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Agricultural Extension: The Training and Visit
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Washington, DC 20433 USA

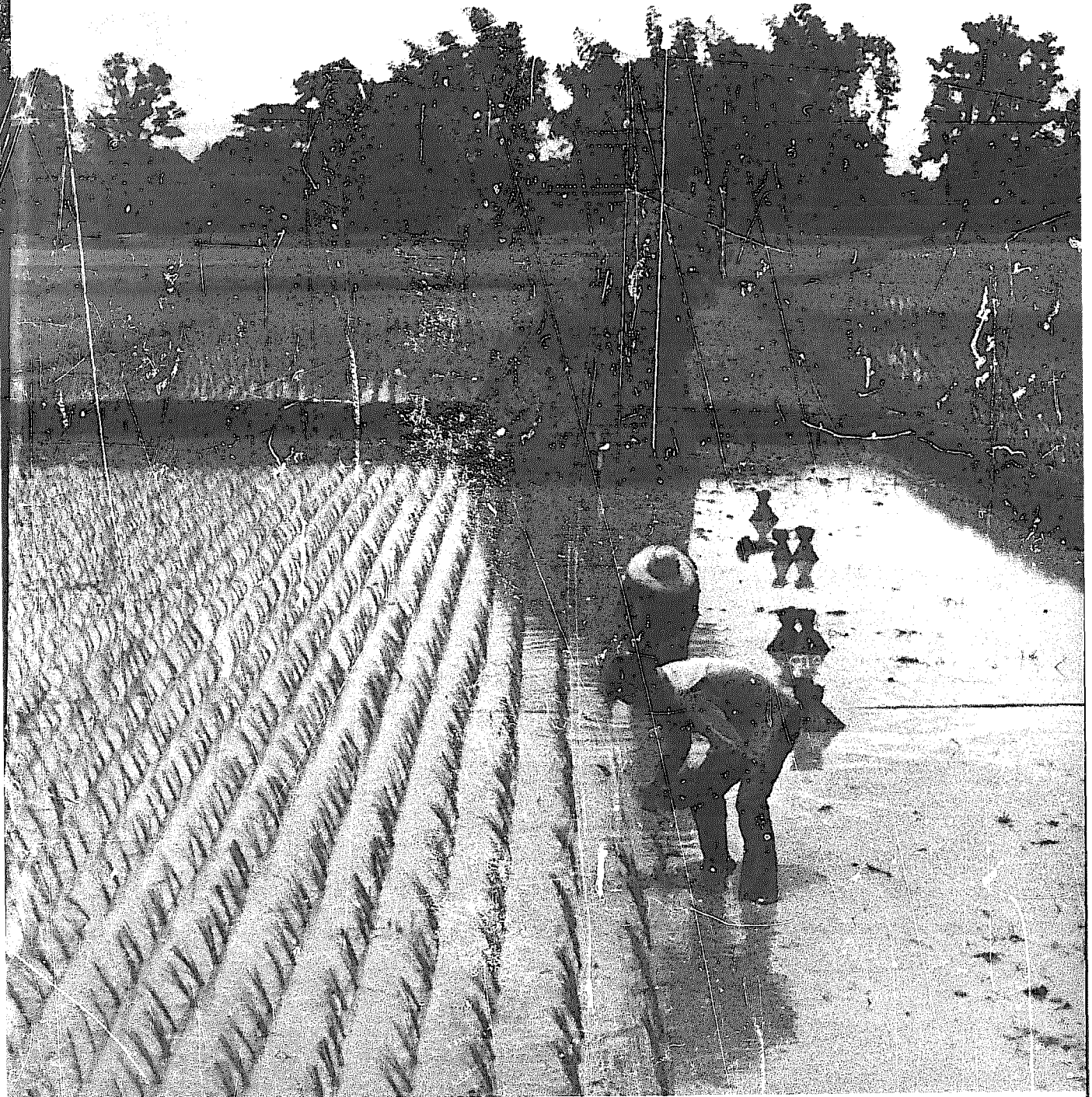
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AGRICULTURAL EXTENSION

The Training and Visit System

Daniel Benor and James Q. Harrison



World Bank
May 1977

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Foreword

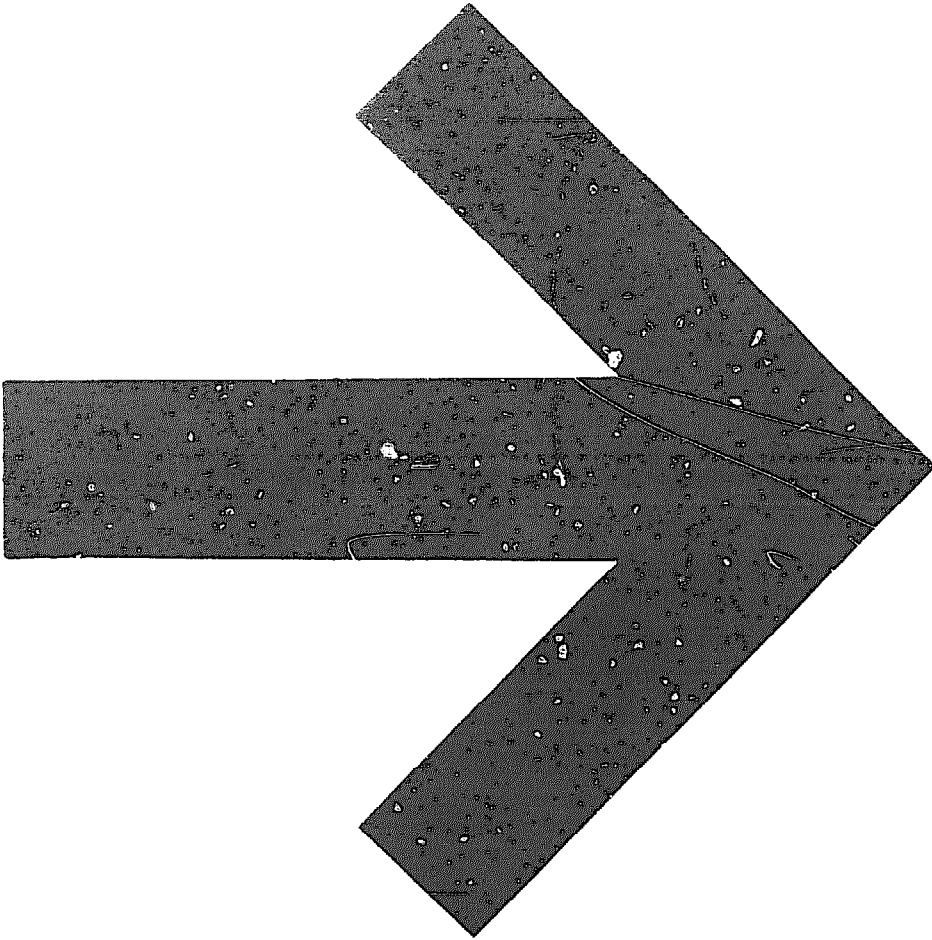
Nearly four years ago, at the World Bank's Annual Meeting in Nairobi, I pointed out a series of measures that could assist in raising the productivity of the rural poor. These efforts are now fully launched by the Bank.

At the same time, governments of the poor nations have to redirect their own efforts to accelerate economic growth and reduce absolute poverty—in short, to meet the basic human needs of all their people by the end of the century. One of these efforts would be to adopt measures to intensify and expand domestic food production.

The present paper examines one approach in which this objective can be achieved. It is to improve and expand agricultural extension through an intensive system of training and visits, and, thus, to reach large numbers of farmers quickly with advice covering the entire production cycle. The cost of such service is relatively small. The results are highly visible, and bolster the farmers' self-confidence and pride in their work. The scheme can also help assure that other investments in agriculture achieve their potential.

The system has been introduced in projects assisted by the World Bank in a number of countries with considerable success, and has aroused wide interest inside and outside the Bank. I have traveled with Mr. Benor round parts of Bengal and seen the impact of his work and his genius as a teacher on hundreds of grateful peasant farmers. The paper, I hope, will be of assistance to those who may be able to adopt this system productively elsewhere.

Robert S. McNamara
President, World Bank



Agricultural Extension

The Training and Visit System

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Preface

This paper describes the Training and Visit System of Extension developed by Daniel Benor, which has been introduced in projects assisted by the World Bank in a number of countries with good results. In India, it has been found very effective when introduced throughout the area served by specific irrigation projects; it is now being rapidly broadened in scope by a number of state-wide extension projects serving both irrigated and rain-fed agriculture. Because of the wide interest shown in this approach both inside and outside the Bank, this paper gives details of its underlying principles, so that others may benefit from the experience gained so far.

The system has been put into operation in areas where the need is to improve the level of agricultural production by large numbers of farmers cultivating mostly small farms using low-level technology and usually traditional methods. Initially, the extension service concentrates its effort only on the major crops and on those few aspects of their production which offer greatest scope for increasing incomes through relatively simple techniques of better crop husbandry. These techniques often call for little or no increase in cash inputs. Results have sometimes been dramatic. As the farmer's confidence in the system grows, he is likely to try using more advanced methods and more cash inputs to improve productivity further. The experience cited in this paper applies to farmers specializing in crop production, but the system is equally suited to livestock and mixed farming operations.

Although the system reaches large numbers of farmers, its cost is low in comparison with the incremental value of production achieved. It uses village-level workers with comparatively low educational standards supported by subject matter specialists and provides close supervision through a management structure which establishes a clear single line of responsibility. The village-level workers are given regular training in the production methods which they disseminate through selected farmers and others, who

adopt the new methods and compare the results with that part of their fields cultivated by normal practices.

The simplicity of the system is notable. Before hastening to initiate something similar, perhaps a note of caution should be sounded so that the reader will pause to reflect on what has led to its success. The fundamental requirements are firm decisions to set priorities and concentrate efforts to ensure success right from the start. Such initial success generates growing enthusiasm for the system and the possibilities it offers of higher productivity in return for the hard work done both by the extension agents and by the farmers themselves. Without dedication, and particularly the enthusiasm which initially depends very much on the inspiration of the key personnel selected to put the system into operation, one might question whether it can be expected to succeed.

The structure of the extension service described in this paper is intended to be flexible so that it may be introduced through modification and restructuring within an existing service rather than requiring a completely new organization. It is important, however, that following such restructuring the service has a unified command structure and the agents are not diverted from their task of advising farmers by any conflicting demands to perform other services. The agents must also be given adequate financial reward for the work they undertake.

Any fundamental reorganization of an agricultural extension service should, regardless of the scale of its initial introduction, be capable of being expanded to the entire state or nation. It should be possible to extend it to both irrigated and rainfed areas of production, and to all categories of farmers. Failure to recognize this need will result in the establishment of a favored group of producers—those in the project compared with those outside—and give rise to bitterness and resentment among the “have nots,” which can only be harmful in the long term.

Finally, the system as described provides a service capable of raising productivity initially by introducing relatively unsophisticated techniques among farmers in developing countries and areas. As such farmers adopt more advanced methods of crop production and more diverse cropping systems, the extension service will need to increase its capabilities, advising on a wider range of crops and on much more sophisticated techniques. The system should have a built-in capacity for monitoring and self-evaluation so that it can be continuously modified and strengthened to meet the changing requirements of the farmers.

To those interested in strengthening agricultural extension services, the World Bank offers this paper in the hope that it will stimulate thought and discussion in a field of endeavor which, perhaps more than any other, can contribute to improving the livelihood of the rural poor.

AGRICULTURAL EXTENSION

The Training and Visit System

1. Introduction

The Training and Visit System of Agricultural Extension has helped increase agricultural productivity impressively in several areas. In the Seyhan project in Turkey, farmers increased cotton yields from 1.7 tons to over 3 tons per hectare in three years. In Chambal, Rajasthan (India), farmers increased paddy yields from about 2.1 tons to over 3 tons per hectare in two years. Combined irrigated and unirrigated wheat yields in Chambal, Madhya Pradesh (India), rose from 1.3 tons to nearly 2 tons per hectare after one season and have since risen higher. The area under high-yielding paddy and wheat varieties in the entire state of West Bengal increased substantially in a single year.

It is always difficult to isolate the factors responsible for changes in agricultural production. As far as can be determined from the available data, these rapid increases in farm output were not primarily the result of an increase in irrigation, better weather, discovery of new varieties, or even more fertilizer. In one area (Chambal, Madhya Pradesh), yields increased while use of purchased inputs declined. In areas where there was irrigation, it had been available for years, but had been poorly managed and used. It is reasonably certain that a professional agricultural extension service developed on the same principles in each of these diverse areas was the major force behind these changes.

