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Break even analysis of Boro Paddy cultivation with special reference to Bagichapur GP of Harirampur Block, Dakshin Dinajpur District, WB

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ABSTRACT

In the present work an initiative has been taken to explore the economic viability of Boro Paddy cultivation i.e., to find out whether cultivation of this crop gains profit or it suffers from loss in Bagichapur GP of Harirampur block of Dakshin Dinajpur district, West Bengal. Observation has been made at three hierarchical levels: Gram Panchayat (GP) level, Village level and Household level (HH). Data have been collected by door-to-door survey at household level using questionnaire/schedule. A sample size of 50 households has been selected at two stages: (i) using simple random sampling with replacement (SRSWR) 6 out of 28 mouzas (revenue village) in the concerned GP were selected and (ii) from each mouza at least 4 and maximum of 10 households have been chosen randomly accumulating a total number of 50 households. Break Even Chart has been used for data analysis purpose. At household level two third of the firms has been identified as profit-making ones and one third is suffering from loss, while only 4% shows negative contribution i.e., they are not viable at all. But at village level or GP level no such scenario of non-viability has been reported. So, there might have some specific issues which needs to be investigated in another observation. At village level though it is technically proved to be profitable the various parameters of profit clearly show that the amount of profit is not sufficient to make a living of the family.

Introduction

There are manifestations of some realities on to the surface – the future generation of agricultural family are no longer interested to become a farmer. This is one scenario while the other one is that people mostly from agricultural family are leaving their farmlands and rushing every year towards large cities of the country in search of alternative jobs, particularly job of unskilled labor. Now a question might have generated in the mind of reader: WHY? In experience of those people, the existing petro-chemical based industrialized form of agriculture which involves costly input like HYV seed, chemical fertilizer, chemical pesticide, more irrigation etc. are hurriedly draining our scarce soil, which is the very basic ecological capital of farming and thus, causing damage to agriculture itself. As a result, the productivity is drastically decreasing while the input cost is piling up. When a new variety of seed from research laboratory is introduced in any area, initially it provides good yield; then farmers come forward and cultivate same crop over larger area borrowing bank loan but with the passage of a couple of years either its productivity starts dwindling or it is exposed to more pest attack or some time both the phenomena happen simultaneously which leads farmers to get into the trap of debt. Moreover, farmers are compelled to purchase new seed in every season, more fertilizer and more pesticide but on production side they find much less than the expectation. Meanwhile, money is directly drained from farmer's end to the pocket of multinationals which supply those inputs. The entire rural fields, thus, undergo the civilized form of robbery by multinational corporate.

So, there is an urgent need of the hour to (i) evaluate the economic viability of agriculture within existing reference frame of its industrial design, (ii) the reason behind it if it proves to be not profitable at all and (iii) look for alternative method of farming etc. Among various issues the present study with its limitation has adopted a single one: question of economic viability of paddy cultivation. For convenience, from wide variety of crops cultivated in the study area only boro paddy has been taken into consideration since it has taken the highest shape of industrialized design of farming owing to availability of so-called Green Revolution Technology.

Objective and Study Area

Boro paddy which is grown in summer has been adopted for investigation with its basic objective to explore its economic viability i.e., to find out whether cultivation of this crop gains profit or it suffers from loss. Observation has been made at three hierarchical levels: Gram Panchayat (GP) level, Village level and Household level.

Bagichapur GP of Harirampur block of Dakshin Dinajpur district, West Bengal, has been adopted as the study area though the issue is equally applicable in all other GP(s) of the concerned block because of the geographical and socio-economic similarity in them.

Bagichapur GP covers monotonously flat terrain slopping southwards with its average elevation of around 25 m above mean sea level. Soil in most places is clayey in texture belonging to geological category of older alluvium with yellow tint appearing somewhere on the surface while elsewhere it appears to be whitish though underlain by yellowish clay at the

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depth of one or two feet. But near to drainage channels there are various patches of new alluvium which appears to be grayish in look. There are no rivers in the GP except some rivulets. Climate belongs to tropical monsoonal type with annual mean maximum temperature of 35^0C and annual mean minimum temperature of 10^0C with annual rainfall of about 1800 mm. In the concerned GP the net sown area (NSA) takes a share of 70.40% to the total geographical area with cropping intensity of 164%.

