BETTER FARMING

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CONTENTS

1. INTRODUCTION

In our Five Year Plan, as you know, a great deal of importance has been attached to the development of agriculture. Why is this so? The reason is that our country has a very large population, and we do not have enough food for everyone. In the past, we have had to buy grain from other countries in order to feed our people. This has cost us large sums of money, which we could have spent on other useful things if we had produced enough food for ourselves.

It is necessary, therefore, that we produce more food. How is this to be done? There are many ways of increasing our food production. One is by bringing under cultivation land that can be tilled but has so far been left idle. Then again, in most places farming methods can be improved. In an area where there is little rainfall and no canal water available, a certain variety of seed which requires little water for its growth can be sown. In another area a type of seed can be sown which gives a higher yield. Fertilisers can be provided to put back into the soil the good qualities it has lost in bearing crops, so that it is as fertile as before, and the crops themselves can be protected from pests and diseases which reduce output.

These are some of the ways in which we can improve our farming and so grow more food. But remember, our villagers are conservative people. Their methods of raising crops are largely the same as those of their forefathers for hundreds of years. They have to be persuaded to give up some of their old methods and take to the new. They are not, however, unreasonable people. If results will show that the new methods are better they will be only too ready

to accept them, for do not their livelihood and chances of improvement depend on greater production?

There are, of course, difficulties in the way. In one area there may be a shortage of new implements, in another lack of fertilisers or improved seed. Then again, arrangements for short-term loans may be lacking for cultivators who are too poor to buy what they need out of their own pockets.

Problems such as these are a challenge to the hard-working *gram sevak*, who is our chief agent for bringing about better farming methods. Can we not lessen his difficulties? We can, by careful planning and by drawing up an order of priorities so as to make the best use of our resources.

Let us think of the Community Projects and the National Extension Service blocks as big laboratories in which we are carrying out a great experiment, which we hope will enable us to change the face of village India. If it is a success—and it is going to be a success—our country will have taken a very big step forward on the path of progress.

2. IRRIGATION

No farmer has to be told that water is necessary for his crops. But in most parts of India the farmers entirely depend on the monsoon for their water supplies. Sometimes too little rain falls; sometimes too much; in both cases the crop is damaged.

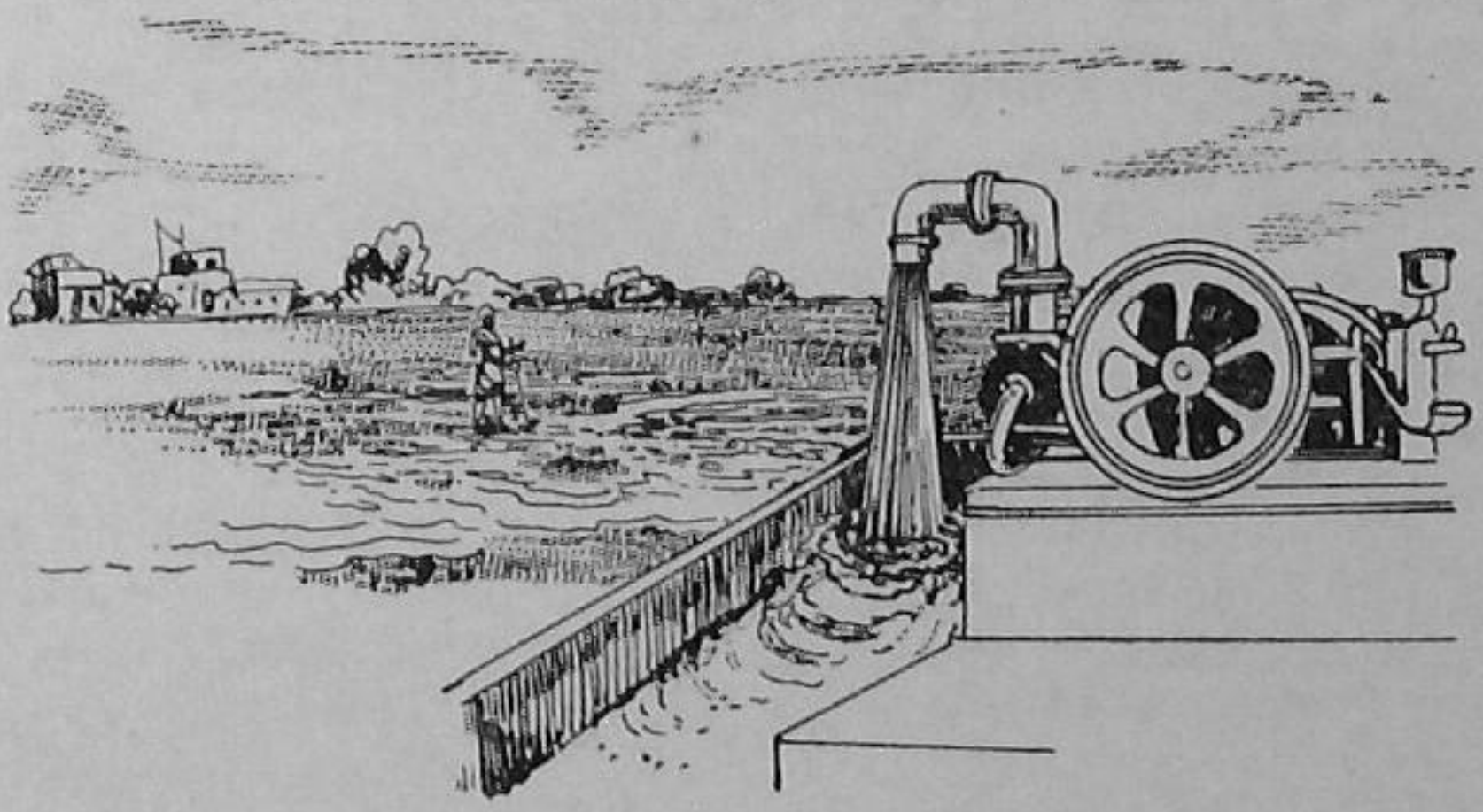
Can we ensure that a particular crop gets only that amount of water which it needs? Of course we can, by providing irrigation facilities. Under our Five Year Plan we have undertaken a huge irrigation programme, and before long many of our Projects all over the country will be supplying water through canals for the parched earth.

These big Projects are the concern of the Central and

State Governments, but there are other ways too in which we can help the farmers. In every development block there are wells and tanks to be repaired, new wells to be dug or tube-wells to be sunk . The project engineers are there to select the sites for new wells after taking into account, among other things, the quality of the water and the depth at which it is found. In one place there may be a stream in which water continues to flow for several months after the monsoon. In this case, wells can be dug along the banks, or there may even be a diversion weir from which water can be taken to the fields.

