

The Philippine Forest Products Laboratory

I suspect that most of the people in the Philippines do not know what a forest products laboratory is. I am sure that is true of the people in the United States. There may even be some lumbermen in both countries who do not really understand what the name means. Defined in general terms, a forest products laboratory is a research institution in which skilled men and women, with proper equipment, combine their talents for the investigation of the properties, uses and processing of wood and other forest products, in order that the forest and its products may be more efficiently, completely, and profitably employed and may give better service to all concerned. This definition may be substantially correct but it will satisfy very few people, if any. It needs explanation. Let us take it apart and examine it closely.

A forest products laboratory is a "research institution." It is not just a building or a group of buildings, it is not just an accumulation of expensive equipment, it is not just a group of appointees on a government payroll. It is more than any one of these. It is more than all of them together. A forest products laboratory is a combination of buildings, equipment, trained people and competent leadership, imbued with the spirit of research, development and service to the nation. It is an institution. It has life, spirit, ambition, and loyalty. Its business is research. It can accomplish great things for the country with proper support and guidance.

The term "research" is not always understood, I am sure. It means, in this case, to study, to investigate, to learn new facts, to solve problems, to develop new processes or products that are better than the old and generally, to increase knowledge.

"Where skilled men and women combine their talents." The success of a forest products laboratory depends in large measure on the skills of its staff and the expert coordination of these skills in the solution of research problems. Forest products research requires a combination of many kinds of scientific training. It is not a job for foresters, or engineers, or chemists alone. All these are needed, as well as pathologists, entomologists, mathematicians, physicists, and other specialists. The important fact to remember here is that these people work as a team, not as individuals. Other things being equal, these specialists, working together under competent leadership, can accomplish much more and with greater accuracy than an even larger number working independently of each other. Individual scientists working alone can accomplish much, of course, but with the constructive criticism and the direct assistance of men of other skills, each scientist is able to make more progress and fewer mistakes than when working alone.

The specialized equipment that can be made available to a forest products laboratory of substantial size is also one of the great advantages possessed by its staff. Individual workers seldom have such equipment available and commonly must be content with makeshift or incomplete apparatus. By itself, the equipment, can do nothing, but in the hands of competent, ambitious staff it permits studies and developments not otherwise possible. On the other hand, the possession of beautiful machines and testing equipment could cause a laboratory staff to become complacent in the belief that they have everything. An individual scientist with brains, ideas, and vision can accomplish more with limited equipment than a group of mer-

with the finest possible equipment but who lack ideas, vision, and a sound research program. The men and women of the Forest Products Laboratory staff and their leadership must, therefore, be of the highest quality obtainable. There is no place for mediocrity among them.

Research in a forest products laboratory is a continuous, full-time occupation, not a secondary item or something to be done in spare time. Research of some kinds can be done by companies engaged in extracting and processing forest products and good examples of company research can be cited. The Weyerhaeuser Timber Company of the United States is outstanding in this respect. It knows that properly directed scientific research and development can pay big dividends and it has plenty of money to finance a company forest products laboratory of considerable size. Its laboratory has been functioning successfully for many years, with profit to the company. But such examples are very scarce. Generally the lumber companies and other wood processors are too busy producing and selling their product to find time for research. When they do occasionally attempt a study, it is usually with the part-time services of someone who also has other duties and cannot put his whole thought and effort into the research job. The result is seldom satisfactory.

"In order that the forest and its products may be more efficiently, completely, and profitably employed and may give better service to all concerned." Here is the reason for the existence of the Forest Products Laboratory and for the investigations it undertakes. Research in forest products is not an end in itself but only a means to an end. Wood is one of the most important natural resources of the Philippines and a good source of foreign exchange. But possibly half of the wood that grows on an area of forest land is left by the logger because it cannot be sold at a profit. It is too small, too defective, or of species for which there is no market. Here then is an enormous quantity

of raw material waiting to be used. There is further loss of wood as the logs are cut into lumber, veneer, or other products so that only about 1/4 to 1/3 of the wood that grows on the land actually reaches the final user in the form of finished products.

We all know that industry must make a profit in order to stay in business. It cannot operate very long at a loss. We also know, or should know, that the loss of wood in its journey from the forest to the consumer is due to inability of the management to avoid the loss profitably. We know that the loggers and the mills are in business to make a profit for their stockholders. If they could find profitable use for some of the wood now left in the forest or lost in processing, they would do so.

There are two general methods of reducing the percentage of the wood that is not used. One method is to improve the equipment and the handling or processing details so that the loss is reduced. For example improved accuracy in sawing lumber can reduce the saw kerf and also the amount of surfacing necessary to produce smooth straight boards. In other words, less of the log goes into sawdust and shavings and more of it into lumber. Other improvements are possible of the same general character.

