

Modern Implements in Indian Agriculture.

BY. A. K. SUBRAMANIA AYYAR, L. M. E.

That India is preponderantly an agricultural country is the alpha of India economics. This simple truth has been so much emphasised in all text books and class rooms that it has almost become an article of faith. When it is remembered that till recently the controversy raged over the fitness of India for further agricultural advance her potentialities in that direction may be considered to have a peculiar significance. She has always occupied an important position in the markets of the world. But when at the present day, the economic solidarity of the world's markets is a settled fact, the development of India's agricultural possibilities becomes a matter of the widest international interest. It is vital not only to her own financial position and economic welfare of her people but to the continuance of the general economic structure of the world's supply of food and clothing. Nowhere in the world is the landed proprietor or cultivator noted for his readiness to move on new lines, and the conservatism of the Indian ryot is proverbial. He has been content to run in a groove as old as his ancient land.

None the less the activities of the departments of Agriculture in the various Provinces have been so inadequate to combat this initial difficulty that the benefit of their experiences and researches in spite of the considerable progress achieved so far in themselves have not been made use of by the ryots to the desired extent. It may be true, however, that the activities in Madras are developing to a surprising degree; but this is only very recently.

It cannot be contended that on the whole the departments have worked with much co-ordination among themselves. The diversity of conditions in this vast country has, to some extent, rendered this co-ordination difficult. It is obvious that in a field like agriculture the general lines of departmental efforts and enterprise should be chalked out by a combination of the Agricultural Department and an independent body of experienced farmers.

It is admitted on all hands that sufficient attention has not been paid to the science of Agricultural Engineering by the various Agricultural Departments in India in view of the great potentialities which India offers to the development of Agricultural Engineering. It may be worth while to quote here the reference to this subject by the Royal Commission on Agriculture.

“Agricultural Engineering has been regarded merely a secondary sphere of departmental activity”

In Madras alone, the extent of cultivable waste land is estimated at 12.5 million acres. A careful scrutiny of the figures reveals that it should be possible to convert at least 6.5 million acres into cultivable lands. But very little of the available dry land has been attempted to be brought under cultivation. It is therefore clear that a large area of dry lands in India still lies waste awaiting the advent of Agricultural Engineering Science *in the agricultural methods of this ancient country*. Reclamation of waste land is possible only with the bigger capitalists as they alone can acquire large areas and cultivate them according to the most up-to-date methods of farming. It is too well known that Indian Capital fights shy of investment in agricultural development and unless the possibilities are demonstrated in a particularly convincing manner, no appreciable advance can be made in that direction. The brunt of the whole work of demonstration will undoubtedly fall on the neglected child, the Agricultural Engineering Section. It is this section that has to show the cheapest method of reclaiming cultivable waste lands, of tilling the soil, irrigating the lands from canals, rivers, tanks, wells and of harvesting, and converting the raw product into finished products for the market in the most efficient manner. Grant of waste lands in some districts of this presidency for cultivation purposes has not produced the desired results, for the conditions of the grant are far too rigid and the ryots are not prepared to risk their capital for fear that when, at the end of 30 years, they are just in a position to gather their harvest, a good portion of it may be snatched away as tax with the result that all labour and capital spent on such lands is not properly compensated.

Agricultural operations would appear to fall under four broad headings:—
 Tillage or the preparation of the soil,
 Irrigation or the supply of water,
 Seed sowing and cultivation and lastly
 Harvest or the gathering of the fruits.

All these operations are being carried on in a crude and primitive way. Each of these has problems peculiar to itself and it is difficult to tell which of the four offers the most difficult of solution. Major portion of these operations demands the attention of the agricultural engineer for efficient execution in addition to reclamation of cultivable waste lands.

