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IV. DEVELOPMENT PROJECTS AND ISSUES

***PROJECT: NON-FORMAL EDUCATION TO PROMOTE RURAL DEVELOPMENT IN NEPAL**

Report by: John Comings, World Education, Inc.
210 Lincoln Street
Boston, Massachusetts 02111 USA

The present national literacy campaign in Nepal began with an experimental non-formal education project undertaken in 1978 between World Education, Inc. and the Center for Educational Research, Innovation, and Development at Tribhuvan University. The project, funded by USAID, originally concentrated on four districts, helping rural men and women learn of new practices in agriculture, health, nutrition, sanitation, and income generation through community development projects. Over the past six years David Walker, the resident WEI Advisor, and his staff have developed a new set of learning materials and methods that stress self-reliance along with the use of literacy skills to solve the myriad of daily problems confronting rural communities.

With continuing assistance from USAID, World Education and the Ministry of Education and Culture expanded the project into six districts. During the most recent cycle of the program, completed in mid-1984, some 18,000 participants were enrolled. A solid organizational foundation has been established for the Non-Formal Education Project, training materials have been carefully developed, and a group of experienced literacy training specialists are working in the field. Building on this foundation, the Ministry of Education and Culture is broadening the scope of its campaign. World Education is now helping the Ministry expand the program into an additional thirty of the Kingdom's seventy-five districts.

***PROJECT: DHADING DISTRICT DEVELOPMENT PROJECT**

Update from: Veit Burger

The results of the development project so far are very encouraging and have also changed the attitudes of some government officials as to the ability of villagers to get involved in the development of their own physical and social environment. Fr. Stiller has left for a sabbatical year in the United States and Prachanda Pradhan and Poorna Adhikary have joined the team. The Planning and Orientation Phase of the project continues through this summer.

***PROJECT: INTEGRATED CEREALS PROJECT CROPPING SYSTEMS RESEARCH**

By: Department of Agriculture
His Majesty's Government, and
Agency for International Development (AID)

Results from Nepal's cropping systems research program are raising the productivity of some of the world's smallest landholdings.

Cropping systems research is a means of finding out what farmers do and why they do it, and systematically applying that knowledge to test solutions to farmers' problems. In Nepal it is not uncommon for two fields lying side by side to be cropped quite differently, one with a high-value crop intensively managed and the other with a minor crop haphazardly managed. The fields may be similar in topography, drainage, and soil quality. Their owners may be equally industrious. The explanation for the differences may lie far from the fields themselves, in decisions their owners have to make about managing other fields, about allocating family labor, about borrowing draft animals, about risk, and so forth.

Cropping systems researchers take knowledge about farmers and their practices and put it to work in testing improved varieties, seeding rates, fertilizer application methods, and other ideas in farmers' fields and prevalent cropping patterns. Technological ideas that pay off with little disruption of existing systems are most likely to be rapidly adopted and to have a far-reaching impact on agriculture.

Experiment station research, cropping systems research, and production programs are interdependent parts of the productive agricultural research and development system that Nepal is building. Experiment stations test enormous numbers of varieties, experimental lines, inputs, and techniques under carefully controlled conditions where even small, but significant, differences can be detected. Outstanding varieties and methods pass into cropping systems trials where their suitability for various cropping patterns is assessed. Information on the strengths and weaknesses of the technology flows back to the experiment stations, while recommendations for improved technology are conveyed to production programs.

The cropping systems project of Nepal's Department of Agriculture has two broad objectives: to improve the technology (varieties and methods) that farmers use in their cropping systems, and to help spread proven technology rapidly.

One way farmers can produce more is by realizing higher yields from crops they already grow. Consequently, the cropping systems project tests new varieties and methods within existing patterns. Another way is to grow more crops each season. Thus researchers are seeking practical ways to insert an additional crop in existing cropping patterns.

Cropping systems research in Nepal is done at six primary locations. The sites were chosen to be representative of major agro-ecological situations of the Kingdom, so that ideas proven successful would have the widest possible applicability. Four sites are in the Hill region, one is in the Terai, and one is in the Inner Terai, a vast, flat valley separated from the Terai by a range of hills. The sites differ in length of rainy season (from 2 to 6 months), type of soil (three major soil groups are involved), and size of farm (the site averages range from 0.5 ha. to 1.1 ha.). Farmers at all sites grow rainfed lowland rice. But at some sites, farmers also grow rice with irrigation, and at one site some upland rice is grown, too.

When the sites were initially chosen, social scientists of the cropping systems program made surveys to draw a quick socio-economic profile of each one. These surveys were done by finding a dozen or so knowledgeable villagers (key informants) at each site and conducting intensive interviews. Subsequently, more elaborate surveys involving randomly selected farmers, crop cutting, and direct observation were conducted to provide additional information.