The second method is to find profitable uses for what is now wasted for lack of market. This involves finding satisfactory ways to utilize species of wood that are now left in the forest as unprofitable. Perhaps some of them can be used for veneer or for special minor products. The slabs, edgings and trimmings at the sawmill are made of perfectly good wood. Why not make them into products that can be sold at a profit? The problems are not impossible and research is one of the basic requirements for their gradual solution.

No one should be deceived, however, into thinking these utilization problems can be solved quickly and easily. If the job were easy, it would have been done long ago, without setting up a research laboratory for

the purpose. In fact, the difficult and time-consuming nature of the task makes necessary the setting up of a scientific organization, a forest products laboratory, to work on it with the best equipment and talent available.

Another thing to remember is that scientists alone cannot solve these waste utilization problems. The lumber industry must cooperate individually and collectively by keeping the scientists' feet on the ground through helpful consultation and advice, by discussing their problems with the Laboratory staff, by furnishing material to work on and other assistance, and by trying out the promising developments arising out of the Laboratory investigations.

In the foregoing paragraphs we have talked in general terms about what the Forest Products Laboratory is and about the problems it faces. But, to be more specific, just what will the Laboratory do? One of its steady jobs will be to build up a mass of basic data on the properties and characteristics of the 3000 species of Philippine woods that grow to tree size. This will require making thousands of tests on the bending, crushing, toughness, and other strength properties of each wood, its specific gravity, its seasoning and shrinkage properties, its resistance to attacks by fungi and insects, its chemical composition, its pulping properties and fiber length, and its microscopic structure. Other things that need to be known about woods for certain uses are their resistance to splitting when nailed, and their behavior under boring, planing, sanding, scraping, painting, varnishing, gluing and the various other shop operations involved in making wood products. Information on some of these properties is already available on a few species from tests made in previous years or from general observation. This will all be collected and added to, where additional data are needed. Most of 3,000 species, however, are still untested. Since the number of species is so large, it will require many years to cover them all. For that reason, the attempt will

be made to cover first the species that are important or promising commercially or are otherwise of especial interest, leaving those of lesser urgency for later study.

Assembling and tabulating data of the kinds described above provides basic information that is helpful in innumerable ways. Let us suppose for example that someone says "I have been importing American hickory tool handles but would like now to manufacture handles from Philippine woods, what Philippine species are tough like hickory and otherwise suitable for tool handles?" Or a lumber manufacturer may say "I am leaving a certain species in the woods because I can find no market for it. What are its properties and what purposes might it be used for?" If the species has been included in the above named tests, much useful information can be given immediately to the inquirer. If it has not yet been studied, perhaps it can be included in later tests.

It is reasonable to believe that much of the mill waste can be made into pulp, paper, or wallboard successfully, some into high class products and some into lower grade products to sell cheaply. For this reason, one of the important sections of the Laboratory will be the pulp and paper section, in which each species available in quantity or otherwise promising will be made into pulp by different methods and then into paper by hand-sheet methods, or into wallboards, for testing. If the first pulping tests with an important species are not successful, perhaps additional studies will be made to bring about improvement in quality. Some day we hope to have a small paper machine that will produce a continuous sheet of paper 10 to 12 inches wide, in different grades and thicknesses.

We also hope to have, in less than a year, fairly complete equipment for making veneer and plywood. This will enable us to try species of wood not now used for veneer or plywood and to study the possibility of producing insect and decay resistant ply-

wood by treating the veneer with preservative before gluing. Such protection should increase the consumer's acceptance of plywood and widen its markets. There may also be a good opportunity to use plywood under severe weather and moisture exposure, if glued with high-quality waterproof glues.

In the beginning, our sawmill will be used mostly for cutting specimens out of logs for strength and other tests. A few years hence, however, it may be possible to use it in studies on sawing, in the effort to find practical ways of reducing the power requirement, improving the accuracy of sawing, reducing the saw kerf, and trying out improved saws.

The research program of the Laboratory must be organized to meet the needs of the times and must be revised each year as the work progresses, new problems arise, and new opportunities present themselves. The program can be considerably influenced by the lumber producers if they will take an interest in the work of the Laboratory, seek to understand its objectives and methods, get thoroughly acquainted with its staff, and convincingly present the problems and needs of the wood industries. The lumber industry, therefore, should plan definitely to maintain close contact with the Laboratory, individually and by committee action.

The research program must also be responsive to the needs of consumers of forest products for better quality, greater satisfaction, and longer life of the product. There appears, however, to be no organization to represent the consumer in the discussions of the annual program of work. Until some better representation is found, the Laboratory staff will have to make sure that the consumer is not forgotten.

