

Some of the Limiting Factors in the Improvement of Paddy Cultivation in Ceylon.

L. LORD, M.A.,

Economic Botanist, Department of Agriculture.

IT would have been more cumbersome, but more precise, to have added to the title of this paper "and an account of some of the factors which hinder paddy cultivation in Ceylon from being more profitable to the cultivator" but I am sure you will agree that methods of increasing the net returns of the cultivator form an essential part of the improvement of paddy cultivation.

Many people view with concern the fact that Ceylon produces annually about 13 million bushels of paddy whereas it imports, either in the form of paddy or rice over 31 million bushels, or more than twice the production. While the use of better seed and methods of cultivation, etc., will appreciably raise the production it is being too optimistic to hope that their use on the existing cultivable paddy land will result in a production of paddy equal to the consumption. More land will have to be rendered

cultivable (by means, e.g., of new, large irrigation schemes or by the improvement of minor schemes) to effect this, but I have not seen estimates of what is possible by these means.

This paper deals with factors which limit the economic improvement of cultivation on existing paddy land. I have added the word 'economic' here because it is, of course, possible to obtain by heavy dressings of manure, outturns which will not cover expenses, and it is possible also to increase outturns by an intensive system of cultivation which may lower the standard of living. And that is why, I think, we must consider in discussing possible improvements, first and always, the cultivator himself.

Last year it was my privilege to describe to this Conference some of the ways in which paddy cultivation could be improved. This year I wish to draw attention to the factors which either hinder or prevent such improvement.

Improvements and limiting factors may conveniently be classed as follows:—

Improvements:

1. Seed and seed supply
2. Cultural methods
3. Increase in size of holdings

Limiting Factors:

1. Pests and diseases
2. Credit facilities
3. Marketing
4. Climate and labour
5. Restricted area of cultivable paddy land
6. Conditions of tenancy

It is neither desirable nor possible to confine discussion of the above improvements and limiting factors to the, perhaps arbitrary, classes which have been specified. For each class of improvement there is no one single limiting factor, there is a combination of limiting factors of varying degrees of importance and the same factor may limit the adoption of two or three improvements. In dealing with the size of holdings it is convenient to include the restricted area of paddy land available instead of discussing this limiting factor separately.

Seed and seed supply.—The improvement of paddy cultivation by the use of selected seed is well known. From the cultivators' point of view it is a simple method as it entails no extra work and generally little or no extra expense. The factors which limit the improvement by this means are the impossibility so far as pure-line selection is concerned of selecting out of a mixed population anything better than the best strain already there, and

the difficulty of conducting yield trials accurately enough to discover the best strain. In course of time hybridisation may open the way to obtaining higher yielding strains still but at present increases of yield by the use of selected seed of more than 20% cannot be expected. It must be remembered too that when an equilibrium is established between the plant food naturally rendered available for each crop, and the plant food utilised by the crop more cannot be taken out of the land without suitable manuring. The factors which limit the supply of seed—finance, staff and organization—are to a certain extent controllable and it is not intended to deal with these here.

Cultural Methods.—The more obvious improvements in cultural methods are better preliminary cultivation, thorough weeding, the substitution of transplanting for broadcasting and, lastly, manuring. Better preliminary cultivation can be obtained by the use of ploughs and harrows which entail the use of cattle. To obtain implements and cattle money is necessary and the limiting factors are chiefly the difficulty of obtaining credit or of obtaining it on reasonable terms, and partly, in some places, the difficulty of obtaining fodder for the cattle.

Weeding has been shown to increase yields appreciably. A 36% increase has been obtained at Anuradhapura. A conservative estimate of the increase to be obtained generally is from 20-25%. The cost of weeding will vary with the amount of household labour used but if paid for in cash it should be less than Rs. 12 per acre. The increase of yield should not be less than from five to six bushels which @ Rs. 2.50 per bushel amounts to Rs. 12.50 to Rs. 15.00 per acre.