The statistics, however, provide only a very incomplete indication of what has been achieved. Numerous visitors to the areas have been impressed by the visible evidence of agricultural improvement. Where wheat was scarcely known and where paddy had been grown in a haphazard manner, fields are now well tended and highly productive. Farmers are proud of what they have achieved and are increasingly asking the extension service for more help. Extension workers, who previously had very poor morale and had been regarded by most farmers as almost useless, are now proud of their work and highly respected by those they assist. Throughout these areas, a more general prosperity is

evident, as farmers use their higher incomes to construct better houses and to purchase a variety of goods and services.

The results were achieved rapidly and at little cost. The extension service's impact can usually be seen in the farmers' fields even before the end of the first crop season. After two or three seasons, most farmers are following all or part of the newly recommended practices on at least a portion of their fields. The extension service is normally developed by redeploying existing staff systematically. The incremental cost varies considerably depending on the existing extension service but, where an extension service is already operating, would normally be around \$0.50 to \$1.50 per hectare per year. The cost to farmers is very small as well, for the initial focus of the extension service in most areas is on the improvement of basic agricultural practices (such as good seed selection, seedbed preparation, better cultivation, and weeding) which require more work but little cash and bring sure results. For the same reason, experience so far suggests that the smaller cultivators, who have an abundant supply of labor, may benefit at least as much as the larger farmers. It is normally easier for such small farmers to follow these labor intensive practices.

The concentration here will be on explaining the ideas behind the extension system, describing its methods of operation, and indicating its impact. It is, of course, not the intention to suggest that extension alone can enable farmers to maximize their incomes. Inputs of seed, fertilizer, and pesticide, effective credit institutions, and investments in irrigation are needed. In addition, agricultural development requires a general policy framework which provides farmers with incentives to produce. What is suggested, however, is that it makes sense to put first priority on the development of an effective extension service. In many areas, significant production gains can be achieved by using available resources more efficiently without significant increases in investment or in purchased inputs. In areas where such gains have already been realized, effective extension is needed to ensure a higher standard of agriculture with increased use of inputs and high technology.

The principles underlying this revitalized extension service are basically simple and can be widely applied to many different situations. The approach contains few really new ideas, if any. Rather it is based on well-known principles applied systematically. But the simplicity is deceptive, for although the system is simple, it is not easy. Hard decisions in setting priorities and concentrating efforts are an essential part of the approach. Continuing



A cotton field in the Seyhan Irrigation Project in Turkey.

efforts are required to ensure that the system maintains its momentum. Where the authorities have had the determination to take such decisions, the results have surpassed expectations. These results have led many states in India and countries such as Turkey, Burma, Nepal, Sri Lanka, and Thailand to adopt this approach to extension either throughout the country or in selected "project" areas. Indonesia's extension service already incorporates many of the principles, but the government there is now applying them more rigorously and systematically. Other countries, including Bangladesh, are beginning to adopt the approach.

While the system offers many advantages, caution is warranted because it has not yet been tried in all geographical, sociological, and technological environments. In most areas, it has been operating only two or three years. The coverage, however, has become increasingly diverse, including rainfed as well as irrigated lands. In the Seyhan project in Turkey, the system has been working well for 10 years. Although formal detailed evaluations are still to come, preliminary results are so encouraging as to suggest the system has widespread applicability for the smallholder-operated farming systems found in many countries.

The purpose here is to explain the proposals for the reformed extension service: how it works and how it can achieve these results. No paper, however, can convey fully the impact it can have. To understand its potential there is no substitute for actually visiting the areas in which it operates, seeing the fields, and talking with the farmers and the extension personnel.

2. General Problems with Extension

It is difficult to generalize about the state of extension across a wide range of developing countries. Some countries have virtually no national extension service. Others, like India, have a fairly widespread extension structure which is relatively well staffed. But it is difficult to find many developing countries with a really effective service. There are many reasons for this. The more important ones are discussed below.

Organization

The most fundamental problem in most extension services is the lack of a single, direct line of technical support and administrative control. Frequently, the field-level extension officer must report to two or even three supervisors. Since he is one of the few governmental functionaries operating at the local level, it appears very attractive in the short run to assign various nonagricultural tasks to him as well. Consequently, he often falls under the control of civil administration, or a broader-based rural development organization (e.g., the Community Development Department in India), or both. His links with the Agriculture Department are tenuous. The inevitable result is that he spends little of his time on real agricultural extension activities.

What little extension work is done is neither planned systematically nor supervised adequately. Extension agents generally do not have a detailed schedule of work. Where extension goals are set, they are often either too unrealistic to achieve or too vague to check, and bear little relevance to the local situation. Extension staff at the supervisory level frequently have neither the means nor the inclination to check on performance.

Dilution of Efforts

Closely related to this problem is the multipurpose role assigned to the field-level extension worker. He often is made responsible

not only for all aspects of rural development, including health, nutrition, and family planning, but also for regulatory work, procurement, and the collection of statistics. This is clearly too much for anyone and especially for a poorly paid and inadequately trained man. Moreover, the programs themselves are often poorly defined and inadequately supported. The responsibilities are simply too broad. As a result, the extension worker can perform neither his agricultural duties nor his other duties effectively and must resort to doing only those tasks which are most closely monitored (e.g., reports and statistics) and to performing token services for the most influential people in his jurisdiction.

Coverage and Mobility

Most field-level extension agents have an excessively large jurisdiction. They may have to cover over 2,000 farm families, and in some cases, over 4,000, often spread over a large area. The task is made even more difficult, since the extension service usually lacks vehicles to ensure adequate mobility. Housing is generally not available or inappropriately located. No time-bound systematic program of work exists. This makes it impossible to achieve the close regular contact between the extension worker and the farmers which is essential for successful extension. Another effect is that extension agents have often found it necessary and convenient to concentrate only on the larger farmers, as they cannot reach all farmers in their area and large farmers can often help the agents with housing and other amenities.

Training

Training of extension staff is usually inadequate and outdated. Most training efforts are concentrated on preservice training, which is often too theoretical and provides little opportunity to apply in practice what has been learned. With little attention given to continuous inservice training, the agent's education is soon out of date. Moreover, preservice training usually seeks to cover a whole range of crops and practices. Few extension agents can remember all this for long. Finally, where extension agents are regarded as multipurpose workers their training is further diluted by nonagricultural subjects.

Lack of Ties with Research

There is usually no effective link with research activities. This is detrimental to the effectiveness of both the extension service and the research institutions. Without a continuous flow of practical recommendations suited to farmers' needs, the exten-



A poor stand of plants on a paddy field.

sion service rapidly runs out of anything to extend. Without a close link with extension and feedback from the field, research becomes excessively academic and unrelated to farmers' real problems. This leads the researchers to focus their work on technically optimal situations rather than on practical field conditions. Consequently, the recommendations the extension service offers farmers are often inappropriate to farmers' needs and their technical and financial capabilities.

Status of Extension Personnel

All of these factors result in the extension service having low status, low morale, and low pay. Farmers, who rarely see their extension agents, have little respect for them. After years of little success, the extension agents have lost whatever enthusiasm they may once have had. Their low pay reflects their low status and low productivity. A vicious circle develops in which lack of success undermines the extension agents' self-confidence, making success even less likely. Since they produce little, there is no case for raising their standards of pay.

Duplication of Services

Efforts to cope with these problems in a piecemeal fashion have in most cases met with little success and may even make the situation worse. One such approach has been to develop special schemes focusing on particular crops, or areas, or techniques. They usually serve to weaken the extension service further. Financial and staff resources are diverted from the regular line extension service. The schemes often duplicate what the regular staff are supposed to be doing anyway, leading to confusion and resentment in the extension service. The creation of many special schemes becomes expensive and this means, given financial constraints, that they end up serving only a few favored farmers in favored areas rather than the bulk of the farming community. Such schemes tend to dissipate efforts in many uncoordinated directions and obscure the need for basic reform of the extension service.

This catalog of weaknesses in existing extension services strongly suggests that the pace of agricultural development could be accelerated if a fundamental revitalization of extension efforts were to take place. The principles of such a reform are described in the following chapter.

3. Reforming Extension Basic Guidelines

For an extension service to make a start it must have advice to offer to the farmers. There must be a gap between what farmers can achieve and what they do achieve in their fields. Once the existence of such a gap is established, it is the job of the extension service first to close the gap and then to be the prime initiator for establishing more know-how. Generally, such gaps exist in all kinds of agricultural areas and in all crops. Where research findings are not readily available, the gap can be the difference which often exists between what a few good farmers do and what the rest of the farmers in the area practice. Thus, the extension service should be constructed to deal with a wide variety of situations. Properly implemented, it functions well wherever a gap exists between what is done and what can be done on farmers' fields. This applies to both irrigated and rainfed agriculture, livestock, and all other aspects of agricultural production.

Unified Extension Service

Once it is clear that there is a gap, the task is to organize an effective way of closing it. Perhaps the most essential management principle to be followed is to establish a single line of command from the governmental agency responsible for agriculture to the field-level extension worker. Unless this agency (in many cases the Agriculture Department) also has full administrative control of the extension service, it is not possible to carry out extension systematically and effectively. The concerns of other agencies would continuously interrupt the program of work. Yet, in many areas, control of the field-level extension staff does not lie with the Agriculture Department. One of the first and most difficult tasks facing those who seek to revitalize their extension service is the transfer of full administrative control of the field-level extension agents to the Agriculture Department. This transfer is often easier to achieve when it is recognized that the extension agents as now organized achieve little either in agriculture, or in broader developmental or administrative activities. This means

that the agency from which the agents are transferred has little to lose.

While the political and administrative difficulties of such a transfer are substantial, they can be overcome. When they are, the results have almost immediately justified the transfer. The West Bengal experience is particularly relevant here. Initially, West Bengal introduced the reformed extension service in six districts. The reaction of the farmers and officers to the new approach was so positive that farmers, administrators, and politicians in the other districts in West Bengal began demanding that extension be reorganized in their areas as well. Within a few months, the Government of West Bengal decided to cover 16 of the state's 17 districts. Once the system is introduced, its success generates pressures for its wider application and this makes it easier to achieve the required transfer of staff.

All agricultural extension activities should be combined into a unified extension service. Any staff engaged in special crop or area-related schemes should be merged with the regular staff. The difficulties posed by special schemes were mentioned in the previous chapter. The goal is to develop a single modern professional service capable of giving farmers sound technical advice on their entire farming operation. If the service does this, no special schemes are needed. If the service cannot do this, then it should be strengthened and improved until it can. Specialized technical advisory services may be justified in special situations where an area's agriculture is dominated by a crop which is the raw material for a vertically integrated industry (e.g., rubber, tobacco, tea). Where such crops form a part of a more diversified cropping pattern, however, it would normally be more sensible for specialists in even these crops to work through the unified extension service.

Extension Exclusively

Extension personnel should devote all their time exclusively to professional agricultural extension work. They should not be assigned regulatory or administrative work. Regulatory functions just should not be carried out by extension personnel. Supply of inputs, collection of general statistics—not to mention other assignments not related to agriculture at all—should not be their responsibility either. Such assignments will divert the attention of the extension staff from their main responsibilities, will undermine farmers' trust in them, will consume most of their time, and will not allow for the systematic and quite rigid time-bound plan of their work. Moreover, these other activities generally have to be

performed in the peak agricultural seasons, when extension personnel is most needed by the farmers in their fields.

Systematic Training and Visits (T&V)

Once a single line of command has been established for a unified extension service, and the personnel can devote all of their time to extension work, the work of the service needs to be organized in a systematic time-bound program of training and visits. The operating details of this system are described in the next chapter. Briefly, under this system schedules of work, duties, and responsibilities are clearly specified and closely supervised at all levels. The number of farm families per field-level extension worker is set at a manageable level. A specific schedule of visits to farmers' fields is rigidly followed. The ratios of supervisory staff are such that close supervision is easy. Frequent (weekly or fortnightly) one-day training sessions for field-level extension staff are an integral part of the system.

In these training sessions, the extension agents are intensively instructed in the three or four most important recommendations for the forthcoming one or two weeks of the crop season. With this concentrated training received in digestible doses the extension agents can develop a better understanding of what they are recommending. This enhances their confidence and makes them better able to convince the farmers.