Methodology

Data have been collected by door-to-door survey at house hold level using questionnaire/schedule. A sample size of 50 house hold has been selected at two stages: (i) using simple random sampling with replacement (SRSWR) 6 out of 28 mouzas (revenue village) in the concerned GP were selected and (ii) from each mouza at least 4 and maximum of 10 house hold have been chosen on the field randomly accumulating a total number of 50.

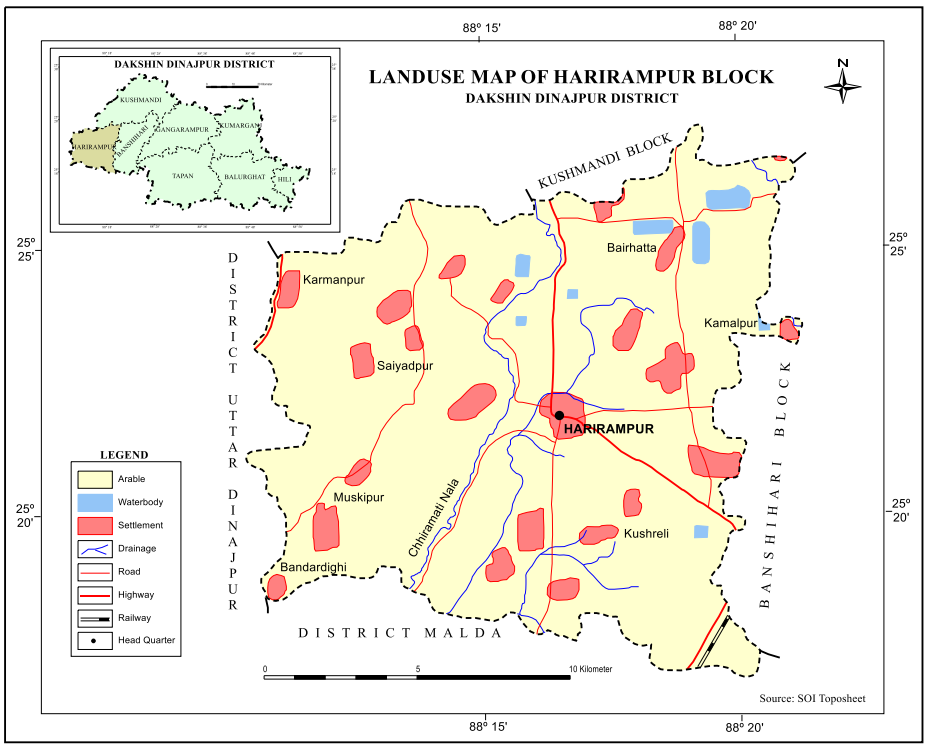

Figure 1: Map to show the land use of Harirampur block which includes Bagichapur GP.

Break Even Chart has been used for data analysis. The technique is widely used in the sphere of economics/commerce to analyze the economic viability of a firm be it agriculture or industry or else.

Break Even Chart, abbreviated as BE Chart, has been defined by Dutta et.al (2008) "as a chart which shows the profitability or otherwise of an undertaking at various level of an activity and as a result indicates the point at which neither profit nor loss is made".

The chart is constructed based on following parameters:

1. Fixed Cost (FC) which always remains constant with the change in amount of production e.g., land rent in this venture.