Now these wells and diversion weirs cost money, and you know that we do not have enough money to pay for everything we want to do in the Projects. Can we not save part of the cost? Certainly we can. An important part of our village improvement programme is to get the people to work together on a project that will benefit all of them. Building a road, for instance. In the same way, we can get them to help to dig a well or a tank which will supply water for many fields. Small irrigation channels, too, can be made, leading off from the well or the tank. Where there is plenty of water from a well or stream, it may be convenient to install an oil engine, pump or some other water-lifting appliance.

But again we come up against the problem of money.



Who is going to pay for these machines? The best thing we can do to organise a co-operative lift irrigation society. This way, the farmers take good care of the machine, for they are all owners of it. The best of machines, however, can get out of order, and it is necessary to make some arrangements for repairs. Every Project has its staff of mechanics, but quite obviously we cannot expect a mechanic to be on hand every time there is a breakdown. So the *gram sevaks* are also being trained in the working of these machines, so that they will be able to carry out minor repairs when necessary.

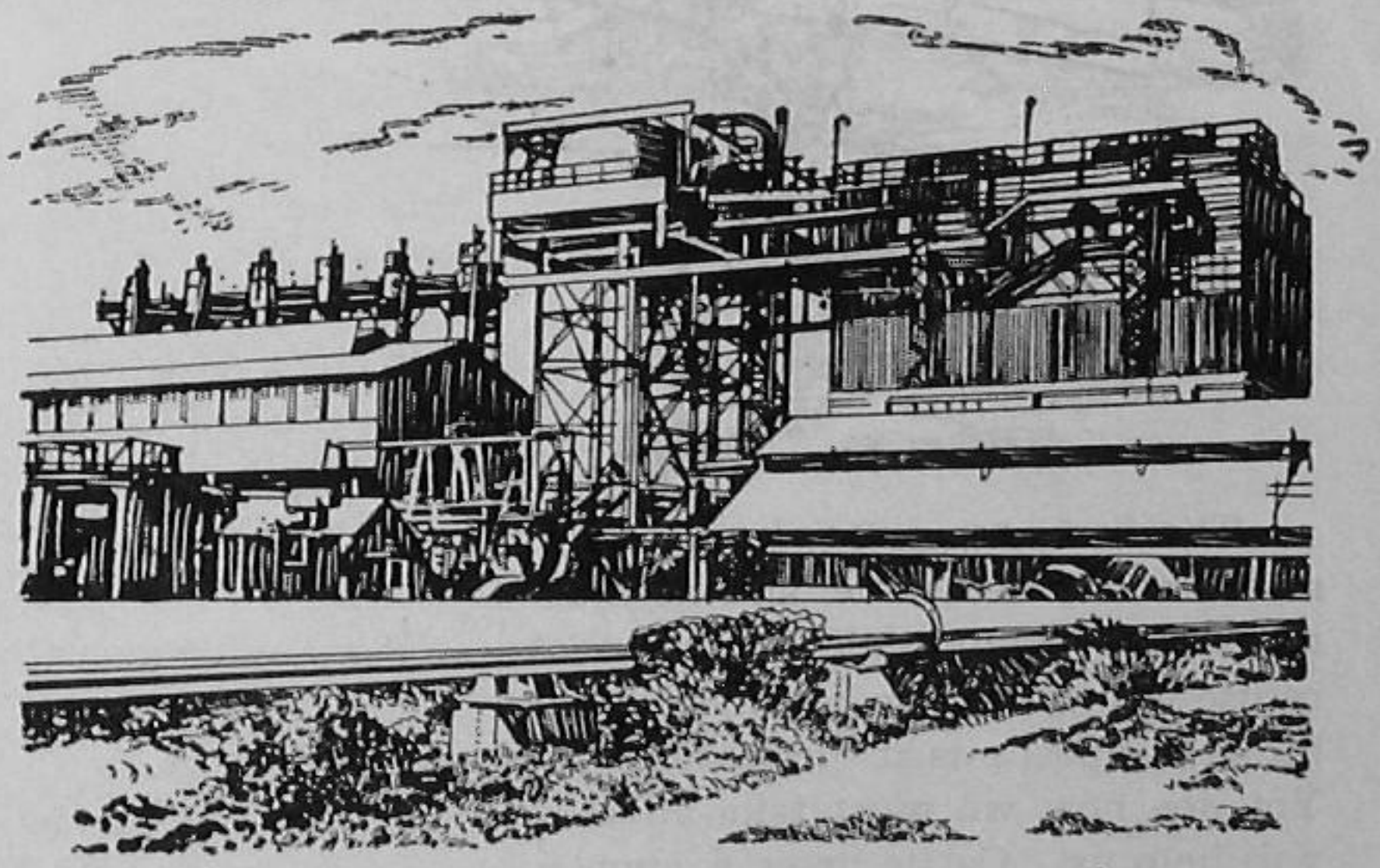
Our work does not end with providing irrigation facilities. Farmers who have been accustomed to raising one crop a year have to be assisted in raising two with the help of irrigation. They have to be told what other crops will be suited to the soil and also the climate, how much water a particular crop needs, and so on.

However, as you will see in the following chapters, there is still a great deal more to be done. Better farming does not only mean providing better irrigation. It also means providing manure and fertilisers, improved seed and modern implements and trying to extend the area of cultivated land. Manure and fertilisers give back to the soil the vitality that it has lost through cultivation, a better variety of seed grows into a better plant, and the use of modern implements and methods of farming increases the size of the crop. We will not get the best results if we use good seed on soil that is poor because it has been starved of nutrition, or if we use modern implements in a field that has been sown with poor seed. But if the land is well irrigated, the soil well manured and treated with fertilisers, good seed sown and modern techniques and implements used, the result will inevitably be a bumper crop. You see how each item plays its part, how the final result depends not on irrigation, or manure or good seed or modern methods alone, but on all of them put together, with each one doing its best. There is a lesson on unity to be found here!

3. MANURE AND FERTILISERS

As crops grow, they need nourishment, and this they get mainly from the soil. Nourishment is also got from the air and sunlight, but most comes from the soil. Now, if the land is not to lose its fertility, the substances it has lost must be given back to it before the next crop is sown. Fortunately this can easily be done through manure and fertilisers.

Experts tell us that manured land will give an yield of up to 30 per cent more than land which has not been so treated. But have we enough manure for our requirements? The answer unfortunately is no, but we have a big factory at Sindri and a few small ones elsewhere which are producing chemical fertilisers in increasing quantities, helping to fill the gap in our needs.