Concentration of Efforts

The whole approach should be permeated by a concentration of efforts to achieve a clear, visible impact and continued progress. This strategy of concentration is a feature of all aspects of the system. The extension agents work only on agricultural extension, rather than spreading their efforts over a wide range of other activities. Within agriculture, at any one time the agents will concentrate mainly on the most important crops. For those few crops, agents will concentrate mainly on those few practices which bring the best economic results. The agents will concentrate on selected contact farmers—not to favor the few but rather to make the impact which is needed to spread the practice to the majority of farmers most quickly. Training sessions will concentrate on only the most important points. Efforts will be concentrated on making the system of training and visits as effective as possible.

Immediate Success

At the initial stage it is very important to achieve an immediate impact which will give the farmers confidence in the extension



On part of this field (left), the farmer in the Rajasthan Canal Project Area followed the Extension Agent's recommendation; on the other part (right), he used traditional practices.

agents and the extension agents confidence in themselves. Once this starts, the process is self-reinforcing: Farmers will expect and demand more from the agent and the agent will be motivated to work hard to achieve another success. The immediate impact of the system is shown in the picture above of a farmer's field during the first season this extension system operated in the Rajasthan Canal Project area in India.

Imitable Contact Farmers

It is impossible to maintain regular contact with most of the farmers directly. In good extension work, however, this is neither necessary nor even desirable. The messages of the extension service should be focused mainly on selected contact farmers who will assist in spreading the new practices to most farmers in the area quickly. Contact farmers must be willing to try out practices recommended by the extension workers and be prepared to have other farmers visit their fields. But they should not be the community's most progressive farmers who are usually regarded as exceptional and their neighbors tend not to follow them. On

the other hand, very weak farmers tend to be slow in adopting new methods. Furthermore, the contact farmers must be of good standing in their community so that their views on new practices will be respected by other farmers. For this reason, it is wise to select contact farmers in consultation with village leaders (or elders).

The extension agent will focus his efforts on the contact farmers not to help only these farmers but to convince all farmers in the group of what everyone can achieve. The extension agent should designate new contact farmers if he discovers that one or more of the initially selected farmers are not well suited, or just to provide this chance to more farmers.

The technical advice spreads from the extension agent through the contact farmers to other farmers by two mechanisms. First, the noncontact farmers see what the contact farmers try in their fields and the results they achieve. This generates interest. Second, each contact farmer is asked to explain the recommendations he has received to several (up to 10) friends, relatives, or neighbors, and to help them adopt the recommendations. In this way, a large proportion of the farmers are reached very fast. Experience in areas where the system is operating indicates that within two years over half of the farmers are following most of the practices.

Best Use of Available Resources

A fundamental concept underlying the approach to extension reform is to teach farmers to make the best use of available resources. This concept influences the message the extension service extends to the farmer. Exactly what this involves needs to be checked thoroughly in the field in each area where the system is being adopted. Nothing should be recommended which will not increase farmers' incomes. In most areas, the initial concentration should be on improving agricultural management practices. These practices include better land preparation, improved seedbed and nursery maintenance, use of good seed (including appropriate improved varieties), seed treatment, timely operations, weeding, proper spacing of plants, and so on.

The initial stress should be on such management practices rather than on increased use of purchased inputs (such as fertilizers) for several reasons. First, these improved cultural practices are well known to produce sure results. This means that in adopting them the farmers face little risk. Second, while their adoption requires more work, they require little cash outlay. Since most

small farmers have surplus labor but little cash, this fits their financial requirements well. Finally, farmers often cannot get full benefit from purchased inputs or more costly investments (such as tubewells), until their practices have improved. For example, if farmers apply fertilizer to a field that is not properly weeded and the stand of plants is poor, they fertilize the weeds which then can compete more successfully with the crop for available soil moisture and light. The result can be a lower crop yield.

Recommendations According to Ability

The agent should usually recommend that farmers adopt these better practices at first on only a small part of their land. This reduces the farmers' risks and hesitations and especially allows the results of the improved practices to be compared with traditional practices in the farmers' own fields. With such practices alone farmers can increase yields and incomes substantially. This gives them confidence in the extension agent and makes them more receptive to his advice. Since these practices are normally quite well known and tested, they can be fed into the extension service quickly without requiring an elaborate, time-consuming screening and trial process. Thus, with such recommendations the extension service can, in many agricultural areas, almost immediately obtain the initial impact which will ensure its continued success.

This initial focus on farm management practices has been found to fit in well with a wide variety of rained and irrigated conditions in a number of developing countries where yields are low and practices need improvement. There are areas, however, in all these countries, where yields and management practices have already reached fairly high levels. In such cases, this must be reflected in the recommendations of the extension services, which should include appropriate advice on levels of purchased inputs. Even within one extension agent's circle there are likely to be several farmers whose practices are considerably more advanced than those of the other farmers. The extension agent should always concentrate on the kind of advice needed by the majority. Nevertheless, he should be prepared to spend some time with the more advanced farmers as well, for they will provide an example of what a major part of the farmers will do a few seasons later.

After improving their management practices, income of the average farmers will be higher and they will be financially better able to adopt more expensive (e.g., fertilizer) or more dramatic (e.g., new varieties or cropping patterns) recommendations. Even

as farmers move to this stage, however, the emphasis should be on how best to use whatever quantity of purchased inputs he has or can obtain rather than on what is the optimal total amount of input. Chemical fertilizer is a good example of this. All too often extension agents recommend set quantities of N, P, and K per hectare as "optimal." Apart from the fact that these doses are often not optimal (they are generally high) and are seldom adjusted either to the specific fertility level of an individual farmer's field or the input-output price ratios prevailing at the time, few farmers can afford such an amount of fertilizer, at least initially. A better approach is to recommend to farmers the minimum quantity of fertilizer which would noticeably increase their net yields and incomes, and to teach the farmers how to make the best use of this amount—for example, when and how to apply it, and how to combine it with organic fertilizers. In subsequent seasons, the farmer could increase the amount of fertilizer to a more optimal level. All the recommendations, of course, should have as their basic goal raising farmers' net incomes. Practices which do not do this should not be recommended.

Research

The initial message of the extension service can take advantage of the gaps between existing agricultural practices and the backlog of research findings which already exist but which have not yet reached the farmers. Such gaps are now large. But within a few years the extension service can close many of these gaps. To remain effective, extension must be linked to a vigorous research program, well-tuned to the needs of the farmers. Without a network of field trials upon which new recommendations can be based and without continuous feedback to research from the fields, the extension service will soon have nothing to offer farmers, and the research institutions will lose touch with the real problems farmers face. To promote such working relationships is an important component of the approach to extension.

Supply of Inputs and Credit

The links between extension and input of supplies and credit need to be carefully defined and developed. In most areas where this extension approach has been adopted, farm management practices were fairly poor. While extension initially concentrated on these practices, purchased inputs and hence credit were of relatively low priority. But soon the extension service starts recommending increasing amounts of purchased inputs. To be able to cope with these demands, the input supply and credit organiza-

tions (and other relevant institutions) should also be strengthened. It is a matter of sequence. Once the extension service is strong, pressure from farmers to receive timely supplies of inputs and credit (and other services) will be strong, and then it will be much easier to improve these services. The extension service will need to know if the inputs will be available and the input supply agencies will need to know what the extension service will recommend.

The extension service can be of great assistance in improving the effectiveness of the supply and credit agencies. First, it helps generate a larger demand which increases the business volume and viability of these agencies. Second, it provides farmers with information on where to purchase inputs and what the prices are, where and how to apply for credit, and how such credit and inputs will augment the farmers' incomes. Third, it can provide supply agencies with rough estimates of the demands for inputs in the area. In addition, it can assist credit agencies in developing per hectare credit norms for crop production loans. It is important, however, to ensure that the functions of the supply agencies and the extension service are clearly delineated. The extension service should not be responsible for ensuring the availability of inputs, filling in loan applications, or collecting debts. These are the jobs of the supply and credit agencies.

With this separation of responsibilities in mind, effective coordination arrangements must be established between extension and the supply agencies. This can be done most easily in conjunction with the regular fortnightly training sessions. The supply agencies can send their representatives to the training sessions, when these topics are discussed, to learn about the recommendations and possible demands for inputs, so that activities will be coordinated. They can also keep the extension staff informed of the input supply position so that recommendations are consistent with the available supplies.

Experience with the extension service so far indicates that with such linkages, input supply agencies respond relatively quickly to the demand generated through extension. In the Rajasthan Canal Project area, for example, during a period when fertilizer consumption was stagnant throughout most of India and fertilizer prices doubled, consumption increased from 1,600 tons in 1974/75 to 6,000 tons in 1975/76, and an estimated 7,800 tons in 1976/77.

Continuous Improvement

The agricultural extension service requires a built-in process for continuous adaptation to changing conditions. The organiza-

tion of the extension service described here is designed mainly for a situation relevant to a number of developing countries, where agricultural performance by many farmers is still poor and yields are low. As this situation changes, the extension service will require continuous modifications: the degree of specialization of extension staff may be raised; frequency of visits may be changed; length and depth of inservice training would increase; qualifications for new candidates be made more exacting. An ongoing process of self-evaluation is necessary for the extension service to identify the areas needing change.

Formal evaluation by an agency separate from the extension service (either within the Agriculture Department or outside in an agency such as the government's statistical organization, planning-evaluation department, or in agricultural universities) also can provide a useful check on the performance of the extension service. This evaluation should include a well designed sample survey of farmers and crop-cutting experiments.

4. Reforming Extension The Training and Visit System

The Basic Techniques

The basic extension technique recommended in this paper is a systematic program of training of the Village Extension Worker (VEW)¹ combined with frequent visits by him to farmers' fields. The system is organized to give the VEW intensive training in those specific agricultural practices and recommendations relating directly to farm operations during a given week (or fortnight). This enables the VEW to visit each of the relatively small groups of farmers he works with once a week (or once a fortnight) on a fixed day known to all and affords close supervision. The training and visit system is the most important extension method to be used by the reorganized extension service and the job descriptions at each level in the extension hierarchy will be geared to this system. Accordingly, it is useful to describe in some detail for each administrative level how the system works and what the responsibilities of the extension staff are.

General Organizational Structure

The entire organization is based on the total number of farm families and the number of families which one VEW can reasonably expect to cover. Once this is determined, the number of VEWs needed to cover a given project area (or state or country) is easily calculated. It is organized in such a manner that an Agricultural Extension Officer (AEO) guides, trains, and supervises about six to eight VEWs. Six to eight AEOs are, in turn, guided and supervised by a Subdivisional Extension Officer (SDEO). The SDEOs are supported by a team of Subject Matter Specialists (SMSs). Four to eight SDEOs are supervised by a District Extension Officer (DEO) who is also supported by SMSs. Depending on

¹ For convenience and to provide a specific example, terminology of all extension staff is in accordance with that used in some states in India. Position titles may vary, of course, from place to place.

the number of districts, the DEO is supervised either directly by extension headquarters or by an intermediate superior. The objective is to ensure that each level of the service has a span of control narrow enough to afford close personal guidance and supervision of the level immediately below.

To provide a concrete and realistic illustration of the administrative and organizational arrangements involved, the following paragraphs and Chart 4:1 on the next page show the extension proposals as they have been applied to the administrative system in India. The general approach, however, can be adapted readily to any other situation. Special attention should be given to the general administrative structure in each area. It will usually be most convenient if the administrative and regional set-up of the extension service fits the framework of the general administrative organization of the country. In this way, the facilities already in place at existing administrative levels can be used.