Reclamation of waste lands:—This operation requires considerable labour and an initial outlay of capital. Experience in other countries and in some parts of India shows that, with the help of a suitable tractor and the necessary implements, any uneven land can be cut down to the desired depth and levelled for cultivation purposes, in a more economical manner than by manual and cattle labour. By the term "suitable tractor," I mean not the low horse power motor tractors started on petrol and run on high class kerosine, but high power tractors started and run on crude oil (Diesel principle). With the experience I have in the use of different kinds of tractors, I consider that the chief factors governing the utility of tractors in Indian agriculture are:

1. The power of the tractors and
2. The cost of the fuel consumed.

Hitherto low power tractors consuming high quality fuel were used most commonly both by the department and the ryots and the results were obviously disappointing. So far as the durability of a tractor is concerned, the less powerful a tractor the more frequent and greater are the breakages of parts due to excessive stresses offered while working. It will be clear from the above that the cry that motor tractors are uneconomical for the reasons,

(1) Their life is short and

(2) They are expensive to work on Indian soil, is quite justifiable. If those interested in this sphere of operation, be they Agricultural Departments or enthusiastic ryots, only conduct experiments with suitable types of tractors and implements, they would realise the enormous advantages in the use of tractor power over cattle and manual labour for which there is greater demand.

Tillage.—Timeliness is the governing factor in this operation, as is the case in nearly all farm operations. As every farmer is aware, there is only one best time for each item of work on a farm. If the right time is missed, the interest of the farmer is bound to suffer. Only through use of a suitable set of tillage implements can the farmer control the right time of most important operations. The use of improved implements in tillage not only saves time but also achieves better results. In some quarters

the country plough is largely in favour with the ryot because he is accustomed to handle it and it does not necessitate a secondary operation by the cultivator or other such implement. The country plough which cuts a triangular furrow at best does half the work of a mould board plough which cuts a rectangular furrow the effort being the same in both cases. The practical aspect of it is that the mould board plough does not leave a ridge between any two adjacent furrows. Thus the work is complete in one operation. Some land owners rely on their coolies for opinion and they are intent on prolonging the operation and getting more wages and avoiding the initial trouble of getting used to the new implement. In the Central Farm, Coimbatore crops grown on soils tilled by the iron plough have withstood drought better.

The essential purposes of ploughing namely the turning of the furrow slices and the breaking of clods are not served by the country plough.

The saving in time and consequently expenditure in ploughing a given piece of land besides durability of the plough is far more compensating than the extra initial outlay in the purchase of an iron plough. The dislocation of work arising out of the necessity to mend the country plough waiting for the services of the village carpenter and blacksmith is avoided if one chooses to use the iron plough. It is however desirable that agricultural engineers turn their attention towards improving the designs in ploughs in such a manner that the present price is brought down. A reduction or even wholesale abolition of duty on agricultural implements may also be necessary.

It is regrettable that the indiscriminate adoption of iron ploughs in the market without due consideration to the draught capacity of the bullocks available has to a large extent been the cause for retarding progress in the introduction of improved ploughs and this will be seen from the statistics that only 17,000 improved ploughs were introduced in India in 1925-26 while 25 millions were needed for work. The remarks of the Royal Commission on Agriculture on this subject are apt and run as follows:—

“Work on implements has been completely overshadowed with that connected with pumping and boring operations and water lifts. There are difficulties of finance. We think an important obstacle is that a natural disinclination which the ryot has to being regarded as eccentric because he has bought a novel implement. The remedy for this is intensive propaganda.” ...

From this remark, it should not be understood that the Royal Commission consider that sufficient advance has been made in the progress of lift irrigation; but only that, a proportionate advance has not been made in the introduction of improved implements. It appears that the reason for considerable progress in pumping, boring and lift irrigation has been sought for in the fact that these were looked after for a long time by a separate department namely the Department of Industries. Had these been placed under the Department of Agriculture, judging from the amount of attention paid so far to Agricultural Engineering Science even the little progress in these could not have been achieved.

Irrigation:—Historically however agricultural problems in India have always centred round irrigation. So long as there was no necessity to bring even the poorer lands into cultivation, owing on the one hand to the comparatively moderate demand for food stuffs and, on the other, to the presence of large areas of land of high fertility, the subject for earlier people has been.

(i) To secure a plentiful and well regulated supply of water. Water there was—plenty of it in the rivers or in lakes, and tanks, or reservoirs. Once a large anicut is built and the adjacent country is equipped with a net work of canals the larger problems of irrigation are solved and the responsibility for the development of agriculture passes into the hands of individuals. So long as the larger schemes of irrigation are handled and solved by the state the individual farmer of wet lands has no serious problem to face. But on dry land and on certain classes of wet land safely depending on rainfall the farmer is at a great disadvantage. His lot is anything but enviable. He it is that has to face this problem in all its aspects. He has to look far up into the sky and bore down far deep into the earth even for a pailful of water. And in the agriculture of India he has an important place as many a raw material for the manufacture of products for the modern world is provided chiefly from the dry lands.

