timber license in Bataan until such time the denuded mountains would have grown forests again.

The assistant director said Bataan is one of the provinces now in "critical list" of the bureau requiring accelerated action of forest protection and conservation. He said under the bureau's forest management program, logged-over areas may become self-regenerating. If properly managed and protected from further destruction, logged-over forests can be restocked with second growth forests, Utleg explained.

He also said director Apolonio F. Rivera had appealed to the Philippine Constabulary and other law enforcement agencies to help stop illegal logging in Bataan. He added that forestry employes in the province had been instructed to intensify the drive against illegal logging and enforce strictly forest laws and regulations.

Utleg said drastic measures would be instituted against forestry officials found in connivance with illegal loggers.

— *The Saturday Chronicle, Saturday, January 9, 1965*

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UNAUTHORIZED LOGGING INSIDE SUBIC BASE HIT

Olongapo, Zambales, Jan. 7 — (CNS) — US naval authorities in Subic Bay disclosed today that logging operations were carried out within the naval base here by a Filipino businessman allegedly without authority from the bureau of forestry.

In a press statement, the naval base commander also said that logging roads were "illegally built" by the businessman who gained "uncontrolled entry" into the base. It identified the logger as one Edgardo Gener.

The USN commander's statement follows:

"In early December 1964, It was discovered by United States naval officials that logging was being carried out within the naval base at Subic Bay. Investigation revealed that the logging was being conducted by Edgardo Gener who had no official authority to log within the naval base."

"U.S. naval authorities in the Philippines have recently been informed by the forestry bureau, in writing, that Gener had no authorization to cut timber anywhere in the Province of Bataan. A timber license he once possessed expired on June 30, 1964 and has not been renewed, according to the Forestry Bureau.

— *The Manila Chronicle, Friday, January 8, 1965*

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REFORESTATION WORK PRESSED BY VINZONS

Daet, Camarines Norte, Jan. 13 — (CNS) — Gov. Wenceslao G. Vinzons, Jr. this week pressed for the reforestation of mountain areas in this province even as he deplored the rampant denudation of forest reserves here.

Gov. Vinzons' proposal was contained in a letter to the Reforestation Administration.

Considering the depleted area of timberlands in this province, the provincial chief executive said, it would be to the great advancement of the reforestation office's project if a reforestation program could be extended here.

The governor cited many mountain areas in this province which acutely need supplanting of trees. He cited the mountains in Basud, Labo, Paracale, Capalonga, and Vinzons. According to him these mountains are being denuded of wild trees by illegal loggers and kaingineros.

Gov. Vinzons proposed that the reforestation administration set aside funds for the purpose. He said that he could solicit seedlings from private persons here who are willing to help in the program of the government to undertake reforestation project.

Earlier, Gov. Vinzons urged bureau of forestry officials to do "within the powers of their office" measures that would stop once and for all the activities of illegal loggers and kaingineros in forest reserves inside the Camarines Norte boundary.

Gov. Vinzons, who made an on-the-spot survey of forested areas here, observed that illegal loggers were fast denuding the areas of wild trees.

He said if nothing is done to avert this activity, time would when mountains here would completely denuded.

Late last year, the Philippine Constabulary here nabbed a group of illegal loggers in Basud. — hpz

— *The Manila Chronicle, Thursday, January 14, 1965*

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CLASSIFICATION OF LANDS URGED

College, Laguna, Dec. 15, 1964 — (CNS) — Director Ricardo Marfori of the bureau of soils said that the country is losing hundreds of millions of pesos in trees and other forests products destroyed by kaingineros.

According to him, it is the money loss alone. "If to this is added, loss due to soil erosion, decline of soil fertility, destruction of wildlife, flood and drought, and the cancellation of the many blessings that man derives from the forest, the total would be appalling," he said.

The director further disclosed that in the Philippines the practice of kaingin has been going on for centuries that approximately 5.46 million hectares of land had been left barren by the practice. "No matter how justified the reason may be of the kaingineros, it still remains a fact that kaingin cultivation is very destructive," he said.

Marfori estimated that the area destroyed through kaingin annually is 40,000 hectares of forest lands. He also made an estimate of approximately 240 million pesos on the destruction of forest annually. On soil resources, the director said an approximate loss of one foot on top soil is a conservative estimate considering the fact that the area is rendered useless after two or three years.

To solve this destructive practice, the director recommended the classification of all public lands. "All land suited for agriculture may be released for the production of food and other crops," he said.

Likewise, he said lands for forest or for wildlife should be devoted for those particular purposes. "There should be rigid control of all areas set aside for permanent forest," he continued. "And areas that had been worked by kaingineros should be reforested."

The director concluded that as squatters in cities are now being relocated in suitable areas, "it is believed that kaingineros, if the government is

really determined, could also be relocated in suitable agriculture areas." — wcd.

—*The Manila Chronicle, Wednesday, Dec. 16, 1964*

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TIMBER SMUGGLE DRIVE LAUNCHED

Naga City, Jan. 12 — (PNS) — An all out campaign against timber smuggling in Camarines Sur's parks has been started by Capt. Jesus Lomeda, commanding officer of the 134th PC company.

Lomeda urged a conference of representatives of the PC, parks and wildlife office and the Bureau of forestry to institute measures against violators of forestry laws and regulations.

The drive launched following reports of destruction inside the Bicol National Park in Lupi. Subsequently, nine persons were apprehended for alleged violation of the parks and wildlife regulations and released after investigation.

The reports of the destruction and apprehensions were made by a patrol headed by S/Sgt. Abedencia and Sgt. Del Rosario of the 134th PC company. and parks and wildlife officer-in-charge Felicisimo Estivez.

— *The Manila Chronicle, Wednesday, Jan. 13, 1965*

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BENGUET PINE PRODUCES PAPER

College, Laguna, Jan. 18 — (CNS) — Researchers at the Forest Products Research Institute in Los Baños, this province, disclosed Jan. 12 that the Philippines can now produce the best quality wrapping papers and commercial bag papers comparable with the world's best.

Researchers P. V. Bawagan, J. O. Escolano and L. A. Ynalvez said that wrapping papers and bag papers from Benguet pine are very much superior in all strength properties than any commercial wrapping and bag papers.

"It meets the U.S. Federal specifications for Class A and B kraft wrapping and Class A heavy duty shipping sack kraft paper," reported the FPRI experts.