If therefore, the cultivator received for his own use all the increase, weeding is profitable and may be very profitable but where, as so often happens in Ceylon, a cultivator is a tenant on half shares, half the increase goes to the landlord (who has done nothing to merit the increased return) and the cultivator cannot be blamed for preferring to spend his time working on estates, roads, etc., where he obtains the full value of his labour. The conditions of land tenancy prevailing in many parts of Ceylon constitute the chief factor in limiting improvement by this method.

There is no doubt that transplanting increases the yield of paddy. At Anuradhapura, with six month paddies, transplanting has resulted in a 30% increase. The experiment has been fully described in the *Tropical Agriculturist* for July, 1927. The value of the increase will under ordinary circumstances more than cover the extra cost of transplanting. Normally the increased return should be more than double the cost.

Two factors limit the adoption of transplanting, first, uncertainty of water at transplanting time and secondly under a share system of tenancy the fact that half of the increase would go into the pockets of the landlord. Where paddy depends for its water supply on direct rainfall it may be dangerous not to take the opportunity during the earlier rains of broadcasting the fields.

We have in Ceylon at present little scientific evidence as to the value of the increased returns given by the application of manures but most cultivators realise the value of cattle dung, green leaves and steamed bone meal. Experiments have been started to collect reliable data, but there will be little incentive for the cultivator on half shares to buy and apply manures when half the increase of yield due to their use goes to the landlord.

So far as the adoption of improved methods is concerned it will be seen that the limiting factors are chiefly tenancy conditions and the difficulty of obtaining cheap credit and partly, in certain districts, the uncertainty of the water supply. A limiting factor which I think can be removed in course of time is the conservatism of the cultivator himself.

Size of Holdings.—Statistics of the size of paddy holdings worked by a single occupier in the different parts of Ceylon have not been obtainable but there is no doubt that the average holding is exceedingly small. The following are rough estimates:—Peradeniya and neighbourhood 1-2 acres, Jaffna 1-1½ acres, Batticaloa 25 acres worked by four occupiers co-operatively, Tissamaharama 3-4 acres, Weligama 1½-2½ acres, Anuradhapura 3 acres. It is doubtful if the average paddy holding in Ceylon worked by an occupier is much more than from 2-3 acres. The size compares, perhaps, favourably with holdings in Japan. Keatinge* talks of the "2-acre holding of the Japanese peasant who wields his hoe from morning to night and treats each plant in his field to a separate dose of liquid manure" but who, according to Darling† "keep themselves afloat by the rearing of silk worms." I think this picture of Japanese cultivators implies a standard of living lower than what we hope for in Ceylon.

If we turn to Burma we find conditions very different. In Lower Burma the average holding worked by a single occupier varies from 20-40 acres. In Upper Burma I believe it is about 7 acres.

A 2-3 acre holding cultivated under Ceylon conditions is not an economic holding but so long as the Ceylonese holds as he does the view that cultivating paddy land—even as a tenant—is a higher form of work than cooly work, that it gives a certain

* Keatinge, G. *Agricultural Progress in Western India.*

† Darling, M.L. *The Punjab Peasant in Prosperity and Debt.*

amount of social prestige, so long will these conditions remain. The demand for paddy holdings in certain districts is so great that landlords are offered a monetary inducement over and above the ordinary terms of tenancy to favour a particular applicant. In the Ratnapura district the landlord himself levies a *madaran** or tax, which varies according to the fertility of the fields, besides taking his half share. There is, of course, in Ceylon, land still available for paddy cultivation and it may be possible by the provision of new irrigation schemes or the repair of old ones to bring more land under cultivation. Where paddy land is available at present, e.g., in the Northern Province, factors such as the prevalence of malaria and the lack of cheap capital retard its being taken into cultivation.

Pests and Diseases.—The paddy crop suffers from numerous pests and diseases which assist in reducing outturns. The following may be mentioned—birds, paddy flies, stem-borers, the fungus disease *Sclerotium oryzae*, land crabs and ravages of cattle and wild animals; and attack on stored paddy by moth and weevil. The provision of adequate fencing will lessen or prevent damage by wild animals; the damage, which is not very serious, by land crabs, can be prevented by trapping the crabs; and control measures against certain of the insect pests are possible.