2. Variable Cost (VC) which goes on changing with the change in amount of production.

3. Total Cost (TC) which includes both FC and VC.

4. Total sale (TS)

On Cartesian reference frame production is plotted on horizontal axis while cost and sale are plotted on vertical axis (Fig. 2 to 5). However, the chart consists of the following parameters:

1. **Break Even Point** (BEP) which refers to that point at which neither profit nor loss is made. It is the point generated due to intersection of Total Cost Line (TCL) and Total Sale Line (TSL). Its monetary value can be detected from vertical axis while from horizontal axis the amount of production can be determined. BEP can be mathematically calculated using equation 1 as shown below.

BEP = FC ÷ Contribution…… Eqn. 1

Contribution = SP – VC ……..Eqn. 2

Where, FC = Fixed cost

SP = Sale price per unit of produce

VC = Variable cost per unit of produce

It is worth mentioning that contribution is the measure of economic viability of the firm. Its positive value indicates that the firm is economically viable while its negative value depicts the firm which is not viable at all.

2. **Margin of Safety** (MOS) which indicates the extent to which firm is economically safe. Mathematically it is of the form:

MOS (Rs) = (Amount of Production – BEP) x Total sale price per unit of produce. Eqn. 3

The positive value indicates that firm is economically profitable while negative value identifies that the firm is suffering from loss.

3. **Profit** which is equivalent to the Chart Area enclosed by TSL and TCL beyond BEP. Its mathematical form is shown in equation 4.

Profit = (Amount of production – BEP) x Contribution…. Eqn. 4

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The negative value of the result of equation 4 indicates the amount of loss made by the firm.

Result and Discussion

The observation was made in 2013. So, the result should be understood in reference to the market value of both input and output of concerned financial year. At house hold level, as shown in figure 2, 62% of the firms is profit making, 34% is suffering from loss while only 4% shows negative contribution i.e., they are not viable at all. But at village level or GP level no such scenario or non-viability has been reported. So, there might have some specific problem which needs to be investigated by another observation. At village level, though it is technically proved to be profitable the various parameters of profit clearly shows that this is not sufficient to make a living of the family i.e., margin of safety is quite low (Vide Table 1).

So, far the profit per bigha (approximately one third of acre) of land is concerned, it varies over a wide range from Rs. 149/- in Mollahar Village (JL 12) to Rs. 2237/- in Dolgaon Village (JL 14) while interestingly their yield is very much close to each other, 796.76 kg/bigha in former while latter one shows 836.83 kg/bigha. This difference in profit could be attributed to variation in production cost which is the function of availability as well as market value of water, labor and so on. Irrigation cost is to some extent low in that area where surface water is abundant or depth to ground water is less. Another interesting picture is seen in Sundail. The village shows 816.65 kg/bigha of yield which is in fact much higher than the GP average of 748 kg/bigha. But its profit/bigha is quite less than GP average while its profit per capita per month is lowest one having the value of only Rs. 53/-. This anomaly could be attributed to the fact that farmers in Sundail are mostly small ones having average land size of 1.4 bigha while the average family size is 5 which is equal to that of GP level average. On the other hand, in Bagichapur village there are comparatively big farmers having highest average land size of 8.8 bigha but due to low soil fertility the yield is lowest amounting to 616.66 kg/bigha and their average family size is 6 which is higher that GP level average. This has caused much lower profit per household as well as lower profit per capita.