We may not have all the manure we want, but we can and should take full advantage of the supplies that are to hand. Every farmer knows that cattle dung and the refuse from stables make excellent manure, yet how much of this is used for fuel! It is said that nearly half our farmyard manure resources are lost in this manner.

Consider the matter from another angle. Outside almost every village there is a manure heap. To this place is brought cattle dung, stable waste and house sweepings. But in a loose heap the cattle dung, the organic matter in the house sweepings and the remains of plant stalks fed to cattle dry up and do not rot in the manner we want. Then again, this uncomposted material lies fully exposed to the wind and the rain, and much of it is wasted. We cannot allow this waste. We must do something about it.

The first step is to dig compost pits. Every farmer must have at least one, and he must be shown the proper method of composting cattle dung and farm and house refuse. A good plan is to organise special campaigns for filling compost pits at the season when the leaves are falling. You see how we must take advantage of everything that will help us! Cattle urine is another instance. At present it is wasted, but it does make good manure. Bone-meal and inedible oilcakes are also useful. In irrigated areas, or places where the rainfall is high, green manure crops can be grown to enrich the soil for paddy cultivation.

If we act on these lines we shall be making the maximum use of our manure resources. But have we not

forgotten something? Whenever we plan any action we must always think in advance as to what results that action will have. Will anyone suffer from it? If so, steps have to be taken to avoid that. In this case, we plan to stop the villagers using cattle dung as fuel. Have we any other fuel to offer them? Yes, we have. We can partly overcome the problem by encouraging the planting of quick-growing trees like the *babool* which can be used as firewood. In some places it may be possible to supply cheap coal.

In spite of all our efforts, local manure cannot meet all the farmers' needs. Fortunately, there are chemicals like ammonium sulphate, superphosphate and ammonium phosphate which do the same work. These chemical fertilisers are especially useful for growing paddy, sugar-cane, irrigated wheat, vegetables and fruit, and also for crops grown in high rainfall areas.

Fertilisers must be applied with care to the soil. Left to themselves, the farmers would not know what amount should be used for a particular crop and how and when it should be applied. All this has to be carefully demonstrated to them.

Before the farmers will accept chemical fertilisers, they may have to be convinced that it will benefit their crops. To do this, what we do is to choose three small plots and apply the fertiliser to the central plot, leaving the two others under the villagers' normal manure treatment. The difference betweeen the crop grown on the plot treated with fertiliser and the others convinces the farmers of the benefits of the new treatment.

It is usually best to combine chemical fertilisers with manure. The State Agricultural Departments have been experimenting for years, and are able to state what amounts of each should be used under local conditions. It is a good thing if multi-purpose co-operative societies can be made responsible for buying and storing fertilisers and fertiliser-manure mixture and supplying it to the farmers when it is needed.

4. IMPROVED SEED

How does an average Indian farmer sow seed? I do not mean a farmer in a Project area, who has already been shown the best method, but one of the millions throughout India who sow as their fathers and grandfathers did before them. Each one of these millions follows what we call the broadcast method of sowing. In other words, he merely scatters the seed over the ploughed-up soil. He may be sowing good seed along with bad, but it is not his fault; he knows no better. If someone were to ask him whether he was sure that the seed he was sowing was the best for the local conditions of soil and climate, he would be astonished. Seed was seed, he would say. How could one wheat seed be different from another?

He would be very wrong, for there can be a great deal of difference between seeds of the same crop. One variety may grow best in a certain type of soil, another in a different type of soil. One may require very little water for its growth, another may want more water. One may not be able to stand much heat, another may thrive under such conditions. So you see, if we want good results a great deal of care has to be taken in selecting the type of seed which is most suitable for local conditions. Science has helped us here. Let us suppose that in the area in which you live the farmers are hardworking people, but the crops they grow look sickly. You wonder why. An expert comes. He says that the seed being used in your village is the type which needs more water for its proper growth. But what can you do? There is no more water, for your area depends entirely on the monsoon.

This is where the State Department of Agriculture comes in. We have already seen how these Departments are able to give advice on the use of a manure-fertiliser mixture. In the same way, they have been carrying out experiments, trying to improve seeds by combining one type with another until a new type is found which has the good qualities of both. You know that you inherit certain qualities from

your mother and father. You may be clever like your mother and a good sportsman like your father. It is the same way with plants. When two seeds are combined, the new seed has some of the qualities of each of its parents. This we call cross-breeding. In the case mentioned above, we have to find a type of seed which likes less water. Let us suppose the Department already has a stock of such seeds, but they will not grow well in the area because it is too cold for them. What the Department's scientists do is to combine the two types—the local seed and the other type—until a new seed is evolved which will not find the climate too cold and yet will need very little water. Since these experiments have been going on for years, in most Projects improved types of seed are now available for distribution.

How are we to popularise the improved seed? In the last chapter we talked about the use of demonstration plots to show how fertilisers were good for the crops. Can we not use the demonstration plot to show the value of improved seed? The method is the same, only that all three plots are treated equally with manure or fertiliser and the improved seed is used only in the central plot.

Once the improved seed has been popularised, it cannot be allowed to go out of use again for lack of supplies. How are we to make certain that we shall never be short? Obviously we cannot expect the Department to keep supplying all the seed needed in all the villages of the Block. We can, however, help by setting up what we call "nucleus" villages in which literally to grow pure seed. The method we adopt is this. The Department supplies pure "nucleus" seed, and this is sown in three or four "nucleus" villages in the Block. The seed is sown in compact blocks of well-manured and well-irrigated land. The best cultivation treatment is given to the plants, as well as protection from insects, pests and diseases. In the case of paddy, the Japanese method of cultivation is followed. A useful plan is to establish "raised bed" nurseries under irrigation from tanks and wells and supply the seedlings to the farmers. In the case of crops like wheat, barley and cotton, the seed

is sown in neat rows in order to provide adequate growing space to each plant and to avoid waste.

In this way it is possible for us to greatly increase the quantity of good seed available for distribution to the farmers. Of course, we will have to obtain "nucleus" seed regularly from the Department. For cross-pollinating crops like *jowar, bajra* and castor, it will be necessary to supply the farmers every year, but in the case of largely self-pollinating crops like paddy, wheat, barley and gram, and those like sugar-cane and the potato which are obtained from cuttings or tubers, supplies will have to be made only once in three or four years.

The work of obtaining the "nucleus" seed from the Department, arranging its multiplication in the "nucleus" villages and distributing it to the farmers is best entrusted to a multi-purpose co-operative society, if one exists in the area. Otherwise it is the responsibility of the Department of Agriculture, and the task of informing the Department about local needs is left to the village-level worker.