Credit Facilities.—These have already been mentioned and it is only necessary to add that the spread of the co-operative movement offers great hope of ameliorating the present conditions of credit.

Marketing.—At the present time, so far as Ceylon is concerned the marketing problem is a minor one. With an increase in production it may assume great importance at which time co-operation will have another problem to tackle.

Climate and Labour.—Climate is used here in its widest meaning. As a limiting factor it acts in two ways, on the one hand it affects the area of the crop sown owing to good or poor rains (and the incidence of the rainfall may prevent the adoption of transplanting), and on the other it affects the condition of the cultivator himself. So far as rainfall is concerned we all know how disastrous the last season has been in the Northern and North-Central Provinces.

In certain districts the climate lowers the efficiency of the cultivator. Calvert† speaking of the Punjab says “In this country people will accept a low standard of living with small exertions rather than strive after a higher standard by greater

* See Madanayake, A.—Conditions of tenancy in paddy cultivation in Ratnapura District.—*Trop. Agric.* LXVIII. 3., 1927., pp. 154-155.

† Calvert, H.—Wealth and Welfare of the Punjab.

exertions." This criticism might be applied to certain paddy cultivators in Ceylon, but where it is applicable I believe the energy of the cultivator has been sapped by repeated attacks of malaria.

In some districts there is apparently a shortage of labour for such operations as weeding and transplanting, but where the women of the villages are trained to do this work as they are, for example, in Burma, and in parts of the Central Province in Ceylon, there should be no real difficulty.

Conditions of Tenancy.—There are two essentially distinct forms of tenancy in Ceylon, the fixed rent and the share system. The share system predominates, and the landlord's share of the net produce (the produce remaining after deductions for seed paddy, irrigation tax, fee to *Vel Vidane*, threshing charges, etc., have been made from the gross outturn) varies from a quarter (in newly opened areas) to two-thirds. Generally the landlord's share is one-half. Fixed rents are found in Jaffna and Batticaloa. In Jaffna the tenant pays in kind, 1 bushel per *lacham* or 24 bushels per acre, (which is almost double the rent in Lower Burma). In Batticaloa four tenants co-operatively cultivate 25 acres and reserve the produce of $2\frac{1}{2}$ acres out of the 25 for the landlord. They also do certain other work for the landlord. Though there are apparently fixed rents prevailing at Tissamaharama it is only the chief tenant who pays them (Rs. 5.00 to Rs. 6.00 per acre). The sub-tenant who does the work rents on half shares, and I am told that only cultivators who will borrow seed paddy and rice for consumption from the chief tenant (at an appropriate rate of interest) are given the opportunity of sub-renting the land. The share system is not confined entirely to the landlord. To a lesser extent certain cultivation charges are paid for by shares of the gross outturn, e.g., irrigation tax ($1/10$), threshing ($1/16$ to $1/20$), *Vel Vidane* ($1/48$). The amount of the share charged for the above varies and the figures are given only as examples. It will be seen that where tenants cultivate on the share system they have very little incentive to produce larger outturns if any expenditure of money or labour is necessary because even half the increased yield is not secured to them. Why, for example, weed, when the six bushels increased yield (which is sufficient to show a profit) is cut down to three bushels (which is insufficient)?

It may be held that the share system of tenancy has the advantage that in a poor season, involving a partial or total failure of the crop the tenant has no burden of a fixed rent to bear. That is true, but in the event of a total failure involving a whole district it is always possible to follow the system which prevails in Jaffna. There, when there is a widespread total failure, no rents are charged.

In the brief space of time which has been allotted for this address it has been impossible to do more than indicate some of the limiting factors in the improvement of paddy cultivation, and any suggestions that have been made for eliminating these factors are even more faintly outlined. So far as tenancy conditions are concerned I hope the discussion, which, according to the programme, is to follow this paper, will bring to light practical methods of ameliorating these conditions. Fixed rents, security of tenure and compensation for tenants' improvements are possible lines of development.