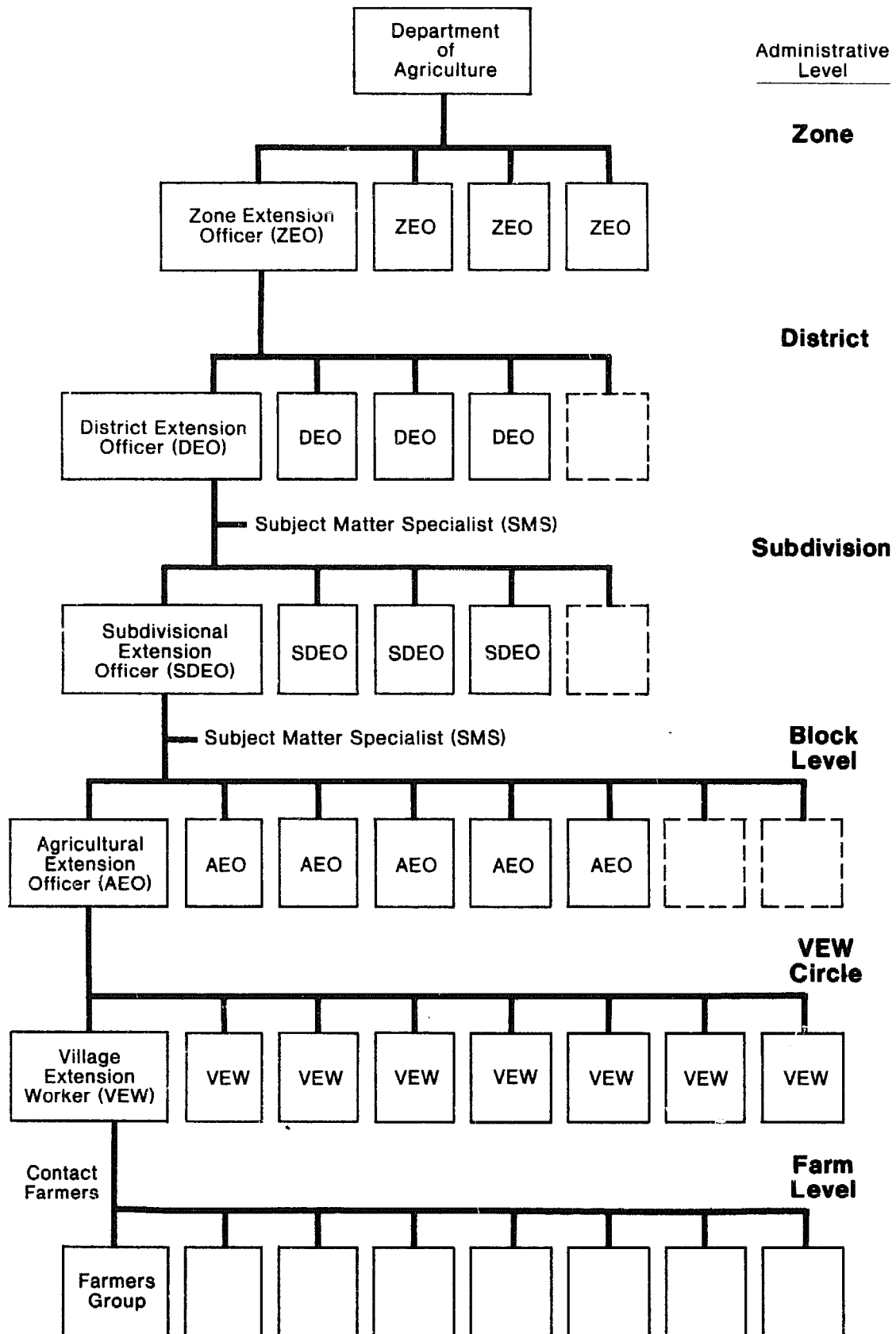
Field Level

The number of farm families that a VEW can cover varies considerably from place to place depending, among other things, on the density of population, roads, the intensity and standard of cropping, and the types and diversity of crops grown. There is no simple rigid rule for weighing all these factors to determine the "right" ratio of VEWs to farm families. This is a matter of careful judgment after fairly extensive field visits. Where the population density is high, with many small farmers living close together, where the cropping intensity is fairly low and only a few main crops dominate agriculture, a ratio of one VEW for about 800 farm families will generally be adequate. In some areas, however, this ratio could go as low as one to 1,200 or more. Where population is more widely dispersed, farms are larger or agriculture more intensive (as in intensely irrigated areas), a ratio of one VEW to about 500 farm families would be more effective. In some special cases, the ratio could be one to 300. The farm family is taken as the denominator of this ratio, since the farm family is normally the basic farm decision-making unit. The number of farmers will generally be larger than the number of farm families. A farmer and his grown sons would normally constitute one farm family but several farmers. Also, a joint family which consists of a few farmers working together is considered as one farm family.

All the farm families under a VEW's jurisdiction are divided into eight groups of about equal size (depending on such factors as

Chart 4:1

**Organization Pattern of Intensive Extension Service
in One of the States in India**



geography, size of the villages, and ease of communication, the number in each group may vary somewhat). The VEW will live in his jurisdiction. From each group, the VEW, in consultation with village leaders, will select about 10 percent of the farmers as contact farmers on whom he will concentrate his efforts.

The key point here is a fixed schedule of VEW visits known to all. Several variations of these schedules have evolved. Under a fortnightly program of visits, such as is followed in West Bengal, the VEW visits each of the eight groups in his circle for a full day once each fortnight. He always visits a given group on the same day of the week, so the group always knows when he should be with them. In each visit, he sees at least the contact farmers. All other farmers in the group are also invited to meet the VEW on this day, and any of them may participate in visits to fields and in discussions. In the morning, the VEW visits farmers' fields, demonstrating the recommendations for that fortnight, checking progress, and observing any technical problems the farmers may be having. If he is sure he knows the answer to such problems he gives it. Otherwise he should bring it up at his next training session. (In case of an emergency such as a virulent pest attack, he should notify his immediate supervisor for action immediately.) In the afternoon, the VEW holds a group discussion in a convenient location in the closest village.

The above schedule, built around a visit to each group once in a fortnight, is one possibility. An alternative is for the VEW to visit two farmers' groups a day. In this case, he will visit each group for one-half day only, but once every week. This weekly schedule of visits may be most appropriate in intensively irrigated areas with diverse cropping patterns. Still another possibility is to shift from a weekly to a fortnightly schedule and back again depending on the requirements of the cropping season.

Village Extension Workers (VEWs). This intensive series of fortnightly or weekly visits on a fixed schedule known to all farmers results in the farmers themselves beginning to act as supervisors of the VEW. Each week, the VEW will devote four days to visits so he covers his entire circle of eight groups in a week or a fortnight (depending on which of the above alternatives is chosen). One of the two remaining working days each week will be devoted to inservice training. This inservice training is crucial to the program, for through these training sessions the VEW learns what to recommend to the farmers in the next period of visits. He also has an opportunity to bring any farmer's problems to the attention of the trainers. One of the training sessions each fort-

night will be conducted by the team of Subject Matter Specialists (SMSs) responsible for the area.

This will be the most important training session. The session is scheduled so that the VEWs are trained for a full day in groups of 30 to 40. Efforts are concentrated and the sessions prepared so that only three or four crucial points are covered, but these are covered well. No more than one-third of the time should be spent on lectures. The remainder should be spent on practical field demonstrations of what is taught, and on discussions. The VEW should be required at the end of the session to restate the lessons as he would present them to the farmers. The VEWs will be given pamphlets summarizing the recommendations as well as samples or other visual aids as required. The goal is to make the VEW a Subject Matter Specialist on the few points of particular relevance during the coming fortnight.

While the VEWs will not be responsible for distributing inputs or monitoring their use, it will be important for them to know of the availability of inputs. It will also be useful for input supply agencies to know what inputs farmers may require. The same is true for suppliers of other agricultural services, such as credit agencies. For this reason, the representatives of credit and input supply organizations will be invited to the relevant fortnightly training sessions. Such matters should normally not take up much time of the session.

The other weekly training session during the fortnight will be conducted by the immediate supervisor of the VEWs, the AEO, for the group of VEWs under this charge. This should be a fairly informal session during which the points raised in the previous week's training session will be reinforced and any problems encountered by the VEWs will be discussed and either resolved or taken up at the following week's training session with the SMSs. Any modifications or adaptations of the recommendations to local conditions can be discussed and decided on. Some office work and reporting to the AEO can be done at this time also.

This schedule of visits and training takes up 10 of the 12 working days in the fortnight. During the remaining two days the VEW will make extra visits to supervise field trials, arrange special extension activities, make up visits missed because of illness or holidays, and complete whatever office work is necessary. Each VEW will maintain a table showing his fixed days for visiting each group, as well as the time and place of the meeting (see Table 4:1, page 24). His supervisor, the AEO, will keep such tables for all the VEWs he supervises.

The VEW will keep a diary recording his visits and progress with each contact farmer. A sample diary, such as is used in West Bengal (India), is shown in Table 4:2 on page 26.

Table 4:1

Typical Timetable for a Village Extension Worker

(fortnightly visits)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
First Fortnight	1	2	3	4	TRA SMS	EXT VIS	H	5	6	7	8	TRA AEO	EXT VIS	H
Second Fortnight	1	2	3	4	TRA SMS	EXT VIS	H	5	6	7	8	TRA AEO	EXT VIS	H

1-8 = Visit farmers group.

TRA = Training conducted by Subject Matter Specialist (SMS).
SMS

EXT = Extra visits for checking field trials, office work, make up visits due to
VIS holiday, illness, etc.

H = Holiday.

TRA = Training conducted by Agricultural Extension Officer (AEO).
AEO

Agricultural Extension Officer (AEO). Each Agricultural Extension Officer will supervise and provide technical support to about eight VEWs (see Chart 4:1, page 21). In India where extension is organized along these lines, each administrative block has several AEOs (the number depending on the number of farm families and VEWs in that block), each responsible for a circle of eight VEWs. In a fortnight, the AEO will spend two days in training sessions for VEWs (the informal one he conducts and the one conducted by the SMSs) and eight days in the field, supervising the VEWs and assisting them in getting the message across to the farmer. He should have sufficient mobility to visit two VEWs with their farmer groups in a day. His visits should be prescheduled and timed so that over a period of several months he sees each of his VEWs with each of their groups. The AEO (as well as his higher supervisors) will also keep a simple diary recording the findings of his supervision visits.

Subdivisional Level

The subdivision (or subdistrict) is an administrative unit covering several blocks. The Subdivisional Extension Officer (SDEO)

supervises the AEOs and VEWs under his jurisdiction and is in overall charge of the extension program. One SDEO can supervise effectively about six to eight AEOs. Subdivisions with large farming populations may have two to three times this number of AEOs. Consequently, the SDEO will normally need support from one or more Assistant Subdivisional Extension Officers (ASDEOs), or the existing subdivision may have to be further divided into *agricultural* subdivisions for extension purposes. Each ASDEO should supervise a circle of six to eight AEOs, leaving the SDEO to supervise about four to five AEOs directly. In addition, the SDEO would supervise the work of the ASDEOs. The ASDEOs would be located within their AEO circle. Both the SDEO and ASDEO would spend more than half of their working time in field supervision of the extension service and the training program. They would be guided by a chart of AEO visits similar to the chart of the VEW visits used by the AEO.

The SDEO would have with him a team (or teams) of Subject Matter Specialists (SMSs). Each team would have at the initial stage at least one specialist for agronomy, one for plant protection, and possibly one training officer. The SMSs would devote one-third of their time to VEW training sessions, one-third to field visits (assisting VEWs and AEOs in their field work and field trials, responding to problems raised by farmers), and one-third of their time visiting research facilities and conducting some research to maintain close contact with the latest research findings. This division of duties means that in a fortnight a team of SMSs has four days available for VEW and AEO training sessions. Since the class size of the fortnightly sessions should not exceed 30 to 40 persons, this means that one team of SMSs can train about 120 to 160 VEWs. If there are more VEWs than this in a subdivision, then additional teams of SMSs will be required. The training officer will be responsible for the logistical and administrative arrangements for all inservice training activities in his jurisdiction.

District Level

At the district level, the District Extension Officer (DEO) will supervise the SDEOs. He will also make random checks at other levels in the system. He will be supported by a team of SMSs in fields either not yet required at the subdivisional level or not yet available in adequate numbers to post at that level. These might include specialists in farm management, water management or farm implements, or specialists in livestock or crops of special relevance to the district. These SMSs would be involved in the

Table 4:2

Sample of the Diary of a Village Extension Worker (West Bengal)

(translated from the original)

Name of Block: Memari II. Name of VEW: Sri Bimal Busan Roy Choudhury.
HQ: Paharhati.

Date: 11.24.75 Day: Monday Place: Rokanpur F.P. School Unit: No. 1

<i>Names of contact farmers</i>	<i>Subject on which training imparted</i>	<i>Problems encountered</i>
1. Sri Kumar Krishna Mandal	1. Recommendation of fertilizer for potatoes on the basis of soil-test results.	<hr/> <p><i>Recommendations</i></p> <hr/> <p>Arrangements were made through personal contact of AEO to prevail upon Assistant Engineer, Irrigation and Waterways, for timely release of water.</p>
2. Sri Dulal Chandra Mandal		
3. Sri Bijoy Chandra Chatterjee	2. Application of soil insecticides before last ploughing in potato fields.	
4. Sri Habul Chandra Ghosh		
5. Sri Fair Chandra	3. Cutting of potato tubers in proper sizes keeping eyes and treating these in 6% wettable mercury before planting.	
6. Sri Gobinda Chandra Pan		
7. Sri Balai Chandra Mandal		
8. Sri Anil Chandra Pan	4. Selection of seeds, seed treatment, spacing and depth of sowing of wheat.	