In this way, within two or three years all the farmers in the Block will be using good seed, and the crops will be bigger and better. Sometimes, however, it may be that there is no improved seed to be had. This can often happen in areas just taken up for development. What should we do then? The only course is to take steps to see that the seed used is the best available, and that more care is taken over irrigation, manuring and all other means of improving the crop.

5. LAND RECLAMATION

How is it that land which has once been fertile and covered with crops sometimes goes out of cultivation? There are many possible reasons. The growth of weeds like *kans* is one. Another is that heavy erosion may have made the

soil infertile; or the soil may have gradually become more saline, or desert sands may have spread over the area. There are other reasons, too. In every part of the country the problem exists but the reasons hardly ever remain the same even in areas which are close to each other.

If we are to make the best use of all our resources, we must obviously try to cultivate all the land we can. This does not mean that we must cultivate even soil which is not fertile; we must, of course, pay attention only to land which it is worth our while to cultivate, land which will give an yield which will more than cover the expense and labour we put into it.

Look at it this way. Suppose there is a large, flat stretch of country on which very few people live. Under such conditions, it would not be worth while to try to increase the cultivated area, as there would be no one to tend to the extra land. If, however, more people were settled in the area, more land could be brought under cultivation. At first, tractors might have to be used to break up the ground, in order to lessen the hardships of the new settlers.

But this example refers to land which has probably never been cultivated before. What of land which has been a good farming area at one time and is now a deserted waste? There are, as we have seen, various reasons for land going out of cultivation. Weeds have been mentioned as one. Now, unless a farmer is very careful there are sure to be some weeds in his field, no matter in which part of the country he lives. But deep-rooted and hardy weeds like *kans, kunda* and *hariali* grow particularly well in areas where the rainfall is fairly heavy and where water is not easily drained away from the soil. There are such areas in Madhya Pradesh, Bhopal, Madhya Bharat and Karnatak. The only way to uproot such weeds is by deep ploughing with heavy tractors before the sowing season. This work can be done by arrangement with the Central Tractor Organisation, and the cost to the farmers of the area is more than made up by the benefit they receive.

Each area has its own problems. In some parts of Bengal marshes have been steadily driving back the cultivated area. Here we have to drain the marshes, and by tractor ploughing and proper cultivation make the soil once more arable. Small schemes of this nature can be undertaken in the Community Project areas, but where the marshes are widespread the work has naturally to be taken up by the State Government itself.

A very important cause of the loss of arable land is erosion of the soil through the action of the sun, wind or rain, or through rivers and streams. In hilly areas, one way to reclaim eroded land is by "terrace cultivation"—in other words, cultivating plots cut into the hillside in the form of steps or "terraces," one above the other. Where the slopes are less steep, "contour bunding" is advisable. This means the building of protective bunds according to the contours or level of the ground.

Then there is tree planting. Did you know that trees

protect the soil? In hilly areas where the rainfall is high the leaves of trees protect the earth from the heavy rain and prevent the soil from being washed away. Moreover, the fallen leaves and branches form a substance called humus which makes the ground fertile and more retentive of moisture. Then again, the roots of these trees hold the soil firmly together, providing a further check to erosion. You see how useful trees are, apart from providing fruit and shade for us and a resting-place for birds!

Year after year during the monsoon we have floods in our country. Many rivers overflow their banks. Learned men tell us that one of the factors responsible for floods is the silt brought down by the rivers from the hills. Some of the silt settles in the bed of the river, raising the level of the water until it overflows its banks, flooding thousands of acres of crops and causing damage worth lakhs

of rupees. What is this silt which is brought down from the hills and is the cause of all this misery? It is nothing other than the fertile top soil of the land which, having no protection from erosion, has been carried away by the scores of streams rushing down to join the big river. And why has this soil no protection from erosion? One very good reason is that there are not enough trees and plants to hold it together. Sometimes we have been adding to the trouble by cutting down all the trees over a wide area. Now tree-wood has many good uses, but what are those compared to the loss of land fertility in the hills and untold flood damage in the plains! We must always plant more trees than we cut. It is best to plant them in rows across the slope of the hillside. In this way erosion is quickly reduced.

Erosion of another kind occurs in the plains. It is caused by seasonal streams during the rainy season which cut their way through the soft ground, forming huge ravines in some places. Reclaiming such land for cultivation costs a great deal of money, as it means hard work and workers have to be paid. In many cases it is not worth while to reclaim such land. But in other cases, where the erosion is less severe, we can do something: we can give this land free to landless labourers. If we also help them by way of cattle, seeds, manure, etc., they will be only too pleased to do the work of levelling and so on, because they will be doing it for their own benefit.

The reclamation of saline or *khar* land has not yet been taken up on a large scale. The Bombay Government is, however, carrying out some schemes in the State's coastal districts, and facilities and technical help for the purpose have been made available in some Projects.

A far more serious menace is, however, the advance of the desert in Rajasthan, Cutch and some parts of Saurashtra. Why does the desert advance? Is there any means of stopping it and driving it back? The answer to the first question is that the desert advances because we are not only allowing it to do so but we are actually helping

it! Following from this, the answer to the second question is 'Yes, we can stop it and drive it back.'

But how do we help the desert to advance? We have just been discussing how soil which is not protected by trees and plants is carried away by streams in the hills. In the same way, a sandy soil which is not tied down by the hardy shrubs and grasses of the desert edge is at the mercy of a strong wind. Our failure in the past has been that we have grazed our cattle and goats on these shrubs and grasses that have been protecting us from the desert. We have loosened the sand from the ropes that bound it, and the strong, fiery "loo" of the summer months has been carrying it further and further over our fields. If you were to read of a case in history where a strong army opened the gates of its fort and told the enemy 'Please come in and conquer us', you would think, how foolish of them. But we have been just as foolish!

How can we undo the damage? The only way is to replant the shrubs and grasses that we have destroyed, and also to plant trees that can grow quickly in a sandy soil and require very little moisture. Give the shrubs and grasses a chance and they will set to work for us, binding the soil and allowing us step by step to drive back the desert.

6. PLANT PROTECTION

If you have lived for a long time in the countryside, you will probably have had an attack of malaria some time or other. Or at any rate you must know what malaria does to a man; how he feels weak for a long time afterwards and cannot give of his best in the work he does.

In the same way, plants are attacked by disease, and when this happens they too are weakened and do not grow as they normally would. Apart from diseases, plants are also troubled by insects which live on them and prevent

their full growth, and by pests like field rats which do a lot of damage.