According to them, Benguet pine is usually long fibered and this characteristics makes it suitable for high quality paper products. The lignin content which needs to be removed in pulping is very low so that it makes it much easier to work on. — wcd

— *The Manila Chronicle, Tuesday, January 19, 1965*

* * *

MORE FORESTRY ALUMNI TAKEN IN BY BISLIG ENTERPRISES

In line with their program of intensive development of their forest concessions, the Bislig Bay Lumber Co. (BBLC) and Paper Industries Corporation of the Philippines (PICOP) have strengthened their forestry technical staffs to meet the expanding activities. As of now there are 14 alumni of the College of Forestry in both outfits, seven of whom have just been taken in.

The forestry alumni with the two companies are a blending of old-timers and new graduates. Their present assignments are as follows:

BISLIG FIELD STAFF

Company	*Class*	*Designation*
A. Soriano y Cia:		
Felix O. Chinte	'30 & '46	Chief Forester
Bislig Bay Lumber Co.:		
Martin Lopez	'34 & '51	Lumber Dept. Supintendent
Artemio B. Cosico	'34	Logging Superintendent
Eulogio T. Tagudar	'51	Chief Forester
Bernardo Garduque	'32	Forester
Domingo Pastores	'58	Forester
Rogelio Ragasa	'63	Forester
Benigno Abugan, Jr.	'64	Forester
Antonio Federizo	'64	Forester
Natalio Micu	'46	Head Forester
Roberto Dormiendo	'62	Forester
Benjamin Malto	'63	Forester
Amando Capiton	'64	Forester

Campus Notes

ORGANIZATION AND CAMPUS DEVELOPMENT PLANS APPROVED

The organization and campus development plans of the College were formally approved by the UPCF Executive Committee. The organization plan is due for approval by the Board of Regents, while the campus development plan awaits implementation.

* * *

JOINT COMMITTEE TO PRODUCE FORESTRY BROCHURE

The members of the Joint Committee on Public Information and Education in Forestry agreed to produce a brochure which will contain the activities and functions of the different forestry agencies. — Members of the committee hope to disseminate more information about these agencies by producing a brochure to be distributed to the public.

* * *

UMALI PROPOSES NEW SOLUTIONS TO MAKILING SQUATTERS

Vice President and Dean Dioscoro L. Umali proposed new solutions to the squatter's problem on the Mt. Makiling area. The proposal was made during a conference at the provincial capitol in Sta. Cruz, Laguna, attended by Gov. Felicisimo T. San Luis and officials of the UP college of agriculture and college of forestry.

The proposed solutions of the aggie dean include the following:

1. Boundaries in the Mt. Makiling forest be relocated. Squatters within the boundaries would become tenants of the University of the Philippines.

2. Land-grabbers will not be allowed to till portions of land inside the boundaries. Only the poor squatters who have already planted coconut and fruit trees will be allowed to continue tilling the soil.

3. The squatters who will be permitted to stay in Mt. Makiling forest will report to U.P. authorities or to the provincial government any violation of forest conservation.

4. Squatters should allow representatives of the provincial governor to undertake a social and economic survey of the areas in order to know their status. The results of the survey will enable the provincial government and the UP to lay down definite policies so that the squatters could be best helped.

5. Squatters with small pathces will be given employment in the national park.

6. Those who will be permitted to stay on the land as tenants of the University of the Philippines will be assisted by the UP College of agriculture community development workers.

7. As to the alleged claim of ownership of the squatters on the land they till, Umali said the court will be the one to decide since it is beyond the power of the UP officials and the provincial government.

8. All squatters who will become tenants of the UP will be required to help conserve the forest.

Umali said settlement of the dispute is of paramount importance because Mt. Makiling forest is a watershed. He revealed that some 260,000 people are getting their water from Mt. Makiling. "If this mountain will be denuded, there will be no more water for the 260,000 people because the rivers will be dry," Umali said.

Those who accompanied Dean Umali were Prof. N. T. Vergara, Dr. D. M. Lantican and W. C. Depositario of the U.P.C.F. and Dr. N. B. Tablante and Cesario Cabrera of ACCI.

SECOND SHORT COURSE ON COMMUNICATION OFFERED IN LOS BAÑOS

The second of a series of short courses on communication methods and techniques, sponsored by the Joint Committee on Public Education and Information in Forestry, will be held on April 19 to May 1 at the UP college of forestry building, it was announced by Prof. Domingo V. Jacalne, chairman of the committee. — Jacalne told P.N.S. that the participants of the course will come from

the five government forestry agencies and from the Department of Agriculture and Natural Resources. The forestry agencies are the bureau of forestry. parks and wildlife office, reforestation administration, forest products research institute, and UP college of forestry. — Prof. Jacalne said the goals of the seminar are to learn the principles of press and radio reporting, news writing, news photography, public speaking and audio-visual communication; and to establish a core of writers or trained staff among the personnel of the forestry agencies who will undertake forestry information and extension activities on the regional or local level. Experienced writers and speakers will be invited to brief the participants. Some 30 to 40 participants will participate in the short course. — The first of a series of the short course was held in Diliman, Quezon City, last December.

* * *

FRM CREATES NEW SECTIONS AND COMMITTEES

Four sections were created during the first meeting of the Department of Forest Resources Management on February 5, presided over by Professor Napoleon T. Vergara, department chairman. These are as follows: Forest Management Section Economics and Policy Section, and Forest Engineering Section. Also taken in the meeting was the creation of committees and appointment of committee chairmen as follows: Management Plan, Adolfo V. Revilla; Curriculum Development, Bienvenido R. Rola; Research Ireneo L. Domingo and Budget Affairs, Andrew W. Bacdayan. Oscar Gendrano was likewise appointed Forestry Extension Specialists of the department.

It is expected that the sectioning would make for greater efficiency of department workings, while, the committees would enhance accomplishments that will contribute to over-all UPCF advancement.

The meeting, which lasted more than two hours, further delve into such other topics as (1) filling up of positions vacated and those to be vacated soon due to retirements and resignations, (2) FRM curriculum changes, and (3) classification of laboratory fees into ₱10 and ₱15 categories. No definite course of action, however, was formally adopted on these matters.