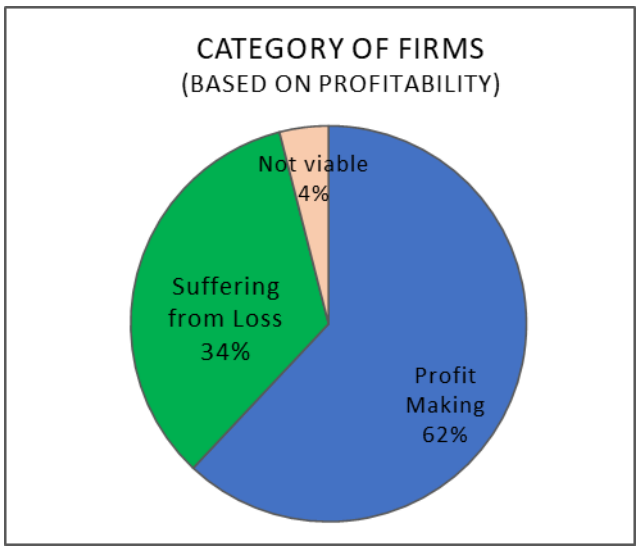

Figure 2: Categorization of firms based on profitability

Table 1: Summary of the observation

Parameter	Village Level Average						GP Level Average
	Bagichapur (JL 17)	Dhanaipur (JL 29)	Dolgaon (JL 14)	Mollahar (JL 12)	Nendra (JL 19)	Sundail (JL 24)	
Land size (Bigha)	8.8	2.21	6.3	7.35	3.9	1.4	5.34
Family size	6	4	6	5	4	5	5
PPB (Rs)	731	1044	2237	149	882	735	947
PPHH (Rs)	6435	2308	14093	1094	3439	1029	5056
PPHHPM (Rs)	1609	577	3523	274	860	257	1264
PPCPM (Rs)	264	144	597	57	215	53	253
Yield (KG/Bigha)	616.66	791.91	836.83	796.76	799	816.65	748

Source: Field investigation

Note:

(1) Boro paddy cultivation takes 4 months to complete its one life cycle from seed germination to harvest (Feb/Mar to May/June). So, for calculating per month profit 4 months have been taken into consideration as the total time period of the undertaking.

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(2) Profit is in Rupees (Rs.). Land size is in Bigha (one third of acre), yield is in Kilogram (KG) per Bigha.
(3) PPB - Profit per Bigha, PPHH - Profit per house hold, PPHHPM - Profit per house hold per month, PPCPM - Profit per capita per month.
(4) Except land size and yield the fractional value of all other parameters has been rounded off.

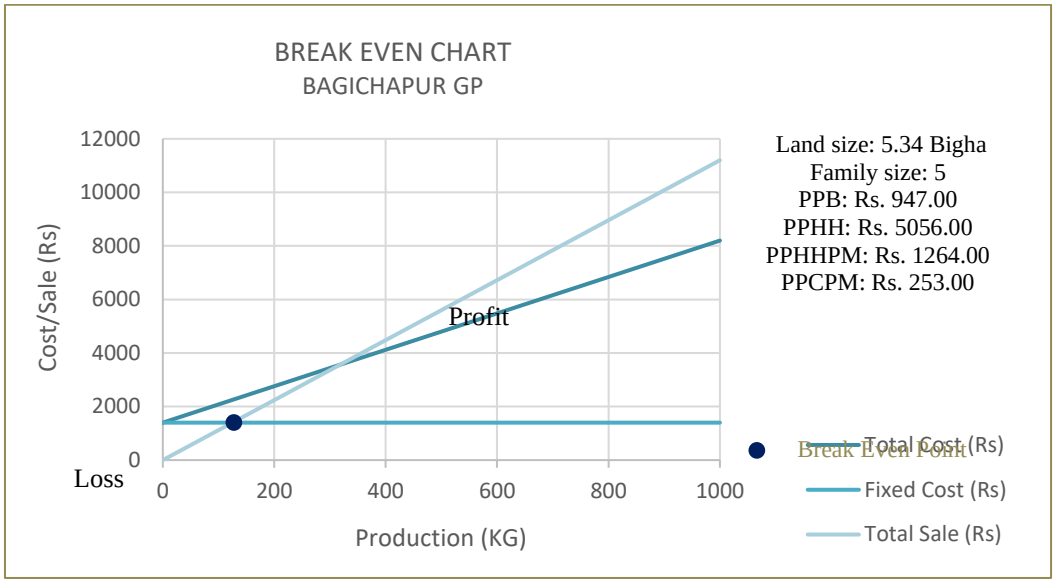

Figure 3: Break Even Chart to show the profitability of boro paddy cultivation in Bagichapur GP. Abbreviations are as same as used in text.