We lose a great deal of food every year because of these insects, pests and diseases. This loss is sometimes as much as 10 per cent of our entire production. And when we consider that we lose another 10 per cent or so through bad storage arrangements, it means that we are just throwing away one-fifth of the grain we produce while millions of our countrymen starve !

Shocking, isn't it? And yet with a little care we can stop a good deal of this waste. The State Departments of Agriculture are doing their bit. They have worked out preventive measures for almost all the major insect nuisances and diseases, and they also have their own plant protection staff who are doing very good work. The plant protection staff cannot, however, be everywhere at the same time. When a major outbreak of disease occurs they can be rushed to the spot, but the day-to-day work of protecting the plants must be done by the farmers themselves, with the *gram sevaks* to help and guide them. There are various methods of plant protection, each type of disease having its own treatment. For instance, the treatment of *jowar* seed with sulphur powder protects the crop against "loose smut", and the soaking of wheat seed followed by exposure to the hot sun reduces the likelihood of "wheat smut." Then there are dusters, sprayers and chemicals which are used to kill insects and check diseases.

Sometimes it is possible to check disease by changing cultivation practices. For instance, as regards the cotton plant, late sowing will reduce the *tirak* disease, closer planting usually lessens an attack of jassids, and the planting of a type that grows quickly reduces the boll-weevil menace.

Then again, it is possible to control troublesome insects by introducing in the fields another type of insect which lives on the first. This is a method which requires a lot of care, however, and the only persons qualified to carry it out are the experts of the Agricultural Department.

No discussion of plant protection can be complete without mentioning the menace of weeds. Some of these weeds are very difficult to remove. In spite of the farmers' best efforts they come up year after year, choking the crops. The worst are the *pohli*, *baru* and *kans*. Because weeds can spread so quickly from one field to another, it is necessary to undertake a mass campaign to remove them from the entire area; and this must be done before they start flowering. In the case of *kans*, the best methods have proved to be tractor-ploughing in the dry season or repeated blade-harrowing from October to May.

Wild animals often do a great deal of damage to the crops. If it is not possible or it is too costly to erect barbed-wire fences in the areas which suffer the most, the only thing we can do is to organise local shikar groups.

In these ways we can give our crops protection and thereby save much grain which has been going to waste year after year.

7. METHODS AND IMPLEMENTS

We have seen that if our fields are well irrigated and manured and if good quality seed is used, it will mean better crops and more food. But that is not the whole picture. You see, our villagers are accustomed to old methods of farming which are now out of date. If we want to increase our production we must not merely provide them water, manure and good seed. We must teach them better methods of farming, and how to use improved ploughs and other implements which will make their work easier.

One of these methods, or techniques, is crop rotation. In some places, the same crop is planted year after year. In one place it may be cotton, in another tobacco, or it may be *jowar, bajra* or wheat. The same substances are taken from the soil again and again. No wonder then that the soil loses its fertility, and the yield becomes poorer and poorer!

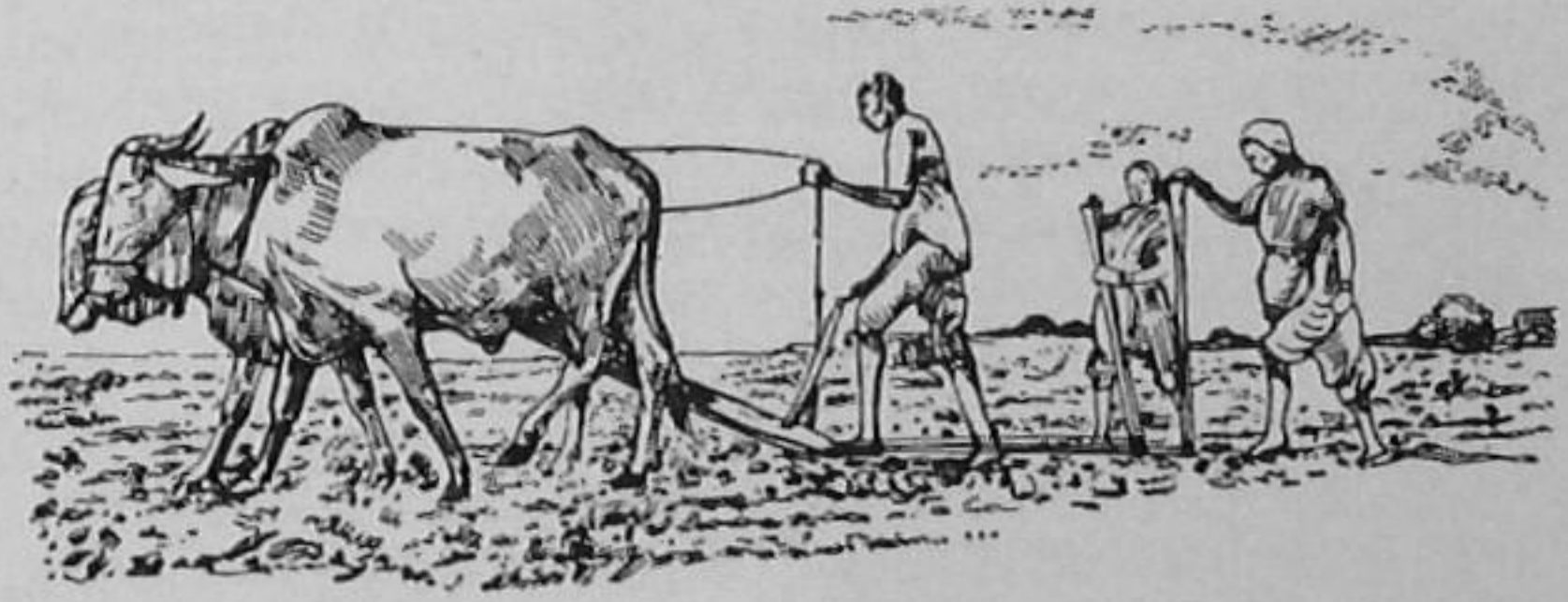
We can change all this by introducing a scientific crop rotation system. Crop rotation merely means that different crops are grown in successive seasons instead of the same crop every time. As the nutrition requirements of different crops are not alike, the soil is not forced to give up the same elements over and over again and, therefore, does not so easily lose its fertility. According to this rotation system, every third crop or so must be a leguminous or 'pod' crop, such as groundnut. It has been calculated that the introduction of groundnut in the crop rotation has increased the yield of cotton by 15 to 20 per cent in Madhya Pradesh, Bombay and Hyderabad.