* * *

CF EXECUTIVE COMMITTEE RESHUFFLED

The College of Forestry Executive Committee has changed its composition. In separate memoranda, Dean Zamuco appointed the new members to assume their new positions effective Jan. 25, 1965. The new members are Professors Osiris Valderrama, Napoleon Vergara and Filiberto Pollisco. — Professor Valderrama replaced Prof. Ruben Garcia as Administrative Assistant for Business Affairs when the later asked the Dean for relief in view of his assignment to the Office of the University President in Diliman, Quezon City. Prof. Vergara is assigned Chairman of the Dept. of Forest Resources Management vice Prof. Juanito Lamanilao when the latter had requested earlier for relief. Prof. Pollisco on the other hand, is appointed Acting Chairman of the Dept. of Forest Utilization Engnieering in place of Dr. Domingo Lantican. Dr. Lantican was appointed Administrative Assistant for Academic and Research Affairs a few months ago. — The new appointees will hold their respective positions for one year unless sooner terminated by the Dean.

* * *

FED TO PUT UP CONSERVATION CIRCULAR

The Forestry Extension Department will put up a monthly *Conservation Circular* beginning next month. The circular will contain news items about the important accomplishments, activities, on-going projects and plans of all the government forestry agencies of the country. Hence, the forestry extension department is requesting the cooperation of the other forestry agencies to provide the forestry extension department brief summaries of their activities and future plans. — The *Circular* will be distributed to all senators, congressmen, governors, provincial board members and the different field offices of the government forestry agencies — The purpose of the *Conservation Circular* is to arouse forest-consciousness among our legislators and provincial executives and to let them know the programs, activities and problems of forestry.

* * *

BACDAYAN IS DESIGNATED SUPERVISORS

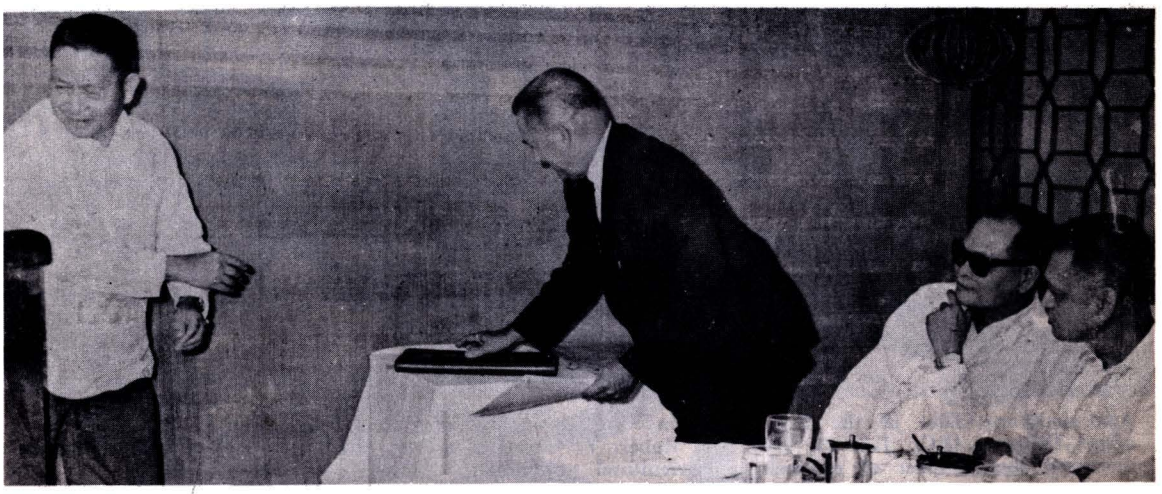
Prof. Andrew W. Bacdayan is assigned to supervise the Physical Plant of the College of Forestry effective Jan. 27, 1965. As head of the physical plant, he supervises the maintenance of buildings and grounds, water system, electrical and telephone system, janitorial services and the labor force of the College except that of the Makiling Forest, the Motor Pool and men assigned permanently with other departments.

The Physical Plant is one of the sections directly under the Business Affairs Office of the College. The assignment of Prof. Bacdayan to his new job will relieve the Business Office of some of its burdens.

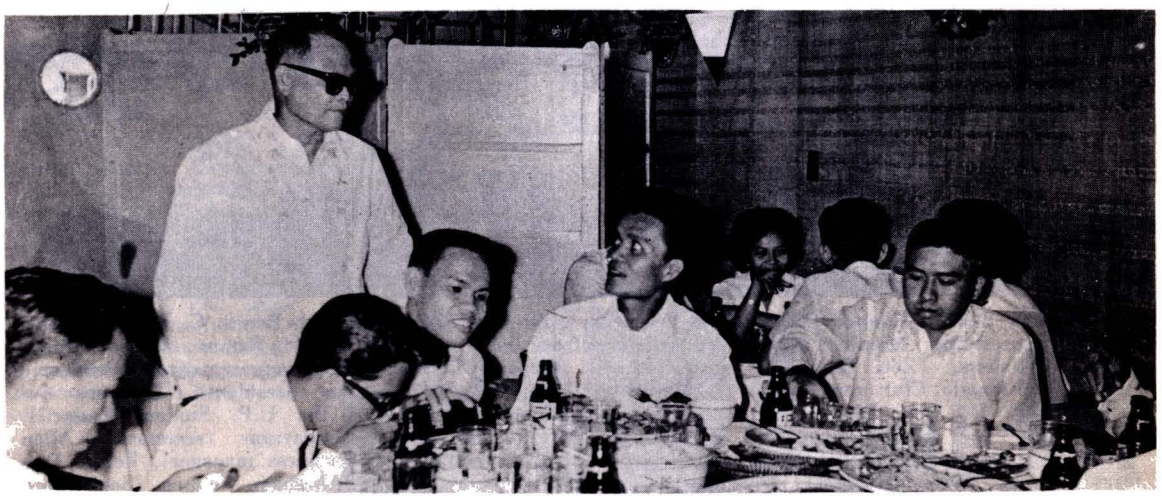
(*Continued on page* 108)

