The search for better rice strains

by Marcos D. Agayo

Ever since it was founded in 1960, the International Rice Research Institute (IRRI) in Los Baños has spearheaded the drive to produce better and higher-yielding strains of rice. Through a variety of methods including cross-breeding and radiation, IRRI scientists have been able to produce rice varieties that are not only higher yielding, more nutritious and more resistant to diseases and pests but also able to be grown in cold temperatures, toxic soils, deep water and almost no water.

Moving the results of IRRI's research from the lab to the paddy is Seedboard, the government entity that has the final say on which of IRRI's high-yielding varieties (HYV) should be recommended to farmers for planting. So far 22 HYVs have met Seedboard's standards.

None of the 22 HYVs are well-suited to all areas of the country. But most of the 22 flourish, in varying degrees, when grown in lowland areas. Sixteen of them are moderately or completely resistant to major plant blights like lodging, blast, bacterial leaf blight and tungro and to pests like the brown planthopper. Only six are moderately susceptible to these rice scourges. All 22 HYV rice strains mature in from 105 to 145 days, thus allowing a minimum of two harvests a year.

Upland farmers expect their share of HYVs.

Higher incomes for highland farmers

Eager to have upland farmers share in the benefits HYVs have brought to lowland farmers, IRRI and the Bureau of Plant Industry (BPI) are devoting increased attention to developing HYVs for the country's 400,000 hectares of upland rice fields.

Presently, little or no chemical fertilizers and pesticides are being used by upland rice farmers. Yields are consequently low—about 15 to 25 cavans of palay per hectare compared to Masagana 99's lowest national average yield of 56 cavans per hectare.

To correct this, IRRI and BPI are testing 26 HYVs for possible upland cultivation. Of the varieties being tested, one known as RP KN-2 seems the most promising. It is resistant to cold—like the native upland varieties—and can yield as much as most of the present recommended varieties do in lowland paddies.

Many Banaue farmers are not now receptive to innovations in farming techniques. They seem to prefer the tried-and-true and much-less-costly methods of old. But Rene Mondragon of BPI says many farmers will change their minds when they see the significantly higher yields produced by Banaue farmers who are testing new rice varieties and using modern fertilizers and pesticides. Using our HYVs may cost farmers a bit more in the short run, says Mondragon, but we're convinced they will find it well worth their while in the end.

Does this mean that old rice varieties which have satisfied the needs—and taste buds—of generations of highland people will disappear? "Not at all," says Mondragon.

He explained that IRRI maintains a germ plasm bank containing 30,000 of the world's rice varieties—including Banaue types. Native strains are preserved so that some of their superior traits might be bred into new varieties. Thus while present HYVs require a lot of pesticides and synthetic fertilizers to produce to full capacity, future varieties may combine the strengths of upland native strains (which require relatively little fertilizer or irrigation and no pesticides) with the high yield capacities of laboratory-developed rice types.

Farming by computer?

Another proposed method for improving rice production suggests farmers leave the thinking and worrying to agricultural technocrats.

The method—dubbed "Agrometrix" because it is based on exact measurement of inputs and plant growth processes—is the brainchild of a professional project management, marketing and communications organization known as The Group.

According to a Group explanation, Agrometrix requires of farmers "no special skills or knowledge, no implements or rice varieties other than what they are using under conventional methods." All they have to do is "follow simple directions on fertilizer inputs and water management emanating from a central organization implementing the technology, which is embodied in a set of formulae."

The "central organization" mentioned is needed to do the computing and evaluating for farmers who are "in no position to grapple with the complex and semi-complex mathematical and statistical derivations."

The Group's proposal may sound a bit snobbish, but the recommended method has produced results in Orani, Bataan, where The Group tested it. According to The Group's findings, fields using the Agrometrix method had an average yield of 166 cavans per hectare. This is nearly 70 percent higher than Masagana 99's highest average yield of 97 cavans per hectare.