Discussion.

HIS EXCELLENCY THE GOVERNOR.—We have just listened to a very interesting paper which raises a question of great importance and great significance to the whole of the paddy growing industry. We should be very much interested to hear either landlords or cultivators, if they are present here.

THE HON. MR. W. A. DE SILVA said that having written a great deal about paddy cultivation, he had thought he would put into practice what he had written and started growing paddy at Anuradhapura. Mr. Lord's paper was very interesting to them because he brought to bear on it his experience of another country where paddy cultivation was carried on on a large scale. He (Mr. Lord) was fresh to Ceylon and therefore, he could view things without prejudice. He was glad to find that Mr. Lord had not emphasised his own part or put forward proposals to revolutionise paddy cultivation for the people expected of the Department of Agriculture when a few hints were given that the yield would be increased by a hundred per cent. That expectation they should take care not to emphasise because they would never be able to get the real meaning of work done by the Department of Agriculture. They in Ceylon were fortunate in that they had a variety of soil and climate and it should be emphasized that the Island would be eminently suitable for a Central Research Station in regard to tropical agriculture. In regard to paddy, the same kind of paddy varied when planted in different places. Paddy that took 6 months to bear in the Kurunegala District when planted in the Anuradhapura District took 5 months to bear, etc. Those variations showed that in the various parts of the Island there were certain conditions in regard to soil and climate and other aspects which made the Island suitable as a centre for research in tropical agriculture. He hoped the Director of Agriculture would press that point as much as possible when the Central Agricultural Research Station was going to be established in connection with tropical products.

With regard to the paper itself, he said that it had to be borne in mind that in paddy cultivation, unlike in tea and rubber, it could only be carried on during a part of the year necessitating the cultivation of other land during the rest of the time. Old books showed that whenever there was paddy land there was a certain extent of high land attached to it. There was a dispute as to the exact area of high land. It was absolutely necessary in order to make paddy cultivation an economic proposition that the cultivator should have high land too.

Then in regard to the relations between landlord and tenant, Mr. De Silva said that in his experience so long as the landlord treated his tenant liberally he himself stood to benefit. A system he had found of very great value was where the tenancy was on half shares to see that the cultivator received half the gross produce and not half the nett produce. There should be no deduction for draught animals, manure or seed paddy which should all be supplied

by the landlord. He started work eight or 9 years ago and had a lot of statistics and he would submit the paper some day to the Director of Agriculture. With regard to the cultivators in the North-Central Province, a man or family worked on paddy for only six months. Work had to be found for the rest of the year. From actual figures he found that the cultivator obtained 120 bushels of paddy a year which might be put at Rs. 2·00 a bushel. If things could be arranged that way paddy cultivation need not be called unprofitable. As regards the conservatism of the cultivator, so far as his knowledge went, Mr. De Silva said, he considered conservatism a great asset because scientifically they had not found the causes for certain things and if they adopted measures which had been successful in other countries they were bound to make mistakes. As regards manuring, a mistake may be made because there must be something peculiar in the semi-liquid state of the earth which made the paddy plant thrive in it rather than in dry earth. In olden times there was not only "mud paddy" to translate the Sinhalese term literally but there was extensive cultivation of "elvi" or dry paddy. Then mud paddy was looked upon as second class and dry paddy was preferred.

Continuing Mr. De Silva stated that he could show that dry land cultivation in some parts of the North-Central Province was more profitable than the cultivation of irrigable land. The chena system had got itself established on account of a vicious principle of the desire for land on the part of the peasant, the official and the landlord. Instead of giving chenas with reluctance at the last moment if the cultivator was given a certain acreage and told that was his dry land, the man would be able to make a good living out of the land. Investigation and research should be carried out and care should be taken not to consider the paddy cultivator too conservative. He should be helped on his own lines by the supply of selected seed because it was a difficult thing for the cultivator to get good seed.