Here & There

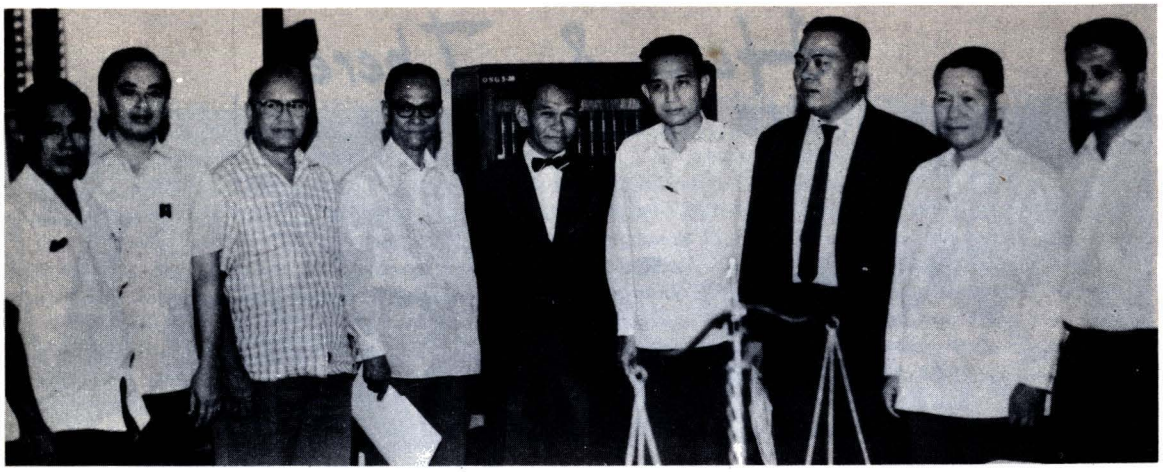
At the head table at the graduation exercises of the First Short Course on Communication Methods and Techniques sponsored by the Joint Committee on Public Education and Information in Forestry. (L to R) Prof. Jose B. Blando, Dean Zamuco (hidden by) Dir. M. Monsalud, Prof. F. Arcellana, Adm. J. Viado. Prof. James Davis, Dir. M. Buncio, Mr. F. de los Reyes, DANR Publ. Officer, & Mr. Eliseo Casia (Kodak Philippines).



Dean Gregorio Zamuco smilingly receives diplomas for graduate trainees from Prof. Davis as For. Rayos, President of the Graduate Trainees, and Prof. J. Blando, look on.

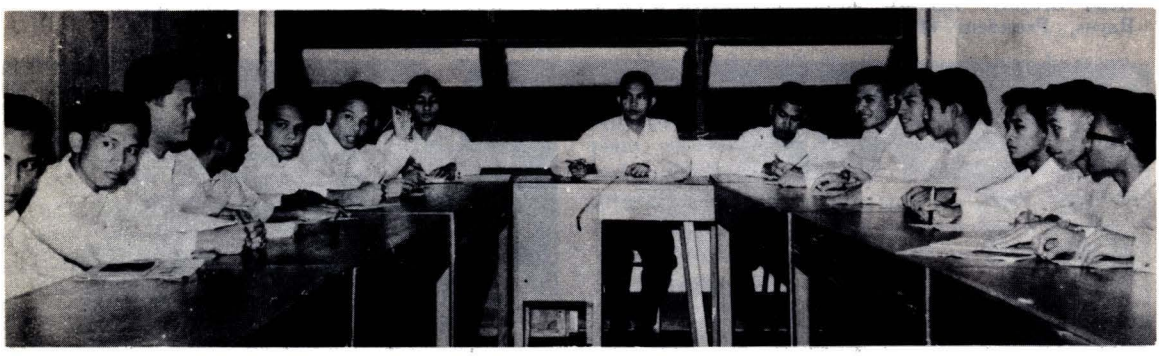


For. Rayos with graduating trainees, (l. to r.) S. Matibag, R. Camero, L. Reyes, A. Glori, and G. Cabanero.



Forestry Agreement — The U.P. College of Forestry and the Reforestation Administration concluded recently a memorandum of agreement in the field of research and seed collection. U.P. Vice President Dioscoro L. Umali and RA Administrator signed the agreement, witnessed by Dean Gregorio Zamuco of UPCF. Solicitor General Arturo Alafriz and other officials of RA. UPCF and the office of the Solicitor General. Photo shows (from left), Paciano Rimando, RA supervisor: Mauro Versoza, RA legal officer; Carlos Cunanan, RA deputy administrator; Viado, Alafriz, Umali, assistant solicitor general Dino, Zamuco and Romualdo Eclavea, legal officer of the U.P. College of Agriculture.

Administrator Viado of the R.A. delivering the closing remarks on a convocation held at the central office, Diliman, Q.C., Jan. 25, 1965. Dr. Robert F. Chandler of the IRRI was the guest speaker. He discussed the "impact of research in agricultural production."



The Forestry Student Council in session at the newly acquired FSBO office with Benito C. Battung, FSBO president, presiding. Members of the council are from left to right: Amado Ramos (sgt. at arms), Generoso Valiente (Zeta Beta Rho representative). Francis Mabanag (MLC representative), Prudencio Afalla (Pensionado Club representative). Marcelino Dalmacio (Senior Class president), Teogenes Agbisit (FSBO P.R.O.), Elpidio S. Padre (College Councilor, Rep. to the U.P. Student Council), Crisostomo Vilar (vice-president), B. C. Battung (president), Julian Gumayagay (secretary), Allen Torrenueva (treasurer), Eustaquito Tandug (auditor), Nelson Mercado (business manager), Felipe Pastores (Junior Class president), Diosdado Marfil (Junior Class Rep.), Abraham Velasco (Sophomore Class president). Not pictured: Prof. Andrew W. Bacdayan (Adviser), Members Aquiles Udarbe, Rogel Pimentel, Romeo Briones, Narciso Mindajao, Bernardo Dacumos, Primitivo Galinato, Jr., Delfin Ganapin, Roberto Romero, Carmelito Sagrado.

Participating Bureau of Forestry personnel to the convention of licensees for the initial steps in the organization of the Philippine Chamber of Wood Industries. (1) Roman Rondilla, Chief, Sw. & Lic. Div. (2) Domingo P. Ramel, District Forester, Ilagan, Isabela; (3) Bernardino T. Taeza, Asst. District Forester, Ilagan, Isabela; (4) Vicente Valdez, Officer-in-charge, Forest Station, Echague, Isabela; (5) Genaro M. Clemente, T. M. A., Ilagan, Isabela; (6) Brigido G. Aglugub, T. M. O., Echague, Isabela; (7) Mariano R. Serrano, Scaler & Asst. Lbr. Insp., Echague, Isabela; (8) Santos Cariaga, T. M. O., Palanan, Isabela; (9) Paterno Acosta, Scaler, Echague, Isabela; (10) Claudio B. Lazaro, Forest Guard, Forest Station, Echague, Isabela; (11) Juan A. de la Cruz, Forest Guard, Forest Station, Echague, Isabela; (12) Gaudencio R. Romero, Forest Guard, Forest Station, Echague, Isabela; (13) Virgilio Gomez, District Driver, Ilagan, Isabela; (14) Jose P. Tugade, Check Scaler, Ilagan, Isabela.