Agrometrix essentially consists of "an integrated series of formulae which, applied to prevailing field conditions, such as the available solar radiation level, give the quantity and the timing of application of necessary water, fertilizer and other standard production inputs." By enhancing or retarding certain characteristics which appear defined stages of the rice plant's life cycle, the plant's yield is maximized.

The Group gives this rough example of an Agrometrix technique: At a certain stage in the rice plant's life, it requires a specific amount of solar radiation in order to produce the desired number of spikelets which will eventually mature into grains: In order to absorb the optimum amount of solar radiation, a plant should ideally be of a certain size with a certain amount of leaf area. Too large a leaf area means the plant will absorb too much solar radiation, grow too fast and too large. The result is mutual shading and, in the end, a low grain yield. Too small a leaf area, on the other hand, results in inadequate solar radiation, a smaller number of spikelets and fewer ripened grains.

While still being evaluated, the Agrometrix method's chief value is that it suggests that precise control of the various stages of a plant's growth can, by itself, lead to higher yields. The organic methods of Japan and Taiwan, demonstrate that costly fertilizers and pesticides are *not* necessary to increase production. For those who worry about ecological balance and find the old unadulterated rice the tastiest whether as *sinangag na kanin* or rice wine, that is welcome news indeed.

From steam to power

Geothermal power will solve the oil crisis.

by Marietta B. Arinto

Leyte, the island of firsts, has done it again: it is now the site of the first commercial geothermal power plant in the country.

The inauguration of the Tongonan Geothermal Power Plant last July 21, 1976 was a triumphant culmination of efforts started late in 1973, when the Philippine National Power Corporation (NPC) and New Zealand's Kingston Reynolds Thom and Allardice Limited (KRTA) began drilling exploration holes. Seven wells were completed. The first three produced only hot artesian water, instead of the coveted steam, but they were instrumental in locating the steam reservoir.

With the creation in September 1976 of the Department of Energy, management of the Tongonan Geothermal Project passed from the NPC to the Energy Development Corporation (EDC) of the Philippine National Oil Company (PNOC). The drilling of the deep wells started under the PNOC-EDC Management.

Steam to power

The first production well, Mahi-ao I, spurred by the First Lady on October 21, 1976, was completed January 13. Three months later it was ready to draw steam.

The construction of the power plant, along with the setting up of a 20-kilometer transmission line from the plant to Ormoc City, was started on May 2. Fxactly two months later, on July 2, the plant was running. By July 12, Tongonan was supplying power to Ormoc City.

Mahi-ao I, which can generate up to 10 megawatts, is only the beginning of a five-year geothermal power development program for Leyte, the goal of which is to have 100 megawatts geothermal power generation capability by 1982.

The program will involve drilling of 24 production wells with depths of 5,000 to 6,000 feet, laying approximately 30 kilometers of steam ducts and an effluent disposal system and constructing two 50-MW power plants consisting of two 25-megawatt units each. The estimated cost is US$90 million.

For all these the Philippine government hopes to realize by 1981 savings of $7.6 million per year in foreign exchange from the operation of the first 50 MW plant, and another $7.6 million per year by 1983 when the second plant is operational.

For the people of Leyte there are even more tangible benefits. Foremost of these is cheap power. In geothermal power generation the cost of fuel—which makes up 80 to 85 percent of the total cost in conventional (or oil-based) power generation--is eliminated.

This means that all PNOC will shoulder is the cost of drilling, piping and maintenance. To be sure, the materials required in geothermal power production are rather special—steam being what it is—but engineers maintain that, all things considered, geothermal costs are more than competitive.

Just how cheap Tongonan power will be for its consumers is not yet known as PNOC—which sells the steam to NPC, which converts it to power and delivers it to the consuming public—has yet to determine its selling price. But it will definitely be much cheaper than non-geothermal power, both PNOC and NPC sources say.

First in the country

The Tongonan Geothermal Power Plant is the first ever in the country to produce power in commercial quantities. Its completion has put the Philippines in a class with the very few countries in the world—notably New Zealand, Italy and the United States—which have availed themselves of geothermal energy to meet part of their power requirements.