<i>Names of other attending farmers</i>	<i>Other subjects discussed</i>	<i>Visits and comments</i>
1. Sri Sanatan Pan	1. Cultivation of sun-flowers.	<p>Attended the training program today. The VEW is requested to attend sowing of wheat in some fields to guide the farmers in spacing and depth of sowing.</p>
2. Sri Biswanath Ghosh		
3. Sri Jamini Kanta Pan	2.	
4. Sri Jadal Chandra Karmakar		
5. Sri Harendra Chandra Malik		

(signed) A. Choudhury,
AEO, Memari II

Recommendations of higher authorities

Please advise the farmers to go for Janak in late-sowing wheat fields and also for prophylactic spraying of fungicides on potatoes.

(signed) M. Roy
SMS-I, Burdwan

regular training sessions of the VEWs and AEOs as and when needed. SMSs in plant protection and agronomy would be useful at this level as well as to provide support to the subdivisional SMSs in these fields. They would also provide training to subdivisional level staff and, together with them, screen and develop the recommendations to be taught to the VEWs in the training program.

Zone Level

In cases of too many districts to be supervised directly by the headquarters department, one additional level is required, the zone level. The Zonal Extension Officer (ZEO) will be responsible for all extension activities in his districts. On professional matters, the department will maintain direct links with the districts and even subdivisions mainly through the SMSs. In other matters, the links between the department and the districts will be through the ZEO. The field supervision work will be done by him personally and he will be assisted by a few administrative staff only.

Headquarters Level

The organization of the headquarters may differ from place to place in accordance with the different responsibilities and the entire structure of the Ministry (or Department) of Agriculture. It would be best if the headquarters unit dealt with agricultural extension exclusively and were called "Extension Service" rather than Department of Agriculture. The Director of the Extension Service would be assisted by three deputies. One deputy would be in charge of administration, including personnel management and finance. The second would be responsible for all technical and professional aspects of the service. He would run a cell of senior Subject Matter Specialists whose work would include: (a) developing inservice training programs for extension personnel (and particularly SMSs) in their field of specialization; (b) maintaining close contact with research workers throughout the country and in other countries; and (c) provide technical support to the research and extension committees described in the next chapter. The third deputy would be responsible for the execution and implementation of the work at all levels, constantly monitoring and regularly evaluating the effectiveness of the system.

Impact

One way to assess the impact of this system of training and visits is by calculating the number of farmers who can be reached

directly by the service in a given period of time. For example, in West Bengal, each VEW is in direct contact (in the fields and in the group discussions) with not less than 15 farmers (the contact farmers and other interested farmers) during his visit to a given group. Since he visits eight groups in a fortnight, each VEW advises directly about 120 farmers every two weeks. When this number is multiplied by the total number of VEWs (4,000), this means that about one-half million farmers (out of a total of four million in the state) will have the opportunity to learn directly from the VEWs the recommendations for the fortnight. Moreover, this is done within only two weeks of the VEWs' training session. The indirect impact on other farmers would be considerably more widespread. It is clear that this system of training and visits provides a powerful tool for reaching large numbers of farmers very quickly with the most up-to-date messages.

5. Reforming Extension Other Operational Features

Links with Research

As noted earlier, an extension service cannot function for long unless there is an effective research program. Often the agricultural research function is separated from the Agriculture Department. In any case it is necessary to ensure close contact between the research institutions and the extension service. This is often difficult. The two organizations may have their headquarters in different locations. They may also have different conceptions of their purpose.

One step toward more regular contact between researchers and extension personnel can be the establishment of a research and extension committee, chaired by the Director of Agriculture and including relevant representatives from research and extension. This committee would have responsibility for developing recommendations for the extension service to transmit to farmers, evaluating past experimental data, and designing a program of field trials to check out experiments. It will also state the main problems faced by farmers that should be solved by research.

Normally, the committee would consist of officials and scientists who have several other duties, so it is unlikely they would have sufficient time to do all the work and analysis required. Consequently, the Extension Service's cell of senior Subject Matter Specialists (SMSs), referred to in the previous chapter, could act as a secretariat to this committee, analyzing alternative recommendations and presenting them to the committee for consideration.

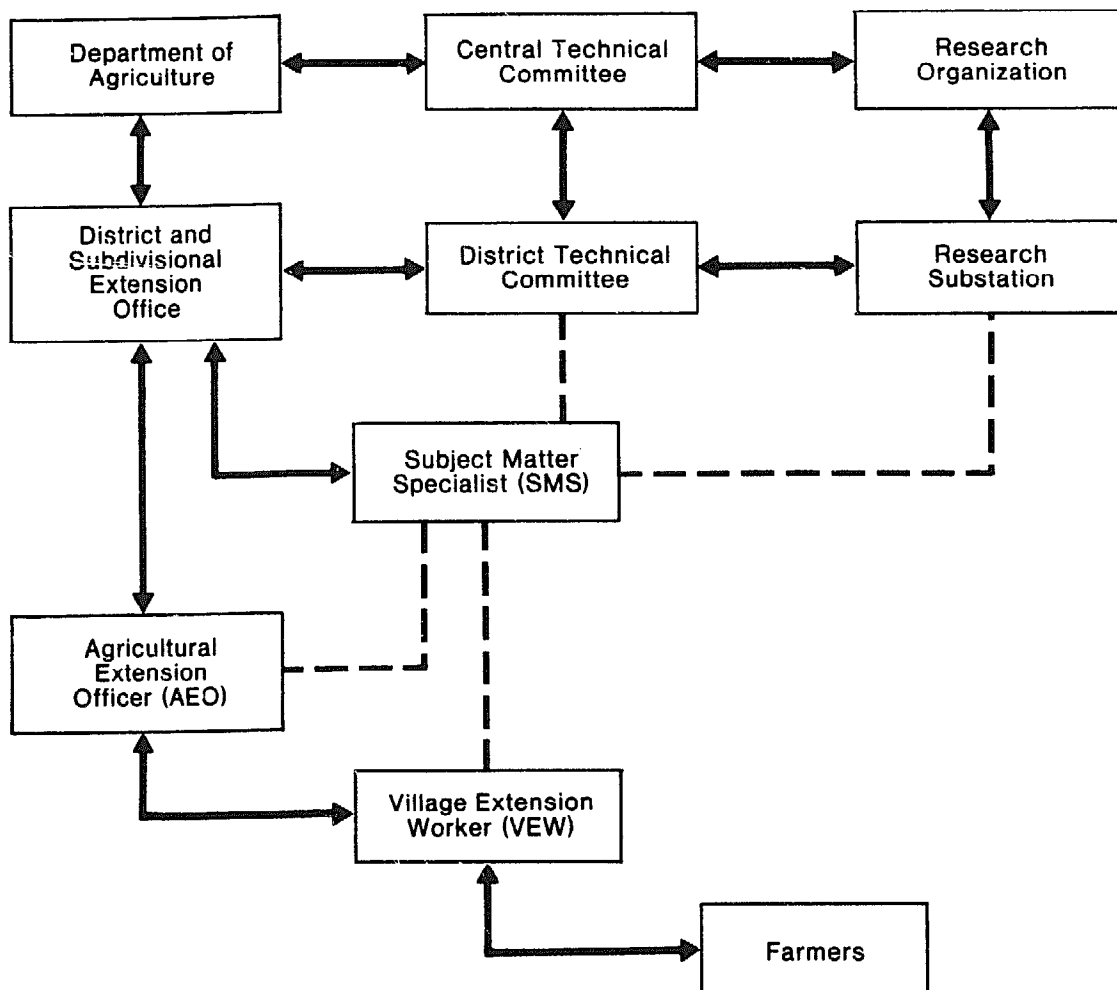
While it is important to have a committee of this kind at the headquarters level to develop general guidelines and recommendations, it will also be necessary to have a decentralized capability to select the recommendations to suit local conditions. For this reason it would be useful, once the extension service has been reorganized, to establish decentralized research and extension committees at a lower administrative level with functions identical to the Headquarters Level Committee, applied to the par-

particular administrative area. In India, for example, the district would normally be the appropriate level for the establishment of the committee. The membership of the decentralized research and extension committee, to be chaired by the District Extension Officer, would be drawn from the SMSs in that area, and from staff at the nearest research substation.

In addition to their formal work on the committee at the district level, the SMSs would, as part of their routine work program, spend about one-third of their time visiting the nearest research substation and other research facilities. Their role would be (a) to keep informed of the latest developments in research; (b) to bring the practical field problems of the farmers to the attention of the research workers; and (c) together with the research workers, to design and carry out, through the AEOs and VEWs, a program of field trials on farmers' fields as described below. Chart 5:1 shows one possible way in which research and extension could be administratively and functionally linked at both the headquarters and decentralized levels.

Chart 5:1

Linkages between Extension Service and Research



Field Trials

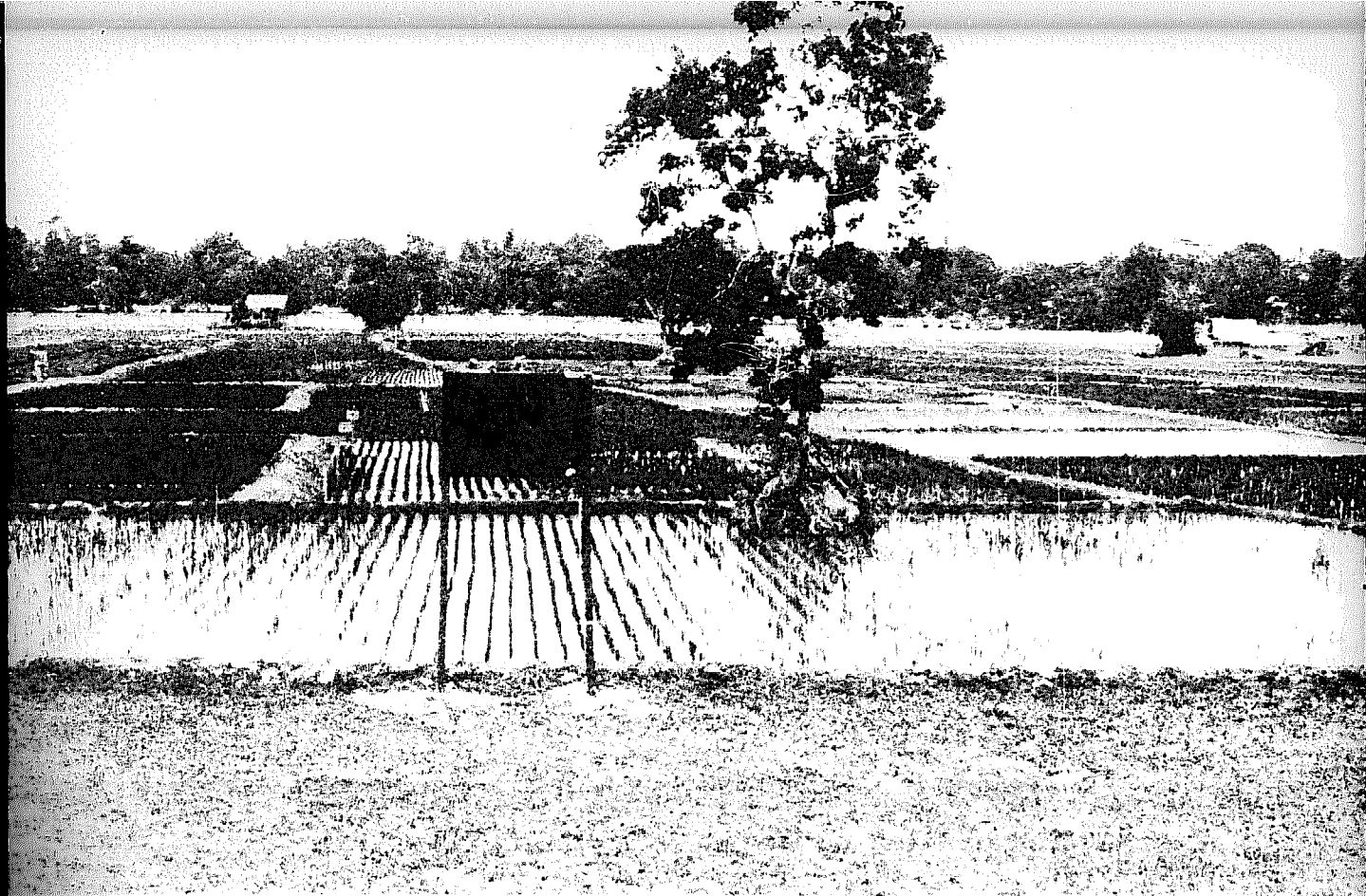
Field trials carried out in farmers' fields are a vital feature of the extension operations. Such trials provide a final testing ground for research findings before they are recommended by extension on a large scale. They also provide a mechanism for close continuous working relationships between researchers and extension staff. The field trial program and procedures are developed jointly by researchers and extension personnel as described above. The research workers from the nearest research sub-station and the extension SMS provide technical guidance to the AEOs and VEWs who, as a part of their regular work program, are responsible for having the trials carried out by farmers in their own fields. The extension staff and research workers analyze the results of these trials jointly.