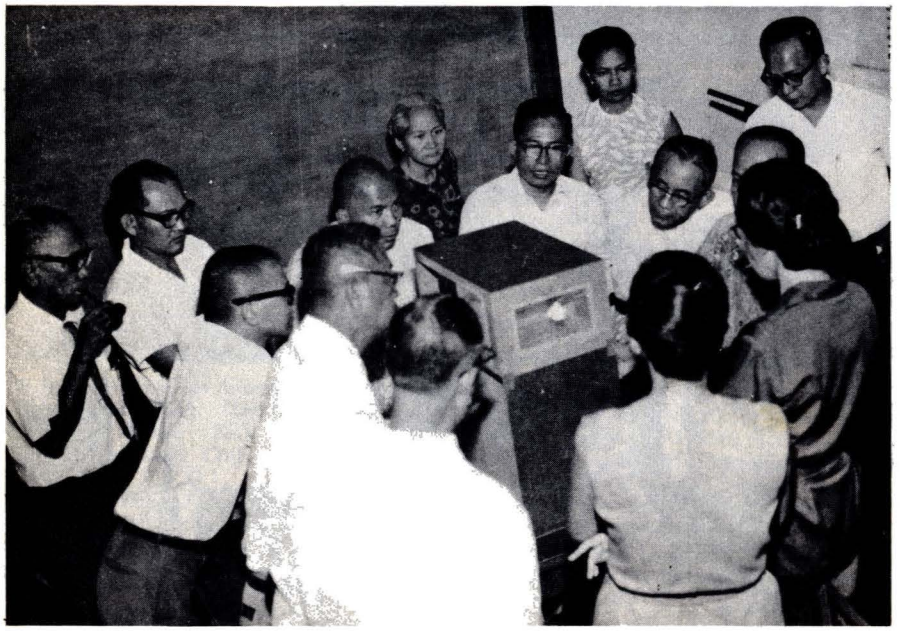
Dean Zamuco interviewed by Pakistan foresters. (l. to r.) Prof. N. Vergara, Mr. Mohamed A. Muyed, Dean Zamuco, Mr. Mazibur Rahman, For. Nastor. Pakistanis are Career Members of the Forest Directorate Government of East Pakistan.

FPRI's Director Manuel R. Monsalud gesturing and explaining to some delegates to the Log Producers' and Wood Processors' Convention, held on the Forestry Campus April 6, 1965, some of the research activities of the Institute that directly or indirectly help develop the wood-using industries of our country.

Director Manuel R. Monsalud and Tech. Consultant E. de la Cruz examining at the back of the Institute some vigorous coppical growth of Kaatoan bangkal (*Anthocephalus cadamba*) about 3 months old. This species may prove to be a "wonder tree" in the tropics similar to *Pinus radiata* of New Zealand and Australia.

FPRI's studies so far have proven that this wood species grows very fast and is good for pulp and paper, bakia making and for veneer core.

Some of the 155 delegates (including Director Monsalud representing the Philippines) from 39 countries that participated in the Pulp and Paper Development Conference held in Cairo, U.A.R., March 8-20, 1965, visiting the High Aswan Dam Project, about 14 hours by Express Train South of Cairo, Egypt.



Members of the Philippine Committee on National Biological Programme (branch of the Philippine National Research Council), chairmaned by Dr. D. Villadolid, met at the FPRI last March 27. They are shown here examining an automatic rat and mouse trap recently invented by Mr. Dimas Micosa, employee in the FPRI. Patent has already been applied for this invention.

Literary Attempts

Trees, Man's Indispensable Companions

by
JULITA GERARDO, B.S.F. '59

"Touch not a single bough. In youth it sheltered me and I'll protect it now."

Trees are natural landmarks and memorials. They are monuments which God had given us to bridge the memory of the dead with the living and the yet to-be born. They are the links which join together the unbroken chain of countless generations. Because God blest them with an almost never-ending life unlike the short life span alloted to man. There are trees that were planted by our great grandfathers which are still grand and towering today. Several, too, have been immortalized by artists as well as poets. And there are those with special religious, esthetic and even sentimental associations. These are the noblest works of Creation. And because of the grandeur each tree offers to mankind voices from afar echoes and each time says: "WOODMAN, SPARE THAT TREE. Touch not a single bough. In youth it sheltered me and I'll protect it now" This echoing distant voice that keeps resounding without end reminds us of how close trees are to our lives. I am told there is a sign in bold letters plastered at the entrance to a public park in Portugal. The tree entreats:

"Ye who would pass by and raise your hand against me, harken ere you harm me. I am the heat of your hearth on the cold winter nights; the friendly shade screening you from the summer sun; and my fruits are refreshing draughts quenching your thirst as you journey on. I am the beam that holds your house, the board of your table, the bed on which you lie, and the timber that builds your boats. I am the handle of your hoe, the door of your homestead, the wood of your cradle, and the shell of your coffin. I am the gift of God and friend of man".

Such is a glaring manifestation that trees are indispensable companions to man. Yet, in his ungratefulness or in his instinctive quest to slake his thirst for food, shelter and clothing he has taken the trees for granted. He has taken the forest as something to get rid of, and not as something great to preserve. He has ignored the manifold and multifarious amenities of life that he derives from trees. Lamentably then, the woodman has not spared the tree.