The overall picture can be briefed in a few points as below:

1. At house hold level non-viable and loss-making firms have been identified though this scenario is not in existence at village or GP level.
2. Although, in all villages or GP as a whole the business can technically be called profit making altogether but the amount of earning is not sufficient to make a living of the family.
3. Except in Bagichapur Village the yield is not much variable elsewhere but there is much variation in profit from village to village. It is because of the variation in land size under cultivation, cost of production which is the function of availability and market value of the concerned input.
4. Since the labor cost takes the highest proportion of the total input cost (Vide Fig. 7) the big farmers who depend upon labor input from outside their family do not take part in this business. Rather they give the land to share cropper/small/landless farmers and earn money in terms of land rent. On the other hand, small and landless farmers who cultivate the land with their own labor effort borrow the land from big farmers and convert their labor resources into monetary form finding no other alternative sector of investment of their labor in the village. Since these small farmers apply labor from their own family, they do not consider the labor cost in calculating profit and hence they apparently find some profit in hand and this is the reason why cultivation is still in existence in spite of producing less profit or almost no profit.

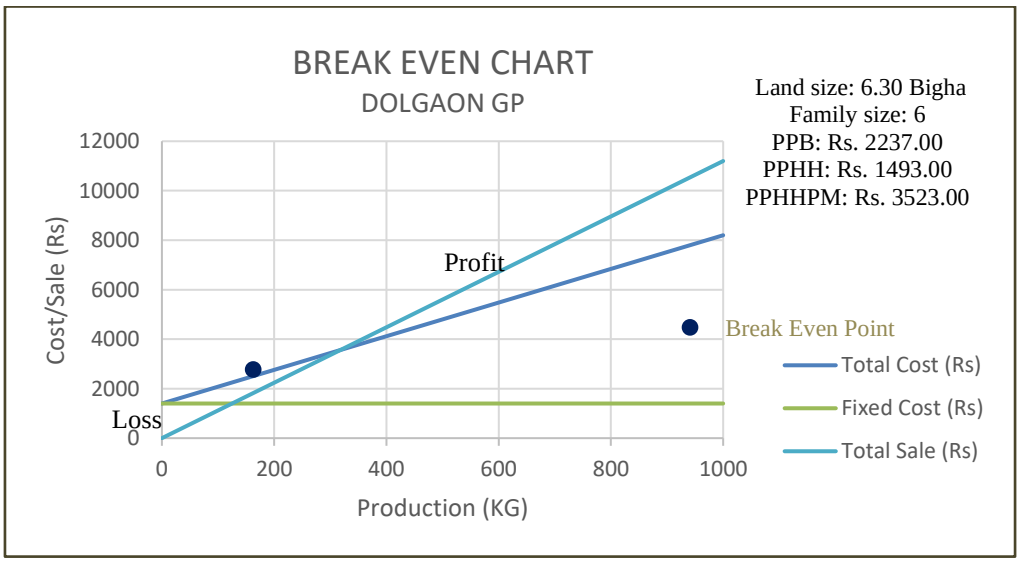

Figure 4: Break Even Chart to show the profitability of boro paddy cultivation in Dolgaon GP.

Abbreviations are as same as used in text.

