

Farm Machines and Green Revolution

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The greatest problem which India will have to face during the seventies is the supply of food and provision of employment to our fast-growing population. Calculations show that even in 1981 about 69.51% of our labour population will have to depend on agriculture for employment (table 1). Hence, it would be meaningful to relate the development and release of new farm machines to employment on the one hand and to the conversion of yield breakthroughs into a green revolution on the other.

Table 1

Selected statistics on the work force of India 1951-1981

(Figures in million)

Year	Population	Working force	Agricultural workers	Non-Agri. workers	% of Agri. to total workers
1951	356.88	139.52	97.30	42.22	69.74
1961	439.23	188.78	131.22	57.56	69.51
1971	559.62	240.52	167.19	73.33	69.51
1981	694.90	298.67	207.61	91.06	69.51

Note: Population estimates for 1971 and 1981 are those recommended by the Expert Committee on Population Projections in 1964 for use in the formulation of the Fourth Five Year Plan.

New-Income Possibilities for Small Farmers:

The catalyst of the green revolution is the high yielding variety, which when grown with fertilizer, water and proper plant protection gives a much higher yield than what was considered

possible a few years ago. The development and release of photo-insensitive and quick-yielding varieties have rendered the introduction of multiple and relay cropping possible. We can now make effective use of the sunlight and water resource with which we are blessed by growing green plants throughout the year (Fig. 1). Such techniques have opened up altogether new income possibilities for farmers with small holdings.

A study of the labour employment potential of 2-crop system carried out at the Punjab Agricultural University, Ludhiana, shows that in farms of all sizes the labour need ^{will} rise substantially (Table 2). When 4 crops per year systems become popular, the labour requirement will grow sharply and the prospects for banishing unemployment and underemployment will be bright. At the same time, the wide spread adoption of such cropping patterns will be possible only if efficient implements are available.

Table 2

Impact of improved technology on employment potential of different sized holdings

Peak work periods	<u>Percentage increase or decrease in employment</u>			
	Small farm	Medium Farm	Large Farm	Overall
Mid-March=Mid-April	18.18	48.75	33.60	4.57
Mid-April=End-April	9.80	12.77	56.93	24.04
Mid-October=Mid-November	40.84	14.97	33.06	29.03
Mid-November=Mid-March	37.55	69.97	2.03	30.45

Source : Labour utilization patterns and employment potentials of Punjab : A case study by S.S. Johl and A.S. Kahlon-Indian Journal of Agricultural Economics, Vol.21 (1) : 77-83.

New Technology for Dry Land Farming :

Even in unirrigated areas with an annual rainfall less than 900 mm. the ingredients of a new technology have emerged from recent research. This technology will consist of the following package:

- (a) Land consolidation and soil conservation.
- (b) improvements in tillage leading to better soil structure and root penetration.
- (c) addition of organic matter in the form of plant residues with a view of improving the physical and biological characteristics of the soil.
- (d) adoption of water-harvesting procedures resulting in storing as much as the precipitation as possible for the use of crops.
- (e) addition of plant nutrients through deep placement of fertilizers and foliar feeding.
- (f) improving the biological fixation of nitrogen through the use of efficient strains of rhizobia, particularly those which are tolerant to salt.
- (g) the introduction of photo-insensitive and quick maturing crops which are less affected by drought.
- (h) development of series of single, double and mixed crop rotations from which the farmer can be advised to adopt the one which is most suited to the likely weather pattern during a season (advances in weather forecasting render such planning possible).
- (i) popularization of crops like soyabean, high protein maize, macroni wheat, short duration varieties of castor and cotton and perennial crops like cashewnut, oil palm and dates which can form the base for small scale food industries and export earnings.
- (j) population of grasses like lemon grass, Panicum cenchrum and high protein bajra, and

- (k) genetic upgrading of the nondescript cattle population by an extensive programme of artificial insemination with semen from superior breeds.

Need for Better Farm Machinery :

From the foregoing, it would be obvious that as our agriculture undergoes rapid evolution and gets closely linked up with animal husbandry, the need for labour will increase. Hence, there is no need to apprehend that the development of better farm machinery will have an undesirable effect on employment opportunities. On the contrary, if the green revolution is to be taken to its logical conclusion, it would be absolutely essential to achieve continuous improvement in the efficiency of farming, as measured by the return the farmer gets from his investment on inputs. If the efficiency of farming is not improved, agriculture will be torn between the needs of the consumers for a reasonable price and of the farmers for a remunerative price. Also, the export potentialities which exist for marketing in countries like Japan for substantial quantities of maize and millet, can never be realised unless the prices are competitive.

Key to Better Farming :

In any view, improved farm machinery would hold the key to the improvement of farming efficiency. Proper and timely land preparation, proper depth of sowing, proper placement of fertilizer and good return from the investment on seeds, fertilizer and water. Land levelling is essential for getting the best out of water. Even a bullock-drawn buck scraper would be of great help. A great difference is seen in the density of plant population in wheat fields sown with a seed drill and with a funnel attached to a country plough (Fig.2). At the time of wheat harvest, much

difficulty is being experienced now to reap the crop, thresh it and store the grains before the onset of rains.

Need for Seventies :

In unirrigated areas, good farm machinery such as a good plough capable of breaking the sub-soil crust and bunding equipment are crucial for improving productivity. Improved machinery is also needed for soil conservation as well as for raising crops in saline and alkaline soils. Above all, an improved post-harvest technology is urgently needed to capitalise on the yield breakthrough achieved in the major crops during the seventies.

Farm Mechanization Creates New Opportunities for Employment :

Farming can undergo qualitative improvement only if good implements become available in increasing numbers. Such implements can also help to lower human drudgery. When farming evolves on scientific lines, there will be more off-take of labour from routine farm operations to agro-based industries. It is not often realised that while only about 5% of the population of the United States is engaged in manual operations on the farm, over 50% of the population of that country is involved in industrial and business activity relating to farming. Improvements in agricultural technology therefore bring about only a redistribution in the proportion of people engaged in different kinds of operations and do not lead to unemployment.

A whole range of new farm implements like seed and fertilizer drills, improved ploughs, reapers and threshers have been designed at the Indian Agricultural Research Institute and at different Agricultural Universities and companies. Most of these implements, however, are not readily available since the technological aspects of their mass manufacture have not received adequate attention.

While a new variety developed by a Plant Breeder can be spread quickly without the intervention of technology, the same is not possible with regard to an implement designed in a Laboratory. Industry therefore should take more interest in the farm machinery developed by research workers and convert them into production models. Another very important factor that needs to be borne in mind while introducing new machinery is that both labour and animals will require much better nutrition if they are to be rendered capable of handling better equipment (Fig. 3). Many innovations in the field of agricultural engineering have not proved to be acceptable among farmers because of the poor vigour of bullocks of even the men behind the plough.