The trials should be simple, normally involving no replications on the same farmer's field. The reliability of these trials is ensured by carrying them out in relatively large numbers. Since some risk is involved, the plot size should be small. Generally, no compensation would be provided to the farmer unless a completely new, unknown input or implement is required. The crop usually would not be guaranteed. While the farmer faces some risk in a field trial, the risk is small because most of the time the recommendation being tested will produce better results and, in any case, the test covers only a small part of the farmer's land. The risk is further offset by the fact that the farmer will benefit from extra attention from the extension personnel and will be in a better position than most farmers to adopt a successful practice more widely in the following years.

Each VEW should be involved continuously in some field trials. Since the trial would need to be closely monitored by the VEW, about four such trials is the most he should undertake in a season. In the initial seasons, while the VEW is gaining the confidence of the farmers, the number of trials would be even smaller. If the field trial is successful, the VEW should use it as a demonstration.

Other Extension Methods

While the extension personnel's efforts will be concentrated on the system of training and visits as the most powerful vehicle for bringing technical recommendations to the farmers, other extension techniques such as the use of mass media, all kinds of group activities, demonstrations, and field days can be used to complement the main program. The demonstrations, however, should not be confined to the conventional concept of a crop nurtured care-



Paddy experiments on farmers' fields in Thailand.

fully from seed to seed, and protected when possible from the whims of nature with no apparent regard for costs and likely returns. Farmers tend to be skeptical about such demonstrations for they see no relevance between them and their own situation. Moreover, even after the best efforts such demonstrations frequently fail and hence are a waste. The VEW should rather look for farmers' fields that demonstrate a particular point he wants to make at a particular time. That field then becomes a demonstration field. Farmers will find it more convincing to see a practice successfully followed on an ordinary farmer's field and explained to them by that farmer. This sort of demonstration is, of course, built into the training and visit system, for the VEW would normally recommend that a farmer adopt a newly recommended practice on only part of his field. This reduces a farmer's risk and enables him and others to see what difference the recommended practice makes on the same field.

Any other extension activities, such as short training courses for farmers, should be closely coordinated with the extension service and draw when necessary on extension personnel (VEWs, AEOs, DEOs, SMSs) for training. But administration of the facilities for

such training (e.g., maintenance) should not be the responsibility of the regular extension personnel for it would be a relatively unproductive burden on their already busy schedules.

Other Training

In addition to the fortnightly or weekly one-day training session described earlier, other modes of inservice training have an important role. First, as the reorganization of extension spreads, the staff in the new areas should receive an intensive orientation course in the new system: the principles upon which it is based, the procedures by which it operates, and the initial message it is to convey. Such orientation should have as a main goal to develop a good understanding of the system and enthusiasm at all levels for the new approach. Second, medium-term courses should be developed. One-week or two-week courses for VEWs, AEOs, and others before each season would provide them with an opportunity to integrate the discrete fortnightly messages they have been delivering and would enhance the overall understanding of their job. Other levels of the extension hierarchy could also benefit from various types of training.

Since many extension personnel are engaged in supervision, organization, and administration, they should also receive training in these aspects. Training in extension methods will be included in the program for those who are not directly engaged in this work. Such training could enable staff to do their own jobs better and also prepare them for possible promotion. Training of the SMSs will be of particular importance given their central role in the professional work of the service. Since there are different specializations, SMS training and updating is best carried out in small groups, and in some cases even on an individual basis. The training is not meant to answer academic needs, but rather it is to be practical and geared specifically to aid the worker in his day-to-day work with the farmers. Training programs for SMSs should be arranged at the institution best suited to their particular needs—be it in the country or abroad.

Lectures will be given by extension staff members, especially by SMSs, but also by research personnel, university staff, and others.

Evaluation

Continuous evaluation and monitoring is essential for the extension system to make sure it is functioning as intended and to see if modifications are needed to meet changed conditions. The most

essential part of evaluation is the self-evaluation built into the system of training and visits itself. The close personal contact established between the contact farmers, the VEWs and the AEOs, and other extension personnel should provide a sensitive instrument to gauge farmers' reactions to particular methods and recommendations. Supervision is relatively simple: Farmers can be asked if they know the name of their VEW, the day of his visit, and three or four of the recommendations made that fortnight or even during the whole season. If the farmers know these and results can also be seen in the fields, then the extension personnel are doing their main job. If the farmers do not, there is a problem to be checked. Another aspect of evaluation would be an evaluation of the extension methods and inservice training used by the service. Such evaluation would be based more on the desire to improve than on the need to supervise. It should be based primarily on first-hand information gathered from the field rather than on written reports.

In addition to continuous internal self-evaluation, it would be useful for an external evaluation to be carried out either yearly or at the end of each season. Such evaluation would provide another, independent check on the system. This evaluation could be carried out either by a separate statistical group in the Department of Agriculture or by the general statistical organization, planning-evaluation agency, or by agricultural universities. Such an evaluation could be based on carefully designed crop-cutting experiments and interviews with samples of farmers.

Incentives

Under the reorganized system, the entire extension staff and especially the VEWs will normally work much more intensively than before. In part, they will be compensated for this by increased job satisfaction: Experience indicates that the VEW is rapidly transformed into a respected member of the rural community. But to attract the best possible candidates into extension work and to maintain the morale of the existing staff, salaries at all levels, but especially at the VEW level, need to be carefully reviewed and, where necessary, adjustments made. Promotion policies should also be reviewed to provide the extension staff who perform well with a reasonable chance of progressing professionally and financially. In addition to adequate procedures for vertical promotion, salary scales of certain grades (particularly of SMSs) should be reviewed and extended, if necessary, to provide adequate financial rewards within grades.

6. Physical and Personnel Requirements

Staffing

The establishment of the intensive agricultural extension service described in the previous chapters will normally require additional personnel, vehicles, training programs, facilities, and financial resources. The system, however, readily incorporates existing extension personnel, redeploying them in an effective manner. The costly duplication of special schemes is eliminated. Those in nonproductive jobs are reassigned. In this way, the incremental costs can usually be kept quite low. How low, of course, depends on the state of development of the existing service. What is needed is to review what is required and what is available at each level in the extension service.

Village Extension Worker (VEW) level. The number of Village Extension Workers required is determined by the total number of farm families in the area to be covered and the number of farm families one VEW can reasonably reach. The parameters determining the ratio of VEWs to farm families were discussed in Chapter 4. Once the number of VEWs required is determined, the number of VEWs available is subtracted to obtain the number that needs to be recruited and trained. If a fairly large number of additional VEWs is needed and it will be some time before they can be in position, then the area of coverage should be limited. The temptation to spread the existing staff more thinly (by lowering the ratio of VEWs to farm families) should be resisted, for if spread too thinly the VEWs will not make a clear impact. Once they make an impact in a limited area, strong support for expanding the system as rapidly as possible will be forthcoming.

The Village Extension Worker should normally be a secondary school graduate with practical agricultural background and some preservice training in agriculture. In India, the present Village Level Workers, most of whom have many years of practical experience, are well qualified for the job when properly reorganized.

The system of fortnightly and seasonal training plus intensive supervision by the AEO provides strong and continuous technical support for the VEWs. In certain situations where no field-level staff were initially available, selected "Master Farmers" have been used. Although this is largely a temporary solution while full-time staff are being trained, it had considerable success in Turkey and also in Nepal and Thailand. Alternatively, training programs can be devised whereby new VEW recruits undertake a four-year program of three-month training followed by nine months of field work each year. Large numbers of VEWs can be put in the field quite rapidly this way and at the same time gain a good mix of formal instruction and practical experience. Generally, preservice training courses for VEWs—where the candidates are secondary school graduates with agricultural background—should take about one year.

To enable the VEW to reach his farmer group easily he should be mobile. Consequently, each VEW should have a bicycle and in some cases a motorcycle. The government should provide him with a salary advance so that he can purchase one. The bicycle or motorcycle as well as responsibility for repair and maintenance will be his. An adequate, fixed monthly travel allowance should be given to meet the cost of maintaining the bicycle or motorcycle and of meals taken in the field.

To ensure close contact with the farmers in his circle, the VEW should live in the area. Unless he already owns quarters in his circle, the VEW should rent quarters whenever possible. He should have a housing allowance sufficient to cover the rent. In areas where it is not possible to rent houses, funds should be provided to construct a modest house compatible with village standards. This should be done only after a serious effort has been made to rent housing.

Funds should be budgeted for extension operations, including funds for field trials and demonstrations conducted by the VEW, preparation of visual aids, obtaining samples to show farmers, and so on. Organizational and financial arrangements need to be made to provide short, intensive inservice training courses lasting about one to three weeks.

Agricultural Extension Officer (AEO) level. Since one Agricultural Extension Officer can supervise eight VEWs effectively, the number of AEOs required is approximately one-eighth the number of VEWs. Staff at this level frequently have been trained at agricultural colleges or universities. Practical field experience and some organizational ability are, however, more important in this position than preservice academic qualifications.



An Extension Agent meeting with a group of farmers in Sri Lanka.

Agricultural Extension Officers should come from agricultural backgrounds. Good VEWs would often make very good AEOs.

AEOs need to be very mobile so they can visit two or even more VEWs in a day. Each AEO should, therefore, be given a loan or salary advance to purchase a motorcycle. This motorcycle will be his and he will be responsible for maintaining it. The AEOs should receive a mileage allowance to cover costs of operating the motorcycle (petrol, oil, repairs). He should also receive a per diem allowance to cover his expenses in the field.

AEOs should live in their area of operation. They should be provided with a housing allowance for renting housing. Where absolutely essential, appropriate housing should be constructed. Funds will be required also for inservice training and for simple visual aids and samples.

Subdivisional level. At this level, the number of Subdivisional Extension Officers (SDEOs) and Assistant SDEOs required is about one for every eight AEOs. The preservice qualifications are about the same as for the AEOs but more administrative ability and field experience is required. The SDEOs can thus be recruited from the better AEOs.

The Subject Matter Specialist (SMS) positions are far more difficult to fill. The basic qualification here is that the SMS should know his subject well and be reasonably good at training. Initially, it may be best not to impose fixed rules for qualifications. A high school graduate with substantial experience can make a good SMS. Ideally, however, the SMS should be a college graduate (an M.Sc. would be best) with extensive practical experience in agriculture plus experience in his special field. Such people are in short supply but a start can be made with existing staff. Special intensive short courses can be provided to boost their technical skills. For example, the States of Rajasthan and Madhya Pradesh in India had staff trained in specially designed courses at training institutes in Hyderabad (Andhra Pradesh).

The term "Subject Matter Specialist" is a relative one and in the initial stages the areas of specialization can be fairly broad. Experience in India suggests that a careful search of the existing extension service and of special schemes usually reveals a reasonable number of SMSs of sufficient quality. By using such personnel, bolstered where necessary by short intensive courses, it is possible to make a start rather than waiting indefinitely for more perfectly qualified personnel. Over time as the standards of agriculture improve, the SMSs will need to become more narrowly specialized.

There are usually few SMSs to start with, so they must be used economically. A ratio of one SMS team (consisting of at least an agronomist, plant protection specialist, and training officer) to 120 to 160 VEWs, therefore, is recommended. The SMSs should train the VEWs directly (and train the AEOs at the same session). As a temporary measure other arrangements can be developed: the SMSs can train the AEOs who in turn can train the VEWs, or a monthly training schedule could be followed. This indirect method of training, however, involves some loss in quality and should be used only as a temporary expedient.

Since the number of SMSs required is relatively small, it is usually fairly simple logistically to arrange inservice training programs for them. Funds should be available for training both within the country and, where appropriate, in other countries.

Staff at the subdivisional level need to be highly mobile. SDEOs and Assistant SDEOs need to cover a fairly large area. SMSs need to get to the VEW training stations, to farmers' fields, and to travel to nearby research stations. For this reason, there should normally be a vehicle for each SDEO, Assistant SDEO, and SMS. The vehicle would be government owned and main-

tained. Travel allowances would cover meal expenses and other incidental costs.