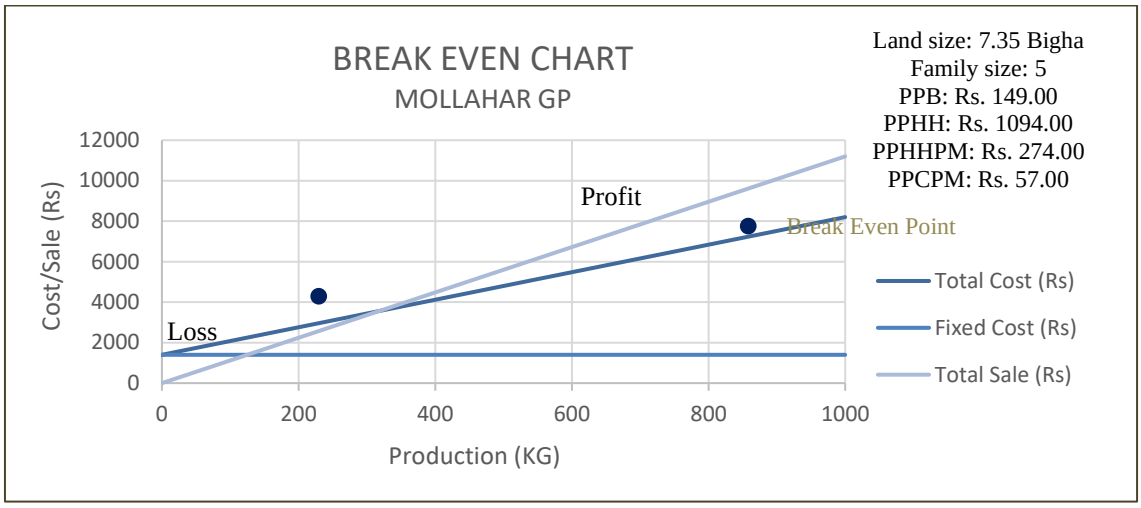

Figure 5: Break Even Chart to show the profitability of boro paddy cultivation in Mollahar GP.
Abbreviations are as same as used in text.

The Future Challenges

In order to make a living for each and every people of the GP it is a compulsion to increase the profitability of the business by either increasing the productivity or minimizing the input cost or both. In perception of local people in the GP, productivity has been stagnated with the average yield of 748 kg/bigha (Vide Fig. 6). Application of chemical fertilizer and pesticide for last two decades has caused huge damage to micro-organism in the soil which in fact produce the minerals essential for plant growth. If new high yielding variety (HYV) of seed is introduced there may be a little bit increase of the productivity but with passage of one or two years it is no longer sustained and is fixed at present value even if higher amount of fertilizer is applied. Some scientists are talking about GM crop but it will not be fruitful since it does not give guarantee for more yield, rather it claims to be pest resistant.

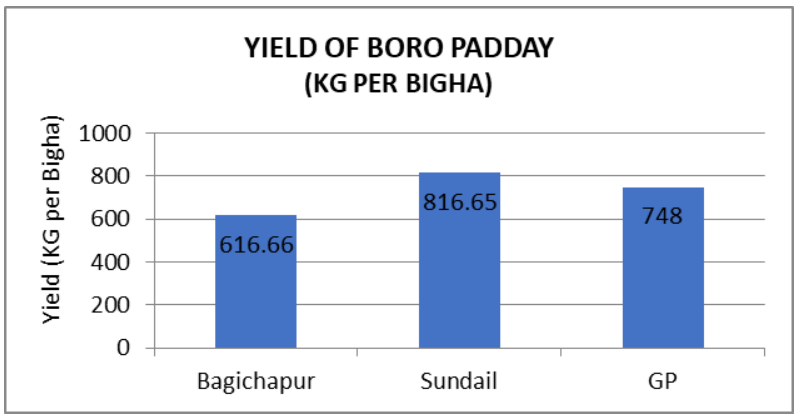

Figure 6: Yield of Boro Paddy in village and GP level. Village Bagichapur shows lowest yield while highest yield is observed in Dolgaon village.

