

Cropping Systems for Small Farms

It is rice harvesting time in Indramayu District on the north coast of West Java. Handlebars and fenders laden with sheafs of the gold-brown harvest, bicycles wobble their way from the fields to the villages. In front of houses and along the roadside sheets of unhusked rice — the area's main crop — are spread out to dry.

Indramayu is one site of a cropping systems project being carried out by the Central Research Institute for Agriculture (CRIA), a unit of the Ministry of Agriculture, based in Bogor, Indonesia.

A part of the collaborative cropping systems program developed in conjunction with IRRI, the International Rice Research Institute, with IDRC support, this is one of two experimental sites in Indonesia, both of which are representative of major soil and climatic conditions in Southeast Asia.

The level alluvial clay soils of Indramayu are fertile and the introduction of the direct seeding — *gogo ranch* — method of rice production in the late 1960s has permitted double cropping on land that would normally grow only one

crop. Irrigation, available in parts of the district, has also contributed to an increase in rice production. Most of the crops are however rainfed and the water supply is inadequate for further cropping intensification using traditional methods. And so, explains Mr A. Sjarifuddin, the project leader, pointing to fields where farmers are beginning the back-breaking task of land preparation, the land lies fallow during the dry season when one or two potential crops could be grown.

The growth of secondary — *palawija* — crops during these seasons would

Packaging dried unhulled rice at Indramayu, Indonesia.



prepared for the sowing of rice and a much needed food or cash crop would be produced.

Experience has shown that it is possible to produce these crops in the area, but, says Dr Jerry McIntosh, IRRI agronomist at CRIA and co-leader of the project, agronomic practices have been developed for the more sophisticated level of management practiced by the agricultural experiment stations rather than for the farmer. By testing various rice-based cropping systems in the farmer's fields, with farmer participation, the project aims at developing cropping systems tailored to the needs of the small landholder.

The second test site, Lampung province in South Sumatra, has been a transmigration site for close to 50 years. The agriculture practiced here is mainly upland — cassava, legumes and some upland rice. Irrigation and infrastructure are lacking. Compared to Java, the red-yellow podzolic soils are poor and the low organic level decomposes rapidly. After three to five years of cultivation the soil fertility is depleted and crop production drastically reduced.

Traditionally the farmers of the area practiced a shifting cultivation not possible for the transmigrant families restricted to the two hectares of land provided by the government. Practicing the labour-intensive cropping methods they used in Java where land is limited, a farmer and his family can cultivate only one hectare. The fallow land is quickly reclaimed by *alang-alang* grass, the ever-present weed.

CRIA pilot-projects at both these sites have shown considerable potential for increasing crop intensity and production. In Lampung a 20-year-old tansmigration site was planted with early-maturing corn and rice. Cassava was planted between corn rows. The corn, then the rice, were harvested and replaced by peanuts between cassava, followed by rice bean, then drought-resistant cow peas during the dry season. With the use of fertilizers, in amounts equal to those used in Java, yields equaled those produced on the best land in Java where the soils are famed for their fertility, Dr McIntosh says proudly.

The two-year project now underway will considerably expand these fledgling cropping programs. In Indramayu, the research team — an agronomist, an economist, a multiple cropping extension specialist and four "spot" workers, graduates from a high school level agricultural college — have, with the help of the kabupaten agricultural officer, selected 27 farmers who each set aside 1,000 square meters of land for the project. In these fields they are experimenting with different crop mixes and varieties, varying fertilizer, weed and insect management and land preparation levels. Up to 24 different crops including sorghum, sweet potatoes, mung beans,

Dr Jerry McIntosh and team leader Acep Syaifuddin examine sorghum.



soy beans, egg plant and chillies are being tested in various combinations.

Divided into three groups the farmers will practice differing cropping systems: some will implement new systems developed at CRIA; others will superimpose new crops and varieties onto their existing systems; the last will carry on as before. All seeds, fertilizers and other inputs required for the experiments are being provided by the project.

The same field studies are being carried out by a similar research team and groups of farmers in Lampung.

Economic and agronomic data based on the farmers' daily records will be collected by the research team at each site and analyzed at CRIA in Bogor for use in planning the second year's experiments involving 100 farmers in both areas.

Training is an essential component of the project. Four provincial agricultural scientists will annually participate in IRRI's cropping systems training program. During the second year, 18 extension workers from surrounding kabupaten will undergo on-the-job training at the original project sites.

The problems of marketing the *palawija* crops and access to fertilizers and other inputs will need to be solved if multiple cropping systems are to be successfully adopted. Difficult though they may be, neither Dr McIntosh nor Mr Sjarifuddin sees these problems as insurmountable. "With the anticipated results from the project and the data gathered, we may be able to convince the government of the profitability of the systems" says Dr McIntosh. "Hopefully" he adds, "the government will take the lead and implement a package assistance program similar to the BIMAS and INMAS production programs which now apply only to rice cultivation". The increased volume of production should also facilitate the development of local and export markets.

The interest manifested by the Indonesian Directorate of Techniques and the Directorate of Extension as well as by the local agricultural offices augurs well for the programs' implementation. Certainly, if enthusiasm is a measure of future success, improvements in cropping practices and in the welfare of Indonesian farmers will not be long in coming.



Village youths are also interested in the experimental sorghum crop.

Photos: Michelle Hibler