The economic needs of the country will also have a strong influence on the program. The reduction of waste, the development of new industries, and the export of a higher percentage of the wood in the finished instead of the raw form will all have a favorable economic influence.

The financial problems of the Laboratory

have not been completely solved. Up to the present, the costs have been paid in part by direct Congressional appropriation, in part by dollar funds from F.O.A. and in part by peso funds from Philcusa. This same situation will probably prevail next year but but it cannot go on indefinitely. The time is coming when neither Philcusa nor FOA funds will be available and the laboratory will have to depend almost entirely on direct appropriations from Congress unless some other source of funds is provided. Since the Laboratory can be of such great value to the lumber and wood industries, its proper financing should be a matter of great concern to these industries and they should press for an adequate solution.

Most of the Laboratory's work will be of the general interest kind. That is, it will be for the benefit of the general public in the long run although it will also benefit the wood industries directly. It is proper that work of this kind be paid for from the general funds of the Laboratory. Occasionally, however, some company may wish to have a special study made that is primarily of interest and value to that company and only incidentally of value to others. It is no more than right that the company so benefitted should pay part or all the costs of the special study. I believe it will be possible to arrange for such studies through individual cooperative agreements which describe the work to be done, the expected costs and method of payment, what is to be furnished by each party to the agreement, the kind of report to be prepared and number of copies to be provided, and any other details that need to be agreed upon. It may be that, in the course of time, other Asian countries that are not equipped for forest products research, will wish to have studies made here at their expense. Projects of this kind from within and from outside the Philippines should increase in number as the Laboratory staff grows in skill and develops a reputation for accuracy, reliability, and good judgment. It

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With 50,000 hectares to be planted yearly, we will need no less than 187,500,000 (3,750 x 50,000) seedlings every planting season of the year. The average cost of raising seedlings in our nurseries is ₱3.00 per thousand or ₱0.003 per seedling. Raising 187,500,000 seedlings would necessitate an outlay of ₱562,500 (.003 x 187,500,000, annually. In actual nursery practice, the cost of raising seedlings alone, represents about 80 percent of the entire cost of nursery operation (cost of planting the seedlings in the field not included). Therefore, including expenses for improvement of water system, maintenance of nursery office and laborer bunk houses, supervision, collection of seeds and wildings, purchase and repairs of tools and equipment, preparation of seedlings for planting in the field, etc., we need approximately ₱703,125.00 to maintain the nurseries capable of supplying the seedlings needed annually to reforest 50,000 hectares.

It is planned to pay ₱0.23 for every surviving seedling (3-year old) by "pakiao" or contract system of planting. To reforest 50,000 hectares, we need to grow at least

75,000,000 seedlings (1,500 seedlings to a hectare). At ₱0.23 per seedling, we need approximately ₱17,250,000.00 to pay for the trees needed to reforest 50,000 hectares annually.

SUMMARY OF EXPENSES FOR ONE YEAR

For maintenance of nursery to produce 187,500,000 seedlings for planting by the contractors	₱ 703,125.00
For payment to contractors for 75,000,000 3-year seedlings at ₱0.23	17,250,000.00

Total expenses, annually . ₱17,953,125.00

Therefore, it needs about ₱736,078,125.00 (17,953,125 x 41) to reforest the entire area of 2,020,320 hectares of cogon land (1,500 trees to a hectare).

If the goal is to grow 2,000 trees to a hectare, the yearly cost will amount to ₱23,937,500.00 and to reforest our entire cogon land will need a total outlay of ₱981,437,500.00.

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is probable, however, that they will account for only a small percentage of the Laboratory's financial support during the next five of ten years.

The Laboratory needs the advice and counsel of the wood industries in developing its research and development program, as well as its support of the financial program. The wood industries need also to maintain close contact with the Laboratory in order to keep informed on the progress of the investigations under way and to understand and take early advantage of the results obtained. An excellent method of providing this two-way exchange of ideas and information is through one or more wood industry advisory committees which would meet with the Laboratory staff for discussion several times a year. Possibly a start has already been made

toward the formation of one or more committees of this kind. If not, it is not too early to begin.

Finally, gentlemen, I ask you to keep strongly before you the idea that the Forest Products Laboratory will be most useful to you and to the country if you, as individuals keep well informed on what it is doing. Give it friendly constructive criticism when you think it is wrong and give it praise when you find something praiseworthy. Get acquainted with the individual staff members so that you can call them by name. Teach them the things you have learned in your business. Your knowledge added to their knowledge amounts to more than the knowledge of either one alone. Above all, give your hearty and continuing support to the development of a thoroughly scientific organization and the prosecution of a well-considered research program.