If the peasantry of India can be taught to sink large wells on improved methods and principles which would ensure large and unfailing supplies of water and to work modern lifts for raising water from wells, rivers, and canals there is no doubt that the Indian would find in the improvement of dry lands and rain fed wet lands a new and fruitful field for investment.

It is extremely regrettable that modern science has not so far been successful in giving a lead in the matter of "reconnoitering" the ground for well sinking. In the experience of landlords, boring has not always been a successful means of opening out subterranean springs. At any rate, there is no need to labour the point that neither science nor intuition has served to mitigate the effects of speculation in well sinking. But this defect has been more than made up by the ardour of the agriculturist as none who has discerned the possibilities of a particular plot of land has been known to throw up his hands in despair over this one point namely "well sinking." He is always imbued with a sporting spirit and launches forth on the scheme with all the enthusiasm of an idealist. The determination to see it to the finish always keeps pace with the increase of difficulties to be surmounted.

The diversity of conditions with regard to sources of water supply in India, is such that it is impossible to introduce a common type of water lift. There are some wells which are suitable only for the picottah lift and some for mhots and others for power pumping plants. But most of the perennial rivers are suitable for power pumping plants. It is well established from practical results obtained from the use of power pumping plants during the past 15 years that if the source of water supply could permit at least 3 mhots of 40 gallons capacity working at the rate of 50 to 60 lifts, per hour it is economical to replace the mhots by power pumping plants. Therefore for wells capable of supplying over 120 gallons of water per minute for 10 hours work every day and for perennial rivers supplying large quantity of water there can be no lift better suited than power pumping plant for effecting economy in lift irrigation.

Although a regular survey has not been made of the area of land that could be irrigated by means of power pumping plants from rivers or canals passing through such areas one could easily notice that there should be vast scope for the development of lift irrigation by power. The 'Bharatha' river in South Malabar for instance is one that carries a very large quantity of water at a level of say 20 feet below the field level.

The ryots owning unquestionably fertile lands on either side of this river are raising only one crop a year which is fed by rain during the South West monsoon.

The failure of even this crop owing to want of adequate and timely rainfall is also not uncommon. Here is a typical instance of a fertile soil on which two crops could surely and easily be raised in a year with the aid of a power lift. I give below an example showing expenditure; quantity of water raised, and area commanded and this could be compared with the relative cost of other kinds of lifts and the extra yield obtained through lift irrigation by power :—

TAKING :—

Area to be commanded as 20 acres.

Kind of crop —Paddy.

Interval between irrigation—1 day.

Lift through which water has to be raised 20 feet.

The required no of irrigations for the 1st crop—5.

Do. for the 2nd crop—30.

A plant consisting of 8 B. H. P. crude oil engine and 5 inches centrifugal pump which will irrigate 10 acres in a day of 8 hours work to a depth of 1 inch is required.

The cost of the above plant complete including construction of engine room and erection charges would be approx Rs. 2000.

Annual running charges, taking 70 working days of 8 hours each in a year will be as follows:—

Interest on Rs. 2,000 at 6 per cent per annum for 1 year	...	120	0	0
Sinking fund annual contribution so that these may accumulate to Rs. 2,000 at the end of 13 years at 8 per cent per annum c. i.	...	130	0	0
Crude oil for 70 days work—560 gallons	...	225	0	0
Lubricating oil for 70 days work—20 gallons...	...	60	0	0
Petty repairs and renewals	...	35	0	0
Driver at Rs. 15 per mensem	...	180	0	0
Total	...	750	0	0

The expenditure of Rs. 750 per year enables the ryot owning 20 acres to raise two crops every year. In this connection it is to be remembered that as the interval between irrigations increases the area that can be commanded by a plant becomes larger; but it may be pointed out that as the lift increases the power required will be greater and consequently the expenditure also.

It is only when all the cultivable waste lands are brought under the plough with the aid of modern implements, good wells are sunk in places wherever needed and power pumping plants are installed in places of adequate and unfailing water supply that India's material wealth will attain a degree of importance comparable with that of other countries.