Surveys are one tool in the continuing socio-economic analysis that is necessary for cropping systems research. Some of the findings from the or panchayat of Pundi Bhumdi, for example, convey the rich detail that the key-informant surveys provide:

- Farms average three fourths of a hectare each. Farmers believe one farm in three is too small to support a household.
- Hail is a threat particularly at the beginning and end of winter though it doesn't occur every year. Damage can be severe.
- About half the land lies fallow in winter. Insufficient compost and the difficulty of protecting far-off fields from marauding monkeys and untethered livestock are the main reasons.
- Little produce is sold.
- Labor shortages occur during land preparation, transplanting, and harvest of rice.
- Bullock shortage is an important cause of poor land preparation.
- Feed shortage during the winter limits the number of animals farmers can keep, and hence the amount of draft power available and the amount of dung produced.
- Most farmers keep a female water buffalo to derive cash income from its milk and offspring.
- Milking buffalo and working bullocks are fed some grain — usually millet, as well as roughage.
- Low soil fertility is a major barrier to more intensive cropping and higher yields. The lack of sufficient dung, inefficient compost-making practices, the scarcity of legumes in the village's cropping systems, and the slight amounts of chemical fertilizer applied all contribute to the problem.

Nepal's cropping systems research staff consists of 2 agronomists, 10 assistant agronomists, and 2 social scientists. Because of shortage of funds and qualified personnel, the program usually operates with one or more vacancies. The cropping systems program is part of the Integrated Cereals Project of the Department of Agriculture. ICP, which is partially supported by the U.S. Agency for International Development, aims at improving all aspects of cereal research and production. Three of the foreign resident specialists assigned to ICP work primarily with the cropping systems program.

In addition, at each cropping systems site, a technician assigned by the Department of Agriculture serves as the coordinator. The site coordinator lives in the village and gets to know farmers' problems and aspirations. He and two or three aides recruit farmers as cooperators, see that trials are properly installed, and collect yield data and other information. Enterprising site coordinators are the backbone of cropping systems research in Nepal.

There is little difficulty in finding farmer-cooperators. Most trials involve crops the farmers would grow anyway. And the seed and fertilizer the researchers supply for the trial reduce the expenses the cooperators would otherwise have. When the season is over, the full harvest is the farmer's.

To establish research priorities, cropping systems researchers have to understand farmers' existing practices. Through interviews and observation, researchers learn how farmers categorize their various parcels of land and what cropping patterns predominate in each land category.

Farmers in Pumdi Bhumdi, for example, distinguish between upland and lowland fields and subdivide those two types into high production potential and low production potential. Production potential is related to the amount of compost that the parcel receives and the soil's capacity for holding moisture. Fields with low production potential are usually planted only once a year, while those with high production potential tend to be double-cropped or triple-cropped.

The predominant cropping patterns in Pumdi Bhumdi are:

Upland, low production potential

maize/millet-fallow
maize/millet-mustard

Upland, high production potential

maize/millet-wheat
maize/millet-potato

Lowland, low production potential

rice-fallow-fallow

Lowland, high production potential

rice-wheat-fallow
rice-fallow-maize
rice-wheat-maize

To study farmers' cropping patterns, the cropping systems workers sample and weigh the inputs that cooperating farmers use. For seed, for example, the data collected provides information on the variety planted, the germination rate, and the seeding rate. The workers also record when and how thoroughly each cooperating farmer carries out cultural practices such as land preparation and weeding. And at harvest time they measure yields. From this information, costs and income can be calculated.

Some cooperators may be asked to alter their regular practices somewhat. Without changing the customary cropping pattern, a farmer might be asked to use a different seeding rate, to apply a dose of chemical fertilizer, to plant a new variety, or to try combinations of these or other new ideas. This line of research is aimed at improving farmers' existing practices.

Researchers also investigate ways to intensify cropping patterns by growing a crop when land is ordinarily in fallow. For example, rice-fallow-fallow might be changed to rice-fallow-maize. The main technical problem would be to find a maize variety that could be planted in early spring and that would mature fast enough to permit on-time planting of the main crop, rice.

A third line of cropping pattern research involves intensification by introducing alternative crops. In Pumdi Bhumdi, for example, researchers have tested cropping patterns that include such crops as lentils, peanuts, broadbeans, soybeans, mungbeans, or oats. Some of these are already grown as minor crops in gardens, in patches of wasteland, on extra steep slopes, in mixtures with maize, or on the bunds of rice paddies. But finding practical ways to fit them into major cropping patterns could boost productivity and incomes substantially.

Farmers collectively guide the research. In initial key-informant surveys, information from farmers influences the types of trials that are established. Continuing surveys provide additional data on farmers' risk perception off-farm employment, division of labor, and other subjects that can have significant bearing on the practicality of new technology and hence the priorities for experimentation.

The farmers manage the trials; they harvest and consume the produce. Researchers seek farmers' opinions about the trials conducted in their fields and in their neighbors' fields.

All results from cropping systems research are ultimately measured in economic terms. Researchers look for improvements that lead to high net returns, but that also have reasonable cost so that the technology is within the economic reach of small farmers.

Cropping systems research in Nepal has reached the stage where it has findings worth spreading. Dissemination takes place in two steps: pre-production verification trials followed by production campaigns. At cropping systems sites, however, verification trials are unnecessary so pilot production programs have been started.