Then there is the question of preparing the land. You all know that when any big event such as a festival or a marriage lies ahead, preparations for it begin well in advance. Now, sowing a crop is a big event for a farmer, but how few of them seriously set about the task of preparing the soil to receive the seed! In many parts of the country the land is ploughed only once in three or four years, and often it receives no attention after the harvesting

of the *rabi* crop till the next monsoon. If land is ploughed immediately after harvest and cultivated in summer, not only will the yield increase but the soil will itself benefit.

At sowing time, the average farmer just scatters his seed over the field and hopes for the best. In this way, some parts of the field have too much seed, other parts too little. In the thickly seeded part, the growing plants struggle against one another, each fighting to live, and when you remember that much of the seed may be of indifferent quality and that some weeds may even be mixed with the wheat you can imagine the confusion. There is a great deal of waste of seeds, too.

There is only one correct way of sowing, and that is in orderly lines, the seeds being some distance apart so that every individual plant can grow without interference. Bullock-operated seed-drills can be used for the purpose. Line sowing increases the yield, saves on seeds and is also useful in that it allows easier inter-culture of plants.



As regards manure and fertilisers, to get the best results we have to know not only the correct dose but also the proper time of applying it. In the same way, there are correct and incorrect methods of irrigating a field, and it has to be remembered that giving a crop too much water can be just as harmful as giving it too little. In dealing with a large field, it is best to divide the area off into small bunded level plots and to water each in turn.

There is a technique known as dry farming which we

use in areas where the rainfall is low and where there are little or no irrigation facilities. In such cases, only those types of seeds are sown which are known to need little water. These seeds are sown some distance apart in widely spaced rows, and the soil is suitably manured. Another practice is to build bunds round the planted area in such a way that the crops receive the full benefit of the little rain that falls.

These new methods will certainly help to increase production. If we can get our farmers to use modern implements, production will rise even more quickly. Just think. The average Indian farmer keeps only an iron-shod wooden plough, a *bakhar* or blade-harrow, a beam-leveller or clod-crusher, a wooden seed-drill, a *kolpa* or blade cultivator and a sickle—implements that his father used and his father's father before him. Think of this poor cultivator, toiling away in his field at harvest-time and taking hours to clear a small area, and then compare him with a farmer in America or in Russia, working a machine that cuts, threshes and stores the grain all in one swift action as it moves rapidly through a sea of wheat. Of course, such machines can be used only on large farms, and it is rather unfair to the Indian small farmer to hold him up in comparison, but it does show the tremendous difference between the implements we use and those used by the most highly advanced nations.

Have we done anything to provide our farmers with more modern implements ? Well, in the past 20 years or so, some of the State Agricultural Departments have made improved models of Indian implements, and some implements have been brought from abroad. In view of their cost, however, these have seldom come into the hands of the ordinary farmer. In our Community Projects we are trying to introduce new implements which will help to increase production while making the farmer's task easier. There are iron ploughs of various sizes, ridgers, bund-formers, wetland puddlers and tramplers, seed-drills, winnowers, threshers, chaff-cutters and the rest. And then

there are oil engines and pumps, electric motors for pumping water and, perhaps most useful of all, tractors.

Some say we are going too slow in supplying new implements and machines for agriculture. We should like to go faster, but there are difficulties in the way. The biggest problem is to repair machines quickly when they go out of order, and this often happens in out-of-the-way places to which there are no good roads. The only way out for us is to arrange for the training of drivers and mechanics for oil engines and tractors through the Agricultural Department. Village blacksmiths and carpenters are being taught to repair and maintain other implements in the extension training centres and the training-cum-production centres. The *gram sevaks*, too, are being trained to carry out minor repairs. In this way we are solving one of our biggest problems.

8. HORTICULTURE

One of the reasons why some people keep poor health is that they do not maintain a balanced diet. Two of the foods necessary for such a diet are fruit and vegetables. Experts tell us that the human body should have 3 oz. of fruit and 10 oz. of vegetables per day, but it has been estimated that in India as a whole the average person eats only 1.5 oz. of fruit per day and even less of vegetables. Small wonder then, that so many of our people do not keep good health! It is very important that we should increase our production of these protective foods.

Garden crops, however, cannot be treated in quite the same fashion as field crops. It is true that here again we have to go in for better varieties, and pay attention to such things as the supply of seedlings through co-operatives, protection from pests and diseases and the proper spacing of trees and plants; but the growing seasons are different, and

so are the requirements of manure and water. In the case of fruit trees, there are such special operations as pruning, budding and grafting which have to be carried out if the trees are to give high yields.

The greatest difference, however, lies in the perishable nature of much of the garden produce. This means that marketing arrangements have to be very good. But what of fruit which for some reason is not sold: do we throw it away? No, we can make use of this, too, for some varieties can be dried and other converted into squashes, jams and jellies. It is, however, a good thing not to concentrate solely on growing quickly perishable commodities and to include onions, garlic and potatoes in the general crop scheme. Potatoes can grow well in the sandy beds of streams, where sub-soil water is found close to the surface even during the dry winter months.

9. FARM MANAGEMENT

One does not have to look very far to notice the difference between good management and bad. One housewife can, by careful management, make far more use of a sum of money than another housewife who is careless. In the same way, a farm can be managed so as not only to obtain the highest possible yield but to get the best possible price for the produce.

It is not easy, however, for a farmer to do every job himself—buying all he needs, sowing, tending to his crops, harvesting and then selling the grain. Somewhere he must call in others to help him, especially in selling his produce in the market; but if he does this he stands to lose part of his profits. How much better would it not be if all the farmers of the village got together and worked jointly on all their fields, treating them as one big farm! By doing this, and by arranging to buy what they wanted and to sell

their grain through co-operatives, they could get the full benefits of large-scale production and at the same time lose no money to middlemen.

This is what we call co-operative farming. Already in Bombay and in other States co-operative farming has been making progress. But in other places farmers have not yet been able to see how this system will benefit them. We have no wish to force them to accept it, so it may take some time before we have co-operative farms all over the country. Meanwhile, we have other plans to show the value of good management.

Remember, we have said before that the Indian farmer is a conservative person. Any new thing must not only be explained carefully to him but he has to be shown that it is good. Here again we fall back on our familiar "demonstration method". In this case, what we do is to select one farm to serve as a "model farm". The cultivator chosen must of course be an intelligent man and willing to co-operate. The best way to find such a man is by asking the village panchayat to suggest someone. When the farm has been chosen, a careful crop scheme covering a period of two to three years is prepared for it. The crops are given all possible care. Improved seed, manure and fertilisers and the most suitable methods of cultivation are all provided. Records are kept of the yield of each crop and of the money spent on various items. No middleman is allowed to come into the picture to steal part of the profits. When the gain is calculated, it becomes plain to all the farmers round about what better farming practices and careful management can bring to them.