Arrangements for housing and office space should be made. Where necessary, additional houses may need to be constructed.

The staff at this level should have an adequate budget for field trials, training, and all other extension operations.

District level. Staff at the district level both supervise the extension operations at the lower levels and provide technical and administrative support to perhaps four or six SDEOs.

Also at this level should be a cadre of a few SMSs for subjects which may not relate specifically to a given location and are not of as much importance as at the subdivisional level. Examples might include SMSs for farm management, a crop of special importance to the area, or farm implements.

As at other levels, an adequate number of vehicles is needed and travel allowances, housing or housing allowances, and funds for extension operations and inservice training should be provided.

Headquarters level. Some additional staff may be required at headquarters to monitor and evaluate the extension service and to provide technical assistance in developing recommendations, guiding field trials, and developing training programs for various levels of staff. Provision should be made for adequate vehicles so headquarters staff can visit the field with ease. Staff and statistical support should also be available for carrying out and analyzing crop-cutting experiments.

A training program is needed at the headquarters level both to keep the technical specialists up to date in their fields and to improve the administrative and management capability of the Agriculture Department.

Finally, there should be a well-equipped unit at headquarters dispensing information, publication, and training aids. This unit would prepare leaflets, charts, and other printed materials on the extension service's recommendations. It could develop training aids (e.g., samples demonstrating particular points). The unit could also publish a small periodical highlighting new technical discoveries, the results of particularly successful extension work, and generally serving as a forum for exchanging ideas within the extension service.

Consultants

There may be instances where consultants, either from within the country or abroad, could be useful in developing extension methods, organization, and training programs, and in helping

to run the service at the initial stages. It is not easy to locate such consultants, however, for they need to have had extensive practical experience in managing extension services. Within India, for example, officers who have been responsible for strengthening the extension service in particular states or areas are very useful in helping reorganize extension in other states.

Estimating the Requirements

The various requirements of personnel, housing, vehicles, training programs, and extension operations can be readily estimated using the norms and ratios described. The cost of organizing the extension service can be kept low by using the existing extension staff to the fullest extent possible. A starting point is, therefore, an inventory of staff and facilities. This should be done with care to ensure that all staff, including those involved in the special schemes, are blended into the reorganized unified extension service.

Once the available staff and other requirements are known, a phased schedule for the introduction of the extension service should be worked out. This schedule should take into account the rate at which any new staff can be recruited, oriented, and trained. Unit costs of the elements required at each level of the extension service should be estimated. By applying these to the phased estimate of requirements, a yearly budget for extension reform can be calculated.

7. Impact of Intensive Extension

The extension system described in these chapters is clearly a very powerful communication tool. It enables vast numbers of farmers to be reached very quickly. In the case of West Bengal, mentioned earlier, about half a million farmers are now reached directly each fortnight. Many more farmers are affected indirectly. The latest available techniques can be taught to VEWs and AEOs in a fortnightly training session and within two weeks a substantial part of West Bengal's farmers will be informed.

The potential of this system is clear, but what has been the actual impact in the field? This may be assessed in: the quantitative effect on such indicators as yield and areas planted to high-yielding varieties (HYV), as measured in published documents evaluating the system; the impressions of various visitors to the fields where the system is operating; farmers' reactions to the new system; and the reactions of the extension staff themselves to their new mode of work. The following paragraphs summarize the results of each of these ways of assessing the system. As indicated in the introduction, however, there is no substitute for actually visiting an area where the system is operating.

Quantitative Impact

Assessing the quantitative impact of extension is difficult. Agriculture is a very complex activity with many interacting factors making it virtually impossible to determine with precision what part of any increase in production is due to which variable. It is particularly difficult to adjust for variations in weather and this complicates comparisons between years. Comparisons between farmers (those covered by extension versus those not) during the same year can be questioned on the grounds that perhaps only the better farmers (or lands) were included by the extension service and these better farmers (or lands) would have higher yields anyway. More fundamentally, if yields increase because farmers follow the extension agent's advice to adopt line sowing,

or use fertilizer, or manage water better, is the yield increase the result of extension? Or is it the result of the farmers' increased labor, or of the use of fertilizer, or of irrigation? If it is the result of a combination of extension and other things, what is extension's share?

Even the most carefully designed and executed evaluation can only minimize such problems; it cannot avoid them. Studies of this kind would be very useful and in several parts of India they have been initiated by agencies separate from the extension service. No results are available yet and, in any case, a detailed rigorous evaluation of the system is beyond the scope of this paper. Nevertheless, preliminary estimates of the impact of extension have been made in several areas. Most of these studies have been carried out by the statistical branch of the extension services themselves, though some were done by separate agencies. The studies are based on crop-cutting experiments of samples of farmers according to standard statistical procedures. Although these estimates are subject to the problems outlined above, steps have been taken to reduce these problems. Where comparisons between years are used, the base-period yields are adjusted for good weather conditions. To allow for differences between farmers' skills, crop-cutting experiments compared fields on which extension recommendations were followed with fields *of the same farmers* on which they had not been put into effect.

The earliest documented evaluation of the impact of this extension system is that prepared on extension in the Seyhan Irrigation Project in Turkey yearly between 1967-72.¹ The extension service was introduced in an area which had ample water resources, but yields were low. Over the five-year period, while the extension service expanded to cover the 100,000-hectare project area, farmers' net profits from cotton cultivation (the main crop in the project area) steadily rose from about \$25 per hectare to over \$330 per hectare. Adjusting for higher prices of cotton over this period still implies an increase of almost 900 percent. Cotton yields, which had averaged 1.7 tons per hectare in 1966, reached over 3 tons by 1969 and nearly 3.8 tons by 1971. This was not an achievement of a few farmers alone. In 1966, no farmer in the area had a 3-ton crop and 75 percent of all farmers had yields less than 2 tons. By 1969, no farmer had a yield of less than 2 tons and 65 percent had yields above

¹The data in this and the following paragraphs are based on official reports of the authorities managing the projects or responsible for the extension services.

3 tons. By 1971, 95 percent of the farmers had yields above 3 tons. Cotton yields in this area are now as high as in the best cotton-growing areas. The extension service stressed cotton, since it is the most important crop in the region. The service covered all crops, however, and good results were reported for wheat and vegetables as well.

The Chambal (Madhya Pradesh) project area in India also showed good results. Here, a reorganization of the extension service was introduced as part of a broader Command Area Development (CAD) project involving land leveling and construction of field channels and drains. Water had also been available for years but not fully utilized and yields were poor. The extension reform was started in 1974/75 in two districts with 70,000 farmers. Data are available for one of these districts (Bhind) where 19,000 farmers, cultivating about 54,000 hectares, less than half of which is irrigated, are covered. In 1974/75, the extension service concentrated on increasing paddy area, which rose from 12,000 hectares to over 16,000 hectares and yields rose to 2.4 tons per hectare as compared to an average good-weather yield of less than 2 tons realized in the years before the extension system started. By 1975/76, paddy area had risen to 19,000 hectares with average paddy yields of nearly 2.8 tons per hectare. Paddy yield data were based on 241 crop-cutting experiments. The average paddy yield of those fields on which farmers followed all the recommendations of the extension agents (about 17 percent) was over 3.7 tons per hectare (based on 89 crop cuttings). Wheat yields in 1974/75 rose to nearly 2 tons per hectare (50 crop cuttings) compared with the best previous yield of 1.3 tons obtained in 1971/72; mustard yields exceeded 1 ton per hectare (166 crop cuttings) compared to less than 0.5 ton per hectare in the previous year.

The Chambal (Rajasthan) project area provides a similar story. Here also, water had been available for a long time but not fully used. The extension reorganization was introduced in the Kharif (summer) 1974 season. The first crop-cutting analysis and evaluation was done for the Rabi (winter) 1974/75 season. Following all or some of the recommended practices brought wheat yields of about 2.3 tons per hectare. Where the practices were not followed, yields were about 1.5 tons. Chickpea yields which had previously averaged 0.6 ton per hectare rose to over 1.1 tons on fields where at least some of the recommended practices were followed, while on the other fields the yield remained 0.6 ton.

Even this soon after starting operations, the extension service was reaching a large proportion of the farmers. Fifty percent of the more than 44,000 farmers covered in the area were following all or some of the recommended practices. These farmers operated 50 percent of the 70,000 hectares of land under Rabi crops in the area. Not only half of the farmers benefited, but the fact that the average farm size of those benefiting was equal to the average farm size of all farms in the project area, indicates that those benefiting represented the average farmers in the area, not just the large farmers.

Crop-cutting experiments for the Kharif 1975 paddy crop on about 250 sample plots yielded similar results: In areas covered by the reformed extension service, average paddy yields rose from 2.1 tons per hectare to over 3.3 tons per hectare for all farmers' fields. On about 40 percent of the 13,000 hectares of paddy area covered by extension farmers adopted more than 50 percent of the recommended practices and achieved yields averaging nearly 4.2 tons. Farmers adopted at least some of the recommendations on another 25 percent of the paddy area.

The extension system benefited farmers with holdings of all sizes. About half of those adopting more than 50 percent of the practices had less than 2 hectares of land. Moreover, as Table 7:1 shows, small farmers gained more than others in adopting the recommendations.

The figures in the table suggest that the extension service reaches farmers of all size groups effectively. It also suggests that the extension message it carries is one to which small farmers can respond well. The recommendations stressed improved practices which required more labor rather than only increased

Table 7.1

Paddy Yields in the Chambal (Rajasthan) Project Area, 1975
(tons per hectare)

(1) Holding size of fields (hectare)	(2) Less than 50% of recommendations adopted	(3) Over 50% of recommendations adopted	(4) Percentage increase (%) (Col. 3 over Col. 2)
0 - 1	2.37	3.92	64.5
1 - 2	2.63	4.05	54.0
2 - 4	2.97	3.79	27.6
4 - 8	3.18	4.39	38.0
8 +	2.70	4.16	54.1

use of costly inputs. It appears that smaller farmers (who have surplus labor) may be able to adopt such recommendations more easily than larger farmers.

In West Bengal, the extension system was introduced in the entire state in the summer of 1975. No formal evaluation report has yet been undertaken, but the Government of West Bengal feels that there are already some first indications of good results caused primarily by the extension efforts. Between 1970/71 and 1974/75 the area under HYV paddy (Amon season) and wheat had been growing at 1 percent and 2 percent, respectively, per year.² In 1975/76, the first year the extension service operated in the entire state of West Bengal, area under HYV paddy grew from less than 1 million acres to about 1.4 million acres. Area under HYV wheat grew from slightly more than 1 million acres to slightly less than 1.4 million acres. Many factors, including weather, no doubt contributed to this, but it appears likely, based on discussions with farmers, that extension made an important contribution.

Statistical analysis does not permit a judgment to what extent these yield increases and technological improvements were due to extension alone and how much to other inputs or investments. In each of these cases, however, inputs were available at more or less the same level before the introduction of the reformed extension service but were not widely used. Nor did the availability of irrigation increase substantially. The only major change was in the extension service itself, strongly suggesting that extension had a catalytic effect on boosting yields.

Visual Impact

A visit to an area where the extension approach is working provides easily visible evidence of the impact of extension. This is the same kind of impact that farmers see and that convinces them to follow the extension recommendations. The visibility of the effects of extension and the speed at which they occur amaze most visitors.

After two seasons, wheat and paddy yields in Chambal (Rajasthan) and Madhya Pradesh were reaching a very high standard. This is not just in selected isolated areas but in field after field as far as one can see.

²Growth rate estimated by fitting HYV area data to the equation $y = be^{mx}$ by ordinary least squares. When the 1975/76 data are added in, the growth rates since 1970/71 become 8.2 percent and 7.8 percent, respectively.



The Governor of Rajasthan awards the Director of Extension in Chambal a medal for his service to the State on Republic Day 1975. Six extension personnel involved in the reorganized service received such awards.

The conditions of the fields provide evidence of sound agricultural practices. Weeds are few, plant populations are nearly optimal, sowing is in lines, pests are well controlled. All of this shows clearly a basic transformation in agricultural practices and hence in yields and incomes.

There is also a strong suggestion that the increased incomes are fostering development of the area in a broader sense. Better food is consumed and more and better houses are being constructed, giving a better standard of living to the farmers and employment to those who need work. As a result, labor wages in these areas have risen substantially. These and some other clearly visible signs of progress give a reliable indication of a major improvement in living standards.