The ultimate objective of production campaigns is to increase farm production by introducing improved farming technology. But the initial goal which will determine the long-run success of production campaigns, is to convince farmers, extension personnel, and, especially, decision makers that the cropping systems approach works. Getting agencies and individuals to work in harmony to raise production throughout Nepal will require strong commitment from politicians and administrators. If the campaigns have their backing, improvements in extension staffing and incentives, in timeliness of input deliveries, and availability of credit will be possible.

The production campaigns are organized to deal with the scarcity of inputs, which is perhaps the most formidable barrier to the introduction of new farm technology. In each pilot production program, several farmers are offered the opportunity to be seed growers. They are given advice on growing crops for seed and on methods of processing, storing, and treating seed. Thus each production program has several local sources of high-germination, improved seed in addition to seed available through farmer-to-farmer distribution and outlets of the Agriculture Inputs Corporation.

To improve credit availability, the Agricultural Development Bank has modified its procedures to fit the cropping systems approach. The bank allows participating farmers to borrow against crop production, instead of being required to submit a land registration certificate as collateral. Moreover the loan is made for the whole year, so that the farmer is not obliged to visit the bank each season to arrange credit for the next planting. The junior technical assistants of the production team help farmers plan a budget for the whole year's operations.

To ensure that inputs are available, the production team gives the local cooperative an estimate of the program's input needs 3 months before each season begins.

Training programs are under way to acquaint extension personnel with the cropping systems approach and recommendations. Training takes place mostly in the field, just as does the instruction they will be giving to farmers.

Women are being employed as field assistants to improve contacts with women farmers, who constitute half the farm labor force of Nepal. Tasks such as seeding and the cultivation of certain crops such as millet are almost exclusively done by women. Moreover, most other field operations, aside from land preparation, are shared by men and women. Because there are few female agricultural extension workers in Nepal, some village women who are high-school or primary graduates have been recruited for training.

By 1985, when 50,000 hectares are scheduled to be under pilot production programs, enough agricultural development officers will have been trained to enable production campaigns to be launched throughout any district for which there is suitable cropping pattern technology. Procedures for making credit readily available to farmers will have been proven and modifications in the system for providing inputs will help ensure that they reach farmers on time.

Cropping systems technology is not difficult for farmers to adopt. Unlike the purchase of a new piece of equipment, it does not require a large investment, and farmers can easily revert to customary practices if the new technology does not work out.

Surveys made by social scientists prior to launching production programs have shown that farmers generally have heard of the improved varieties and are willing to use chemical fertilizer, even if they have not done so before. Some farmers, in fact, start using components of the new technology before production programs begin. The surveys have also shown that farmers desire some production credit, but they are willing to participate in production programs without it.

On the other hand, the surveys have revealed several farmer attitudes that will slow the rate of adoption. Farmers do not perceive great advantages in the new varieties and practices. Furthermore, their understanding is often incomplete. They may know about improved varieties, but not about the practices that are recommended with a new variety. Women are particularly likely to be uninformed because the extension service is not in contact with them.

Success in convincing farmers to try new methods will breed new problems. As more farmers adopt new technology on more land, demand for credit will swell enormously. The volume of inputs that will have to be delivered on time will be immense. Difficulties in marketing will arise as district consumption requirements are exceeded by local production. Policy makers will have to address new problems of prices and transportation of agricultural commodities. Nevertheless, struggling with surpluses would be a welcome change after decades of dealing with shortages.

As long as the densely populated Hill region is a food-deficit area, the paramount priority of researchers must be raising the production of cereals, the staple foods. But when farmers in the Hills become better able to ensure the basic dietary needs of their families, they will seek to expand more profitable enterprises. As a temperate agricultural zone on the edge of the Asian tropics, the Hill region has an immense comparative advantage for the production of horticultural crops and dairy products if marketing systems can be developed. Large-scale production of fruits, vegetables, spices, milk, and cheese could give the Hills a sound basis for commerce, not only with the Terai plains, but with Asian subcontinent as a whole.

Cropping systems researchers are placing increasing emphasis on improving soil fertility, which is the critical factor in permitting the transformation of the Hill region from subsistence agriculture to an efficient commercial agriculture. Immediate gains in output can be achieved through greater use of chemical fertilizer, but in view of the vast area involved and the mammoth logistic problems, fertilizer is not likely to be the whole solution. Researchers are looking at ways of applying fertilizer more efficiently so that more of it is used by plants and less is volatilized or washed away. Opportunities exist for improving farmers' compost-making methods so that more of the nutrients are retained. Mixing chemical fertilizer and compost can enhance the nutritive value of both products. Cropping systems researchers are also investigating legumes that might fit certain cropping patterns, particularly in fallow periods. Legumes improve the fertility of the soil, especially if plowed in as "green manure," and they make excellent feed for livestock. Other crops, such as oats, and certain trees, offer possibilities as livestock feed. Cropping patterns involving them are being studied.

Even as cropping systems researchers shift their sights, some of the testing of varieties and methods can be transferred to the production programs themselves. Thus by using the production team to take on some of the necessary continuing research, the cropping systems researchers can turn their attention to new challenges.

(Abstracted from "Through Farmers' Eyes," an Integrated Cereals Project brochure.)