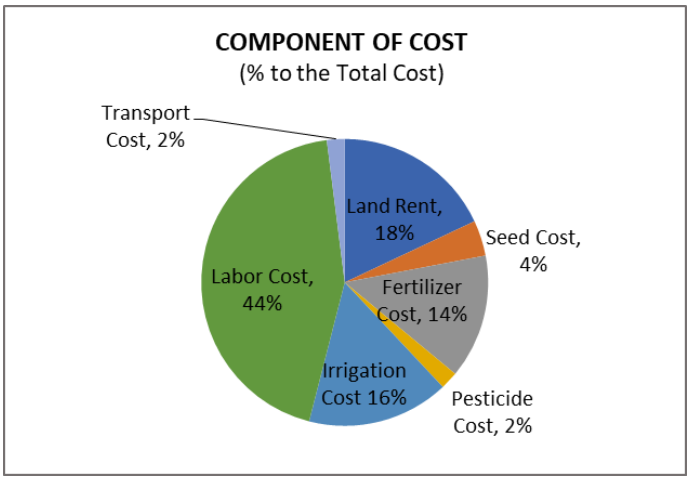

Figure 7: Total cost consists of cost for land rent, seed cost, fertilizer cost, pesticide cost, irrigation cost, labor cost and transport cost.

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On the cost side labor cost claims to be the highest share of total input cost (Vide Fig. 7). Minimizing labor cost is beyond the control of economic manager since there is labor crisis as the people in every year leave their home land and go to large cities in India in search of job. Apart from labor cost the substantive share is claimed by irrigation and fertilizer cost. The presently used HYV seed consumes huge amount of water, fertilizer and pesticide. If this seed is replaced by GM seed which demands more water and more fertilizer there will be farther increase in input cost.

So, it is the great challenge before the agricultural scientist in particular and government administrator, planner, common people in general to avoid two basic constraints – low yield and high input cost – which are aggravating day by day. It is common perception that when existing technology creates some problems the utmost important thing to solve this problem is to remove the technology and look for alternative one but we are to use same chemical fertilizer, HYV seed, chemical pesticide to remove the problem of low soil fertility, high input cost etc. created by this technology itself.

Since long back many scientists like Masanobu Fukuoka from Japan, Albert Howard, Dr. R H Richharia, M.G Jackson, Bhaskar Save, Dr. Debal Deb from India, Fernando Funes Aguilar from Cuba etc. have been pleading for ecological farming which have been proved to be sustainable and profitable since it depends fully on natural input which are occurring abundantly everywhere and crops are looked after by nature itself.

However, the alternative way of agriculture involves a few correlated tasks. *First*, farmers have to stop using poison in the farm land. *Second*, organic manure prepared by locally available natural ingredients have to be used. *Third*, there should be the use of indigenous seeds which are very much adaptive to local soil types and micro climatic environment. Some varieties are salt resistant, some are drought resistant, some are flood resistant but common in all is that they are resistant to pest attack. Though most of them are low yielding fortunately there are many such indigenous seeds which are high yielding by virtue of their biological property. This type of seed is presently available in many tribal societies wherein green revolution technology is not invaded aggressively. *Fourth*, in spite of using mono-culture which is the against the law of nature, farmers have to go for multi-cropping depending upon the natural diversity at local or regional scale.

But before going for ecological farming, ecosystem of farm land as well as that of the village or region has to be restored by growing locally adaptive vegetation which will look after the various creatures which are beneficial for farming. If crabs, fish, snake, frog, spider, birds, grass hopper, rat, earth worm, various micro-organism co-exist in the firm there will be automatic regeneration of soil minerals which are essential for plants. There will be automatic pest control since all macro and micro-organisms are related to each other by virtue of food web. Pest is the prey for creatures like grass hopper, birds etc. So, pest population will be automatically controlled by predatory creatures if they are allowed to make a gathering in agro-field and it will be possible only if farm land is made poison free. The production will be up to the mark and farmer's task is to sow the seed and make harvest; no need to invest much money, no need to give much labor force for taking farther care of the crops.

So, the basic task of agro-planner is (i) to formulate a comprehensive plan to select indigenous seeds which are suitable for local soil and micro-climate of the farm land, (ii) to formulate crop combination and crop rotation depending upon the local ecological rule, (iii) to make local or regional ecosystem healthy by growing local variety of herb, shrub, tree etc. For formulation and successful implementation of agriculture development plan it is very much essential to collect, refine and use of the indigenous knowledge which will show the road ahead.

Reference

1. Dutta et. Al (2008): Theory and practice of cost and management accountancy, New Central Book Agency, pp. 551-552.

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