Forestry expert Tom Gill emphatically points in one of his papers that the Philippine forest is among the finest in the world. He continues without reservation that indeed our forest is not only outstanding in extent but also impressive, in the amount of valuable timber, commercially well-known in the world's market, that it contains. Such being the case he is quite confident and optimistic that if our forests are harvested with considerable care and protection there shall be a perpetual supply of timber and other forest products for our national wealth and economy. That certainly for wealth largely depends on the woodman. Will he spare the trees that crown our mountains grand? Or, in his burning desire and passion for "timber" will he let us live in houses built of mud and use cow dung for fuel like the millions of people in India? What a truly dismal picture the indiscriminate woodman would give us. It sounds strange, incredible and even unreal to us who see trees standing before our eyes. But what about the coming generations? Our

children's children? Our loved ones that are yet to come? Will they be victims of the woodman's reckless system of cutting trees? Or the kaiñgineros pernicious method of shifting agriculture? Or the undiagnosed causes of death of trees? Undiagnosed because more often than not the cause of death is rather obscure. Sometimes without our knowledge lack of water may cause death and, at other times, trees weakened by drought may fall prey to an insect or fungus attack. Or fire which is an arch enemy of trees? Obviously, fire totally kills the tree. But also the heat may injure patches of succulent inner bark of other trees. Fermentation then may easily start in these places and attract insects. While some of these causes are beyond our control others can be prevented. A tree is a living thing. To prolong its life it should be provided with sufficient light and water and not deprived of nutritive substances. A healthy tree will resist insect attacks and other diseases; it will develop a large crown and a strong root system; and it will withstand the action of gusty winds and torrential rains. If a tree is treated as a living organism, with an understanding of its vital functions, it will be a constant source of profit and pleasure to men. That job is everybody's main concern. We are left with a herculean task to conserve our existing forests by wise use and utilization. Because a forest conserved is a nation preserved. Ex-President of the United States of America Theodore Roosevelt and one of the world's foremost advocate of forest conservation, said over a half a century ago that a forest which contributes greatly to the wealth, progress and safety of the country is of interest to the Forester. So we cry to the woodman to spare the tree and to help the forester conserve the forest by being more discreet in his cutting system and by trying to feel less "timber-happy and addict". While it is true that every single bough means a centavo that is not all. All we have to do is to think of the long list of minor products that we all derive from the forest. Trees are our closest link to Mother Nature. As Joyce Kilmer says, "Poems are made by fools like me but only God can make a tree". By pondering and reflecting on the grandeur and mystery of stately trees, man obtained inspiration, solace and even a renewal of spirit. On weary days one has only to stand among the trees within the silent wood and find again all the things that has gone out of hand. Truly, these sanctuaries still yield to sincere seekers the deepest and most spiritual of satisfactions. Because the forest can yield most of the things that man needs, it has attracted the woodman who is quickly tempted to exploitation and monstrous destruction.

Much has been said on forest conservation but so little has been done. And there is still much more left unsaid. A bulwark behind the Philippine forest is scientific research. Results of research studies have contributed fruitfully to combat fires, insects and diseases; to guide the woodman implement the modern techniques of managing the timber as a crop and in utilizing it most effectively; to conserve the use and renewal of forest ranges; to safeguard watersheds etc. Therefore, with such results and many more findings to come the lack of scientific know-how that will prevent wanton forest destruction is no longer the problem. It is only a matter of deadly seriousness by loggers especially in the strict implementation of these scientific techniques. Much remains to be done before we can feel that the Philippine forests — this "everyman's empire" — are handled most frugally and most fruitfully. One basic problem in the scientific management of the forest is the fact that forests are established for a dual purpose. This includes service to the Nation and to the local economy and welfare. While it is a task requiring Sisyphean labor to preserve, protect, conserve and develop this forest property that all Filipinos own, we are confident that with full cooperation and support we will push up through the hard crust of accustomed systems and ideas in order to reach out into the light of greater wisdom — a sunlight in which even

(*Continued on page* 108)

FROM DIRECTOR MONSALUD
Paper conf-Foodagri — Cairo, U.A.R.
March 13, 1965

Dear Prof. Blando:

I am here attending the Cairo Conference on Pulp and Paper Development for Africa and the Near East under the sponsorship of FAO. I have been authorized by our government to attend this conference, in a consultative capacity, upon invitation of FAO Rome. I read a technical paper entitled, "Fibre Characteristics of Philippine Bamboos."

There are more than 150 delegates from 28 or more countries of this region, including those coming from the U.S.A., U.K., West Germany, France, Sweden, Norway, Finland, New Zealand, Poland, Romania, Cuba, Venezuela, etc. Pulp and paper experts from all over the world converge here to discuss technical problems of the pulp and paper industry, such as availability and quality of raw materials, processing techniques, the economics involved, investment trends, future supply and demand, etc.

The U.A.R. has graciously consented to be the host. The conference is going on in full blast. During free days, they conduct us on a study and observation tour of pulp and paper mills, tourist spots like the great pyramids of Egypt, the Splinx, the Sahara desert, the 40-Km. beautiful beaches of Alexandria, the museum, etc.

Cairo is a beehive of tourist activity. There is peace and order prevailing everywhere. Prices are a little bit lower here than those in Manila.

I am informed there are about 200 Filipino students studying here, mostly Filipino moslems, studying the Arabic language and the Koran.

During the day, temperature is somewhat similar to what we have there at this time of the year but at night it is chilly, sometimes the temperature goes down to as low as 8°C.

Egypt is progressing fast. They are utilizing the waters of the Nile for irrigation and at the Aman Dam to generate cheap electricity. Farms around Cairo which used to be dry are now verdant, grown to wheat, legumes, vegetables, alfalfa, oranges, etc. It is not dusty here. Flies seem to be non-existing in most places.

On March 19-21, we are scheduled to visit the High Dam (Aswan Dam) and a pulp and paper mill utilizing sugar cane bagasse. Egypt is by and large denuded of forests. They use reeds, rice straw, and bagasse for pulping.

They have several factories built in recent years. Once they complete the Aswan Dam, I am told, they can electrify most of Egypt at a very low cost of power. Then they can enhance their industrial development. In my opinion, though, our country is richer in natural resources but our politicians (most of them) seem incapable of harnessing our natural wealth and man-power for the general good of our Fatherland. I wish they stop playing too much politics and behave like real statesmen and devote more of their time to the real economic and industrial development of our country.

Our youth should keep themselves physically and mentally fit to answer the call of duty of our beloved Philippines. They should not squander their time and efforts in useless or inconsequential things. They must prepare themselves to serve our country and people no matter what be the cost. This world is just like a stage. Pretty soon we fade away leaving nothing worthwhile for posterity to remember us by.

So long and regards.

Sincerely,

M. R. MONSALUD

August 25, 1964

Mr. Henry Buggel
Diplom-Forest-Ing.
Bonn, German Democratic Republic

Sir:

Thank you for your letter with enclosures of February 15, 1964. I enjoyed reading your informative article entitled "Forestry in the German Democratic Republic." I am furnishing a copy of your manuscript to our College of Forestry,

University of the Philippines for possible publication in its journal the "Forestry Leaves".

I shall look forward to hear from you again. Thank you.