As we have model farms so we also have "model villages" where by community effort and self-help conditions are so improved that the model village becomes an example to the other villages in the area. Model villages should really not be discussed in a pamphlet on farming, as attention is also paid there to things like public health, education, cottage industries, road-building, etc., but they

do show the importance of good management and that is why they have been mentioned.

A little way back we talked about co-operative farming, and agreed that we could not spread it all over the country just now. But we can do the next best thing, and that is to help the growth of co-operative societies. We have seen that two of the small farmer's main problems are how to get supplies of things like seeds and fertilisers and how to get a good price for his produce. We may add a third and very important problem, and that is the problem of obtaining short-term loans to buy his wants. The average farmer is very poor, and if he is to go in for improved seed and all the rest he must be loaned some money in order to make a start.

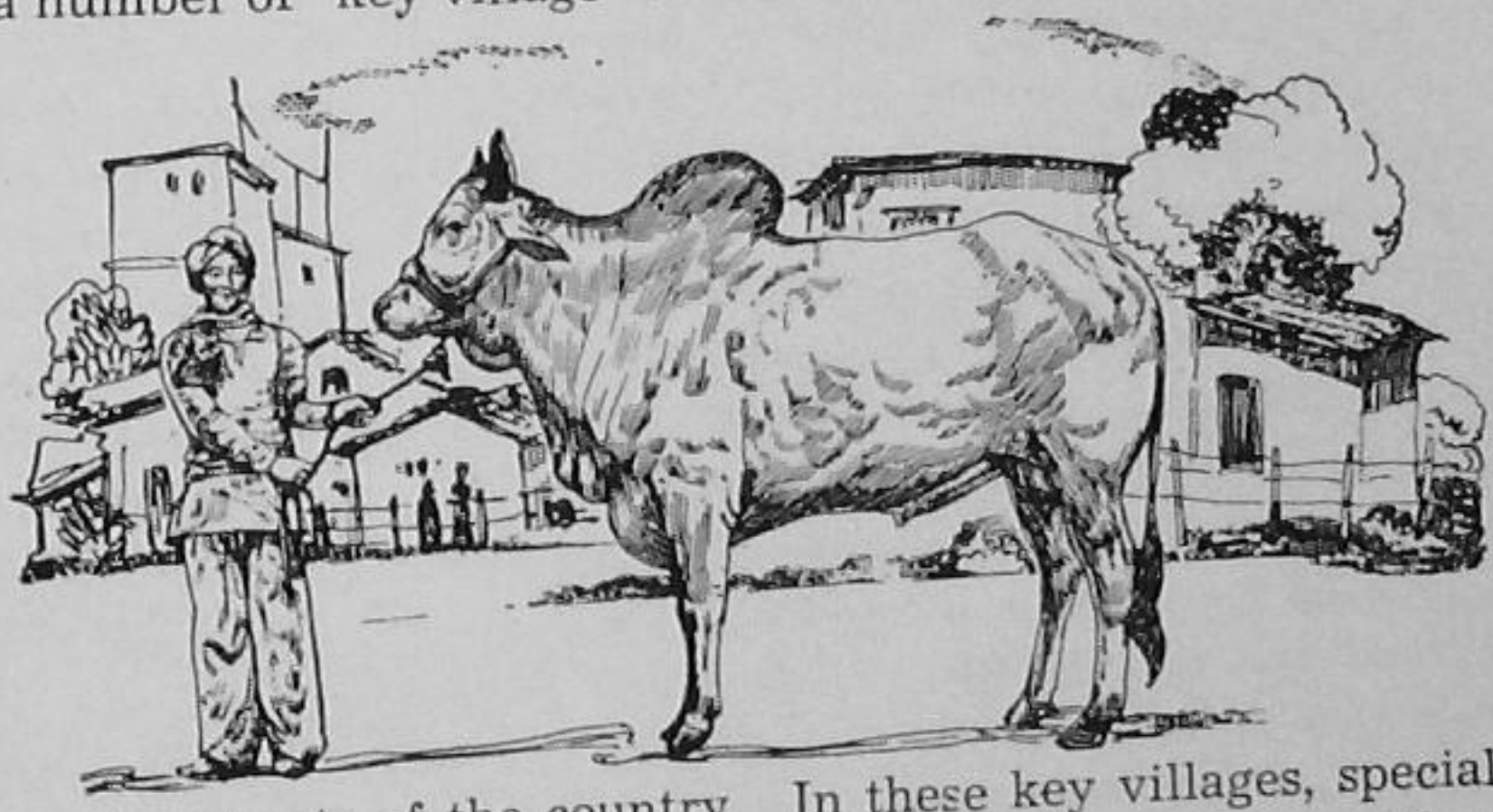
The best way he can be helped is through a multi-purpose co-operative society, which will help him with loans, supply his needs and grade and market his produce at the best possible price. These societies are, therefore, very important. We have many of them in our Projects, but somehow they do not seem to be working very well.

Can't we do something about it? We not only can, but we must. The co-operative movement is too good a thing to be allowed to die for want of attention; for it is just this lack of care that is the cause of the trouble. Every farmer must join a co-operative and take a personal interest in its working. He should make all his purchases and sales through the co-operative. It is to his own advantage, for by giving nothing to a middleman he will spend less on the things he needs and earn more on the produce he has for sale. Each gram sevak should make it his business to see that there is a co-operative working efficiently at his head-quarters.

10. ANIMAL HUSBANDRY

All this time we have been discussing ways in which we can improve our crop production. But the farmer does not depend only on crops for his living. He usually has a few cows and buffaloes as well, or he may keep sheep or goats, poultry or pigs. In some villages bee-keeping is an important cottage industry, and in others fish-breeding (pisciculture, as it is known from the Latin word for fish) has been taken up.

Anything that will add to the farmers' income is important to us. We have to see what we can do to help them. The Central Government have provided money for a number of "key village" schemes for cattle improvement in



various parts of the country. In these key villages, special bulls of pure breed are kept, and all other bulls are either castrated or removed to gosadans. The idea is that if only these special bulls are allowed to mate with the local cows, the breed of the village cattle will improve. In the Projects we are following the same idea of key villages, but we have to think not only of cattle improvement but also of improving poultry and sheep and goats. We also want to introduce bee-keeping and fish farms wherever we can. So you see, the key villages in the Projects have to do a great many things.