Farmers' Reactions

Farmers' reactions to this extension approach are uniformly enthusiastic. The frequency and dependability of the VEW's visits combined with the soundness of his recommendations

induces an almost immediate response. In Assam, after only five rounds of visits by VEWs, many farmers were already approaching them for advice and practicing the new recommendations in their fields. Four months after the extension service was reorganized in one subdivision, the District Deputy Commissioner selected several small farmers as case studies to determine how the revised extension service was affecting them. His report is reproduced in the Annex.

When a team of government officials and consultants was visiting an excellent field in Chambal (Rajasthan), they asked where the farmer was. The neighboring farmers responded that the man was at the temple. The visitors asked why, was there a religious festival? They were told no, but that this particular farmer for years had not had a good crop. After following the extension recommendations, he had an excellent crop, so he now spent all his time either in the field or in the temple giving thanks.

During questioning, another farmer (in the Rajasthan Canal Project) stated that he was going to adopt the extension agent's recommendations on his entire field. When asked if he felt this was risky since it involved a set of completely new practices he had not tried before, he responded that there was no risk: even if the crop was a total failure, the profits he earned from following the agent's recommendations during the previous season would completely cover the loss.

After the extension service had operated for five years in the Seyhan project area, almost all farmers had attained cotton and wheat yields on a very high level. When the farmers were asked if now the extension agents could be withdrawn since they had achieved about all that was possible, the farmers responded with alarm. Would one, they asked, send the doctor away from a village just because no one was sick at the time?

Reactions of Extension Personnel

Perhaps the most convincing testimony to the effectiveness of the extension approach is the reaction of the field-level extension staff. In many countries, they are a dispirited group. These people have an enormous task with completely inadequate administrative and technical support. Over the years, they have become quite cynical. This situation prompted one high official to observe that "if heaven would open and God come down, these people would not move."

Where extension has been reorganized on the principles described in this paper, this situation has changed completely. Given an achievable task and the time and training to do it, the VEWs, AEOs, and others have responded sincerely and eagerly. While for years they had been achieving little, suddenly they can see clear results from their work. They begin to have pride in their work, and the respect of the farmers. In India, these staff are now respected figures in the community.

Priorities

The data and descriptions presented all suggest that a properly organized extension service can have a major impact in a very short time. In countries where the standard of cultivation is quite low it is difficult to imagine any more productive investment. The costs are very low, generally about \$1 per hectare per year. The benefits are great: 0.5 to 1 ton of rice, worth about \$60 to \$120 per hectare is approximately what has been achieved in several areas where the extension service is operating. This is, of course, only one crop. Where more than one crop is grown in a year, the impact would be still higher.

It takes no sophisticated analysis to see that the extension service is a very good buy indeed. This is not to imply that one should go in for extension only, instead of projects to develop input supply, agricultural credit, and water resources. But as a matter of priority, it would seem to make sense to start with extension. It costs little, achieves much, gives extension personnel and farmers alike self-confidence and pride in their work, and with a good extension organization other investments in agriculture are more likely to achieve their potential.

ANNEX

Three Case Studies

(The following three case studies were written by Mr. Rangan Dutta, Deputy Commissioner, Nowgong District, Assam, four months after the extension system was introduced in the district.)

I am enclosing here the response of three small farmers of Batadraba Block of Nowgong to the new extension system started on April 1, 1976. On August 14, 1976, I visited the VEW circle and talked to a number of farmers at considerable length. I selected the three farmers on the basis of their landholding, income, level of technological awareness, and caste or religious considerations. As Deb Goswami is a Brahmin, Bora an Assamese farmer, and Haque is an immigrant muslim of Bengalee origin, they represent the broad sociological farmer types you would see in Nowgong. My interviews were frank and simple. I did not have any questionnaire. The facts which emerged reveal that extension can meet the needs of all categories of farmers and help the small farmers most effectively, leading to an increase in productivity and incomes which anybody can see.

Case 1

Shri K. N. Deb Goswami (age 34) is a small farmer having only 3 acres of cultivable land in the central Brahmaputra valley district of Nowgong, in the State of Assam of North Eastern India. Nowgong District has a subtropical climate with heavy rainfall (annual average 1,700 millimeters) and moderate winters (mean temperature 12° Celsius). It can produce a number of crops such as paddy, jute, and wheat. Like many of his compatriots, Deb Goswami has been trying hard to produce more out of his land and his problems were many and difficult. His land is on an elevation and the soil is composed of a sandy loam with a rather low moisture-retentive capacity. It required some leveling. He had never grown jute and other tropical fiber crops. His main crop is paddy. He had heard about HYV fertilizers and pesticides sometime in 1970 from the local Block Development Officer but used them infrequently. His reaction to these inputs and techniques was mixed. He had vague ideas of extension.

Around 1973, Shri Deb Goswami separated from his elder brother following his father's death, and came to possess his own land of 3 acres. In that year, he took a loan from a bank and installed a shallow tubewell (S.T.W.) on his land with a lot of enthusiasm. He started growing HYV paddy and wheat, using fertilizer, and ob-

tained an average yield of 2 metric tons per hectare of paddy and 1.95 metric tons per hectare of wheat. Much to his dismay, he was losing money. By 1976, he had been able to repay only three of the seven instalments due to the bank and he was worried. The fact is that his agricultural practices were poor. He did line sowing on only 1.5 acres, and did little weeding, and still less of water management. His plant population was thin and quite often infested with pests.

The agricultural extension service was reorganized in Nowgong starting April 1, 1976, and a system of regular Training and Visits of the VEWs/AEOs/SMSs replaced the moribund Community Development extension pattern. The VEW, who had been an Agricultural Demonstrator under the jute program in the same area, selected Deb Goswami as a contact farmer and talked to his group a number of times on fortnightly impact points about major crops (paddy and jute for Nowgong) and, in general, about what extension is and can do. Deb Goswami was convinced that he could expect and receive sound technical advice from the extension service. He accepted the advice of the VEW and adopted line sowing on all 3 acres; he grew seedlings for his entire land in raised seedbeds, and provided for sufficient spacing and plant population. He also gave top dressing of fertilizers at the rate of 60 kilograms per hectare, supplemented by farmyard manure, and took care to remove weeds. Pest attacks worried him but he has now learnt to use pesticides, can talk about the plant diseases in English terms, and mention the cures too. He has come to possess the basic technical knowledge of agriculture. He would like to go for wheat and winter vegetables as per the advice of the VEW whose presence and advice are important as never before when extension visits were rare and not always connected with agriculture. He now knows when and to what location the VEW comes.

Already an advanced farmer, Deb Goswami is being quickly transformed into a hard-headed modern cultivator aware of inputs and land and water management techniques. He is eager to talk to fellow farmers in his extension group on agricultural practices and input use and wants to know more. From a shaky farmer he has become a potential extension leader. Beaming with smiles he stated confidently that he would get about 4 metric tons to 5 metric tons per hectare of paddy (IR-8 and Jaya) in the current Kharif. His shallow tubewell does not cause worry any more.

Case 2

The Training and Visit (T&V) extension program has something for every category of farmer and not merely for the type Mr. Deb Goswami represents. Take the case of *Shri Bhumi Bora* (age 25), an Assamese farmer of Nowgong District who has only 1 acre of land. He recalls that, before extension was reformed, the Village Level Worker had visited his village on only two or three occasions. This time, he confirms, the VEW comes on prefixed days, and discusses things which matter in production. On his tiny but compact plot, he has been growing paddy in a traditional way like his forebears. He is not a contact farmer. He became curious when he heard about line sowing, HYV seeds and better seedbeds, went to other farmers' fields, and attended some training sessions. In the current Sali (Kharif paddy) season, Bora has done line sowing on his entire land but used traditional seeds for raising seedlings for two-thirds of his land. However, on hearing of the productive potential of HYV seeds from the VEW and the contact farmers, Bora purchased 5 kilograms of Jaya seeds and 10 kilograms of chemical fertilizers and applied them on a plot of a little less than one-third of an acre. He raised narrow seedbeds and transplanted in line in early July 1976. He can see the difference between the line-sown traditional paddy and the one without line sowing and, of course, the greener healthy Jaya paddy gives him a satisfied smile. If everything goes well, Bora is confident of earning substantially more this year.

On the two-thirds of an acre under traditional varieties but with improved management practices such as line sowing and weeding, he expects a yield of about 6 quintals compared to his normal 4 quintals. At government procurement prices (Rs. 75 per quintal), this means an additional gross cash income of Rs. 150. Since this increased production was achieved primarily through increased family labor, the increase in his net cash income will be almost identical, probably about Rs. 130 to Rs. 140. Even after allocating a value to family labor, the net income on this plot works out at Rs. 210 as opposed to his normal Rs. 120. From the remaining one-third acre planted to HYV, Bora expects 6 quintals of paddy compared with his usual 2 quintals, an incremental gross income of Rs. 300. Additional cash expenses of about Rs. 72 were incurred for fertilizer (RS. 60), HPV seed (Rs. 2), and plant protection (Rs. 10), giving an increase in net cash income of about Rs. 228 from one-third of an acre. Again, including a value for family

labor, Bora's net income on this plot will be about Rs. 230 as opposed to his normal Rs. 60. Combining the two plots, Bora expects to earn a total profit of Rs. 440 from his 1 acre as opposed to his usual Rs. 180. He is all the more happy because he knows what he is doing. The advantages of improved practices learnt for the first time are at his finger tips which may surprise any visitor. He says he would go for HYV for his entire land and looks forward to extension for sound technical advice for growing winter crops in 1976/77 under improved practices. Bora does not display a feeling of insecurity and hopes to gain a higher yield and income in future.

Case 3

The experience of Samsul Haque (age 40), also a farmer of Nowgong, has been interesting. He possesses 1 hectare of unirrigated paddy land and has been growing the traditional local variety of paddy. He was surprised when he was selected as a contact farmer. In the fortnightly training sessions, he learnt about preparation of raised seedbeds, line sowing, and proper methods of application of fertilizers. He finds the training useful. The first advice he tried was the preparation of raised seedbeds and line sowing which he did for Ahu paddy (pre-Kharif) in April 1976 and found that it gave him a higher yield, because the crop is healthier and interculture operation is easier. He was worried about plant disease but he knew how to tackle it. During the current Kharif, 1976, he wanted to know from the VEW whether he should go for a variety called "Aizong" reportedly brought from Bangladesh by some farmers. It could give a yield as high as 6 metric tons per hectare and the quality of this paddy seemed to be very good. The VEW and AEO made some cross-checks and learnt that, though this variety had not been officially declared as HYV in the Department of Agriculture, some farmers of Nowgong actually obtained very high yields from "Aizong" in the last season. Samsul Haque was advised to go for this variety as it was felt that "Aizong" would do well in low-lying areas because it can stand a certain amount of submergence. He managed to buy seeds, prepared raised seedbeds, and line-transplanted "Aizong" paddy on his 1 hectare of land. He applied about 40 kilograms of urea and equipped himself with plant protection medicines. Samsul Haque looks upon his plot with pride in his new knowledge and stature.

Conclusion

Such instances are many in Nowgong since adopting the new extension approach in April 1976. A rough estimate made recently indicates that about 16,000 to 18,000 farmers out of an estimated 164,000 farm families in Nowgong have readily accepted the message and this does not include the farmers who had reached a higher level of know-how and incomes prior to the new extension program.

For the first time, extension has a definite and objective sense of purpose. The impact achieved in about four-and-one-half months in the irrigated as well as unirrigated areas of Nowgong is impressive. There has been irrigation, both flow as well as groundwater, in the Hamuna system covering 25,000 hectares over the years, but actual use for HYV was meagre and traditional agriculture characterized by poor crop husbandry practices and low yield continued. The Training and Visits Program has brought about a material change in farming practices in this area within these few months. With raised seedbeds and line sowing came the HYV paddy like Pusa-2-21, Jaya, IR-8, and some use of chemical fertilizers and farmyard manure. The spread of HYV-improved practices and fertilizer use seems to be faster than before. It has been also observed that extension, while guiding the farmers, has learnt to appreciate farmers' views and moves with the farmers. This is most desirable. Thus, when the farmers themselves suggested "Aizong" variety, the extension agents after some preliminary scrutiny, suggested its adoption. The resultant spread of "Aizong" can be attributed only to extension efforts. The demand for at least one implement like weeder has been created naturally and not artificially by subsidized lending.

It is evident that the capability of the extension service is the key to the success of any agricultural programming, as the investment-absorbing capacity of the agriculture sector depends on extension's ability to spread technology to the farmers to ensure optimum use of inputs and available resources. Even without much physical investment, extension can bring about increases in income and productivity for the farmers, particularly for the small farmers who are usually keener than big farmers to put their land to more intensive use, as suggested by the three typical examples cited here.

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