Sincerely yours,

(Sgd.) APOLONIO F. RIVERA
Acting Director of Forestry

Dagupan City
Jan. 22, 1965

Dean Gregorio Zamuco
College of Forestry
College, Laguna

Dear Dean Zamuco:

Thank you very much for the radio news materials we received through the mails last week. They were educational and very easy to understand.

I am very glad to learn that you have launched a forestry information campaign, to which we hereby pledge our wholehearted support. I look forward to receiving more interesting and informative articles from your Office. I hope you will send us materials not only twice a month but as often as you can. We can use these materials in our numerous farm and public service programs.

For your information, our station DZTD, 940 kc. Dagupan) reaches seven provinces of Central and Northern Luzon namely, Pangasinan, La Union, Tarlac, Mountain Province, Abra, Nueva Ecija and Zambales. We are operating on 5,000 watts from 5 a.m. to 12 midnight daliy.

I hope your campaign will be a great success and a year-long one.

Very truly yours,

(Sgd.) GERRY GALIAN
Station Manager

(*Continued on page* 112)

BACDAYAN . . .

(*Continued from page* 104)

On the other hand, Florentino Tesoro is also assigned to supervise the personnel of the Motor Pool in order to achieve effective and efficient service. Both Tesoro and Bacdayan will serve for one year unless earlier terminated by the Dean.

° ° °

JLG IS PFP OUTSTANDING CONTRIBUTORS FOR 1964

Jose L. Guerrero of the department of forestry extension emerged as No. 8 top contributor of the Philippines Free Press for 1964.

Joe started sending articles to the Free Press a year ago. He has devoted most of his office hours to writing forestry articles and his duties on radio program officer.

Joe is not a forester, but he proves to all and sundry that he can write good forestry articles.

Our warmest congratulation to Joe! May his tribe increase.

° ° °

LITERARY ATTEMPTS . . .

(*Continued from page* 106)

the aged may flourish verdantly to the end. The power that makes earth green and children fair with promise lies in us. The forest ranger shall guard the patrimony of the Nation because he has to. The woodman shall spare the tree. And, the lumberman too, shall keep the logs rolling without end but at the same time he, too, shall keep the young trees growing because then and only then can our forests render to our people the greatest good to the greatest number not only for the present but for all the generations to come.

Sunshine Corner

CALENDAR SAYS SO

"Just think — some of these ruins are over two thousand years old."

"You can't kid me. They couldn't be that old. It's only one thousand nine hundred, and sixty-five now."

* * *

My wife is mad at me again. I told her her stockings were wrinkled. She wasn't wearing any.

* * *

REAL ROMEO

She: Do you think I'm sweet?

He: Sure.

She: Do you think I'm pretty?

He: Of course.

She: Gosh, you say the nicest things.

* * *

Two drunks were walking along a railroad track. One said, "These are the widest steps I ever walked up in my life."

The other drunk said, "It's not the wide steps that are killing me — it's this low handrail."

* * *

AIN'T IT SO . . .

Lady of the house: "I don't need none."

Salesman: "How do you know? I might be selling grammar books."

* * *

EVOLUTION?

Two handsome apes, mature and wise, Atop a tree did criticize
Both men and apes: their thoughts and deeds,
Their physical wants, their spiritual needs.
The apes were irked, for men had said
That long ago they'd been ape-bred.

"It's false! said one. "Mankind does lie.
In righteous truth, I'll amplify.
Now physically, they are like us.
On that one point we can discuss:
They have two legs, two arms, a head;
They work, they eat, they sleep in bed."
"That's true," agreed the other ape.
"In bodily things they have our shape.
But how they think and act is queer;
Their civilized ways are just veneer."

"Illucidate, dear hairy chum —
Methinks apes too are troublesome.
A stupid few are indiscreet
And one or two display conceit.
Confess, my friend, some apes are bad.
A poor environment makes the cad.
So apes and men are bad or good
Depending on their neighborhood."

"I argue not with words so wise.
You're right and I apologize.
Some apes, like men, are rotten through,
And yet I further question you.
Have you known one of us to lie
To cheat, to steal, to villify?
Would father apes leave home to drink
At corner bars to stew and stink
And would our folks leave food to rot
Whiles apes work hard and still have not?
Would one ape tribe from distant shores
Build bombs of death for eager wars?

"Enough!" My friend. "Enough, you're right.
This talk of men gives me a fright.
The one thing apes must all pursue
Is set the record straight and true.
We apes must tell men everywhere
One truth, this fact we must declare:
Man's evolution theory lies,
For apes are good and men, unwise."

So be it known, please comprehend
That men from apes could not descend.
Most men evil, cruel, unjust.
But apes are beasts that apes can trust.

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AIR CARGO

October 19, 1964

The Dean
College of Forestry
University of the Philippines

Dear Sir:

JOB OPPORTUNITIES FOR FORESTRY GRADUATES

Please be informed that we have three (3) vacancies for Forestry graduates in our Wood-Mosaic (Phils.) Inc.

In this connection, we would appreciate it if you could refer to us applicants who graduated from your College of Forestry who might be interested to join us as scaler-grader of logs. We would be grateful if you could furnish us a list of forestry graduates together with their last known address so that we can immediately notify them for interview.

If it is not contrary to your policies, kindly post a copy of this letter in your bulletin board for the general information of those who might be interested.

Thank you for your kind attention and consideration to this request.

Very truly yours,

(Sgd.) ROMEO C. DIMAYUGA
Administrative Manager

RCC/lcb

A TRUE COPY:
ms/10-23-64

The Dean
College of Forestry
University of the Philippines
Los Baños, Laguna

NOTE: On page 102, we regret that the name of Forester Nicolas P. Lansigan, Ranger Cert. '31 and B.S. F. '41, Executive Forester was inadvertently omitted. He has been instrumental in securing two scholarships, the Bislig and the PICOP, for the College and in the placement of our graduates.

According to Forester Lansigan:

Development towards full integration is lined up for both BBLC and PICOP. In the case of BBLC, it has now a veneer plant of 25 million sq. ft. monhtly capacity, a band sawmill of 35,000

PICOP is in full swing putting up a ₱230-million pulp and paper mill with a daily capacity of 400 tons. Its forest concession is being developed to enable it to supply the vast amount of pulpwood needed .As this is the first instance of a large scale use of Philippine hardwoods for pulp raw materials, much pioneering studies on gathering and raising pulpwood have to be undertaken.