MR. J. C. RATWATTE said that admittedly from a business standpoint, paddy cultivation was not paying and in order to make it so, the capitalist had to be attracted, for then machinery would come in and cultivation would be made cheaper. He thought the only thing to be done was to attract the capitalist and raise the tax on imported rice. From Mr. Lord's paper, it looked that the paddy land-owner must run his paddy land as a charitable institution. He must get a return for his investment. In theory the landlord seemed to get half the share but in practice the landlord—the absentee landlord—got one-third. It varied with the established customs which cultivators observed very rigidly. If paddy could be sold at Rs. 3·00 a bushel the industry could be self-supporting. Another important point was that seed stores should be established in every village and town. If pure-line paddy was used for seed and those who opened land encouraged its use, half the difficulty would be solved. Although the villager was conservative he knew his job, and would adopt improvements when they were demonstrated to him.

MR. GEO. E. DE SILVA asked what percentage of profit a paddy cultivator could get per acre.

MR. LORD said that it was almost impossible to reckon this as it depended on how much labour a cultivator received in co-operation for which he did not pay.

MR. GEO. E. DE SILVA said that it was almost impossible for cultivators to make a profit while paying as much as 12 per cent. interest on money lent by Co-operative Societies. He suggested that the interest should not be so high as that.

MR. A. GODAMUNE thought that the subject was so vital that several days would be necessary to discuss it. Having listened to Mr. Lord's paper, it struck him that they were working high above the heads of the people directly concerned in it. No doubt, theoretically and scientifically if the proposals

put forward were given effect to they would bring some relief but he felt that they were so far away from the villager, so technical and so much above the average practical man that they should devote more time for the study of the subject from the point of view of the villager and so get at the heart of the problem.

Then with regard to the question of tenancy, he (the speaker) thought that Mr. Lord had not had sufficient information on the matter. The terms of tenancy differed in different places. For instance, a tenant in a Nindagama was different from a tenant in a Viharagama and a tenant in a Viharagama was different from a tenant in a Koralagama.

HIS EXCELLENCY THE GOVERNOR said that he had listened to the discussion with interest and he felt with Mr. Godamune that the subject was of such importance that they could not come to a proper conclusion in the course of a discussion of an hour or an hour and a half. It had occurred to him that they might perhaps at that Conference appoint a Committee of the Conference to investigate the whole question of paddy growing and report their conclusions at the next Conference. It was the usual procedure in this country not to appoint informal Committees but rather to adopt the more formal procedure of Commissions. If such a procedure was adopted he would have no objection at all, but a body such as that Conference of people really interested in farming and acquainted with it from the practical as well as from the scientific aspects by investigating the various aspects touched upon might succeed in preparing a valuable report which would be a guidance not only to future conferences but also to the Government.

In reply to Mudaliyar Harry Jayawardene, Mr. Lord said that what he wished to emphasize was whether it would not be preferable to have a fixed rent. In the share system, however much the cultivator may improve the yield, be it by transplanting, weeding or the application of manure, he did not receive the full benefit of such work. If on the other hand, it was a case of fixed rent as in Jaffna, everything a cultivator did towards improvement went into his own pocket and it acted as an incentive towards improvement.

MR. STOCKDALE suggested that perhaps it would be useful at that stage to adopt the suggestion of His Excellency and consider whether they should bring forward a resolution the following day recommending the appointment of a Committee to go into the matter.

Commenting on Mr. Lord's paper, he (the speaker) said that such differences prevailed in the different Provinces and in different parts of the same Province and such customs had grown up through generations of relationship between landlord and tenant, that there was no doubt that the paddy industry was at present in such a position that the whole system required to be reviewed from the point of view of the cultivator. That was what Mr. Lord emphasized in his paper. He had put forward the position of the cultivators and had intimated some of the difficulties that had to be faced.

HIS EXCELLENCY THE GOVERNOR then thanked Mr. Lord for his very interesting paper. He also referred to the keen interest which Mr. Stockdale had taken in regard to the improvement of paddy cultivation.

MR. H. L. DE MEL was next asked to read his paper entitled "Some Aspects of Food Production."