Our work does not end with setting up one key village

in every Project. What about the hundreds of other villages? Are we to leave those people to improve their animals the best way they can? That is not our intention. The key village is there to serve as a guide and a model for the others in the Project. It may in time be able to supply animals for breeding, but in the meanwhile we have to find other ways of helping the farmers. One way is by getting pure-bred animals for them from Government farms or from private breeders. In the whole country, however, there are not enough pedigree bulls and rams to meet even the needs of most of our Project areas. We have to think of another way as well; and so we are planning to set up at least one artificial insemination centre in every Development Block. This will help to reduce the shortage. We are also encouraging private breeders by giving them grazing facilities, loans, veterinary aid, land for growing fodder, help in housing cattle and also facilities for selling their animals.

Just as we take care of our plants we must also take care of our livestock. We must protect them from disease and see that they are well fed. Cattle, for instance, have to be vaccinated and inoculated against diseases like rinderpest, septicaemia and black-quarter, which spread very quickly. In all our Projects there are arrangements for veterinary aid. The *gram sevak*, too, is able to treat minor sicknesses.

Usually farmers who own cattle are not very particular about feeding them. They are content to send them out to graze on the village common land or in the jungle. The result is that the animals are thin and half-starved. If we are going to take the trouble of improving the local breeds, obviously we cannot allow the cattle to starve. We must take steps to increase the production of fodder and to convert surplus green fodder into hay. We must also improve the village pasture lands by sowing better quality grasses. We all know that human beings need a balanced diet . So do animals, although they do not eat the things we eat. Grass and other fodder gives them most of what

they need, but not everything. That is why the milk given by the average village cow is poor both in quality and quantity. We can, however, get the same cow to give more and richer milk by adding oil-cake to its diet.

Then there is the question of housing. Cattle sheds are usually stinking, miserable places where the animals have little protection from the sun in summer, the rain during the monsoon and the cold in winter. They must have sheds that have good roofs and are properly enclosed. Stone-lined or *muram* floors are the best as they can easily be kept clean. And we must not forget the drains to carry away urine for use as manure. It's so easy to overlook these little things!

There is no need to say much about the care of sheep and goats. They are hardier than cattle, and easier to feed and look after. Poultry, however, are in a different class altogether. Poultry farming is becoming very popular, especially in areas near the big towns, where there is a good market for fowls and eggs. But fowls need special care against disease. Many a farmer has learnt this to his cost when his entire stock has been wiped out by a sudden epidemic.

The best way of checking fowl diseases is by keeping the birds' living quarters as clean as possible. A good idea is to put wire netting round the place. The birds then cannot stray and pick up disease. If there is an epidemic in a nearby area, mass inoculation prevents the disease from spreading.

At present, almost all the fowls in the rural areas are *desi* birds. These birds are small in size and their eggs too are small. A hen of a better breed, such as a Leghorn, will not only produce much larger eggs but will lay many more times in the year than a desi bird. So you see why we should bring in improved breeds. It means bigger eggs and more eggs to sell! But how are we to supply everyone with better birds when there are not enough of them to go round? It is true that we cannot supply every farmer just now, but we are making a start in some selected villages. These villages are serving as breeding centres, and as chicks of good breed are hatched they are made available to other villages in the Project. In some places incubators are being used. These are instruments which do the work of a clucking hen in hatching eggs.

What of the villages which even this way will be left out? Well, the only thing we can do is to try to supply a few cocks of good breed to each village. If these cocks are mated with the *desi* hens, the village won't get pure-bred birds but the stock will be better than before.

Poultry farming can be a very paying business. It does not require much hard work, and even children can take it up. It is a good idea, in fact, to organise children's poultry clubs and to have bird competitions.

Another occupation which can bring a useful income is bee-keeping. In Travancore-Cochin, Coorg and the hilly parts of Punjab, Uttar Pradesh and Kashmir it has become an important cottage industry. Some of our Projects now have facilities for training farmers who would like to keep bees. Usually it is best to take up this business on a co-operative basis, as individual farmers are not likely to be able to afford artificial hives and other equipment. It is also

easier for a co-operative society to do the work of bottling and selling the honey.

Similarly, in suitable areas—Mysore, Kashmir and Assam are examples—steps are being taken to encourage silk-worm rearing, or sericulture as we call it. Besides training facilities, eggs are supplied as well as other equipment. The cultivation of mulberry and castor plants is also being extended, as the leaves of these plants provide food for the silkworms.

Finally, we must mention our fisheries. Sea-fishing is a big industry, but we are not concerned with that. What we are concerned with is stocking the ponds and tanks in our villages with good food. Fish contains a lot of the food substance called protein, besides other valuable things like phosphorus and iodine. Doctors say that we Indians as a general rule do not get enough protein to eat. Here is a way in which we can make up for it!

And mind you, fish breed very fast. If you stock a tank today with fingerlings, in a year's time there will be enough fish for the whole village, besides leaving a good supply for sale is the nearest town. It is one of the easiest ways of adding to the farmers' income.

11. PEOPLE'S CO-OPERATION

You must have often heard people saying that co-operation is the basis of the Five Year Plan. Do you know what this means? It means that there can be no progress in any branch of activity in the Plan if the people do not co-operate and come forward to help.

How is the people's help to be obtained? The only way in which we can get their full support is by making them understand that it is their own Plan, something which is very personal to them and from which they will benefit directly.

In our Projects, for instance, we draw up our programmes with the help of Project Advisory Committees, the Panchayats and village councils. This way the people feel that the programmes are their own, and so they work all the harder.

We have been discussing how we can improve our agriculture. How can we make sure that we get the farmers' full co-operation? We have seen that they won't accept anything new unless we prove it to be good. They are simple people, and they want to see results with their own eyes before they will believe. So, in drawing up our programmes, we must be careful to take up first those things which will bring results quickly. In this way we can win their confidence and they will be eager to follow whatever else we show them.

There are many voluntary organisations—such as the Bharat Sewak Samaj, Sewa Sadans, Mahilla Sabhas and Gram Udyog Kendras—which are helping us to secure the people's co-operation. And there is much to be done. Mass campaigns have to be carried out for composting rural wastes, removing weeds and inoculating cattle against disease. Then there are irrigation channels and wells to be dug, tanks to be desilted, trees to be planted and many other jobs which the farmer cannot undertake alone.

At the centre of all this activity there is one individual, always busy, at one moment talking to a farmer about improved seed and then rushing off to show another how to use fertiliser in his field. He is there the whole time, trying to get the people to work together for their own betterment. Do you know who this individual is? Can you tell from the description? You are right, he is the *gram sevak*.

If an official comes to tell the villagers something they are indifferent. They say that how can he, a stranger who does not live like them, understand their problems. With the *gram sevak* it is different. He is the friend and guide of the village people, and so they listen to him and work with him. Through him the co-operation of the people is secured.

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