FORESTRY EDUCATION, A RETROSPECT

The status of Philippine Forestry is inseparably linked with the U.P. College of Forestry. Its being the only institution in the country, it is but natural for anyone to attribute to it whatever success forestry in the country has attained, or to blame it for its slow growth and retarded development.

According to some critics, despite its fifty-five years, forestry education in the country has been found wanting in more ways than one. They blame its sluggish pace to lack of leadership among the graduates that have left the college portals since its foundation to 1957. Because of this, they argue, forestry education has not been able to cope with the rapid economic and social changes in the country and the lamentable fact that the people for lack of forestry consciousness have been destroying our forests faster than any other people in the world.

In the face of such a charge, it is worthwhile to look back into the past. Forestry education began as early as 1910. The former school of forestry started as a small department of the U.P. College of Agriculture offering only the two-year ranger course. It was not until 1922 that the four-year curriculum leading to the degree of Bachelor of Science in Forestry was introduced. From its beginning up to 1957, the school was administered and staffed by personnel of the Bureau of Forestry, the bureau Director being its ex-officio Dean. According to law, the University and the Bureau were jointly responsible for its maintenance, the Bureau supplying most of the teaching staff, the University to look after its other needs, such as funds for additional faculty, equipment and facilities, and additional buildings for dormitories, etc. On paper, this arrangement was all right, but the University had not done its share as expected. The school was dubbed "the forgotten school" and an alumnus compared it to a pig with two masters, one depending on the other to feed it, so that in the end the poor pig died of neglect and starvation. There was a clamor then among the alumni that it be transferred to the University. The formal transfer took effect with the passage of another law in Congress. It cannot be gainsaid that the change of status had done the College some good.

According to the young critics among the present faculty members, the growth of the College under the Bureau was retarded because students' creativity and critical thinking was curtailed so that most, if not all, the students who took up forestry up to 1957 did not have a mind of their own, that they could not argue or reason out with the faculty, for fear of reprisals before or after graduation, and that they swallowed everything taught them hook, line and sinker.

We often wonder whether or not this charge laid at the door of the former faculty and the alumni from 1910 to 1957 is fair and irrefutable. We would like to ask the critics if the College that produced men, who are now holding top positions not only in wood using industries but in other enterprises also,

could be accused of cramping student's creativity *and* critical thinking *during his student days. We wonder if the College who had two of its alumni in Congress, one Cabinet Secretary, a Member of the Board of Regents, of the State University, three directors of the Bureau of Forestry, a Reforestation Administrator, a Director of the Forest Products Research Institute, a Director of Parks and Wildlife, four Deans of the College, Consultants and Managers of well-known firms, ranking officers in the Air Force, Navy, P.C. and other law enforcing agencies, can be accused of failing to produce leaders.*

Another charge is that new graduates do not know what to do once they are out in the field, that they cannot apply the principles that they learned in college to real life situations. While this state of affairs applies not only to graduates up to 1957, but also those of recent vintage, we should like to point out that this is true not only with our college, but of the other units of the university. One cannot deny the fact that book learning is not a sure guarantee that it can solve all problems that a graduate will meet in his life calling. A graduate is expected "to learn the ropes", the day he starts on his own. It can be suggested, however, that the blending of the theoritical with the practical would make it easier for the graduate to meet life's situations. As Alfred North Whitehead says, "the justification for a university's existence is that it preserves the connection between knowledge and the zest of life, by uniting the young and the old in the imaginative consideration of learning. The university imparts information, but it imparts it imaginatively." This is one phase of education that the Dean and the faculty should find worthwhile looking into, if the quality of graduates of the College has to be improved to meet the demands of wood-using and other allies industries.

In making an overall study of forestry education and its effects on the country one should not lose sight of the the various factors that either helped or hampered the efforts of the graduates in the conservation movement in the country. One should consider the attitude of the executive, legislative and judicial branches of the government towards the Bureau's efforts and uphill fight against ruthless and irresponsible forest destruction. One must take into account the difficulties and handicaps that the Dean and the faculty met and suffered in pre-war days because of lack of funds. Bright students, potential A-1 foresters shied away from the College. There were no inducements then such as the scholarships now offered in the College for intelligent and deserving students. It should be borne in mind that it was only through the aids coming from the United States and from our congress and grants from conservation-minded timber concessionaires that forestry education was given the much needed impetus it had been clamoring for all these years. With the creation of the Department of Forestry Information and with the moral and additional support from the University, we believe that forest destruction can be minimized, if not deracinated.

—A. D.

FORESTRY LEAVES

Organ of the Student Body and Alumni of the College of Forestry, U.P.

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Congratulations to the Ranger and B.S.F. graduates.
—THE FORESTRY LEAVES

A magazine like a tree must grow in size, stature and sphere of usefulness.

"Every magazine with a special audience finds it difficult to maintain itself; but the fact that *Forestry Leaves* has continued publication indicates that it has been serving its mission and has thereby won many friends. This is only well deserved. As a college publication which has through the years consistently promoted the interest of students in the College and has indeed contributed to the thought and ideas of forestry services, *Forestry Leaves* is unique in its field.

"We need to be reminded in print, if not in person, of the value of our forests, and this the magazine has done. We need to be told that natural calamities like drought and floods, which wreak havoc on our cities and towns, year after year, are by no means unrelated to how well we, as Filipinos, guard our watersheds from destruction through thoughtless despoliation. With the same insistence, we have to be reminded that from our forest resources may be derived, with the aid of science and technology, some special contributions to our attainment of prosperity and the good life.

"In every phase of human activity there is always need for moral guidance. A magazine because it can subtly but ably speak to its audience, can set the moral tone and explain to its readers the values that make man's activity meaningful . . ."

— C. P. ROMULO

Faculty and Student Body ('45-'46) including "pioneer" staff of the *Forestry Leaves*: Sitting (left to right), J. Natonon, F. O. Chinte, E. Roldan, T. Delizo, G. Zamuco (present Dean), Harold Cuzner (deceased), forester-in-charge, E. de la Cruz, M. Villanueva (FSBO President), F. Rosqueta, R. Cortez and J. Blando (Adviser). Standing (left to right): M. Cortez, I. Siapno, M. de Guzman (Editor-in Chief), V. Maglaya, M. Fabia, O. Ordoñez, L. Ompad, N. Micu, N. Banzuela, D. Gamboa, O. Astudillo and F. Bermillo (Assoc. Editor).