Economic Viability of Sustainable Agriculture

Prof. Ratan Khasnabis
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A DRCSC Publicaion

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Preface

Development Research Communication and Services Centre (DRCSC) is pursuing promotion of Sustainable Agriculture (SA) within the small & marginal farmers of the state, mainly in the rainfed and vulnerable areas, for ensuring their food and livelihood security for the last 25 years. DRCSC feels that real promotion of sustainable agriculture is only possible through policy changes at the government level and adoption by them.

In that context DRCSC was engaging with the government. It was queried by them whether there are hard facts available with us for proving the efficacy of sustainable agriculture and how does it help the small & marginal farmers for having an increased income. Though there were several individual studies available with us, but it cannot be termed as hard facts as queried by the executive. Hence, we decided to conduct a study on 'Economic Viability of Sustainable Agriculture'. Our special thanks to Sri Pradip Majumder, Agriculture Advisor to the Chief Minister of West Bengal, for his impetus to conduct such a study.

DRCSC coordinated an All India Coordinated study on Bio-Farm several years back. This study took stock of ecology and economic returns arising out of the sustainable practices performed by farmers at different states of India. But, it was not a statistical exercise per se but pointed to the underlying facts of ecological and economic benefits of such practices in a broad outline. But still it cannot be termed as hard facts.

Sustainable agriculture is not promoted by the state government before 2014. There are farmers who are sustainable farmers by default. Apart from those organizations like DRCSC and others who pursue SA among farmers in different agro-climatic zones of the state. Hence, the population of sustainable farmers is small compared to Green Revolution (GR) farmers. Therefore, it was imperative that we will have to choose samples from a stratified population of farmers. This is not only important from the viewpoint of sample population but also the very definition of farmers. The traditional idea about farmers is such that they must have some land for cultivation. But, in this study we did not cling to such definition of farmers. It was our idea that landless farmers are also farmers and farmers having a homestead land with small pond should also be considered as farmers from the viewpoint of food and livelihood security. This is also a derivative of our idea that development in agriculture is to be measured in terms of development of the people associated with farming and not the quantum of production only. "**Declaration on the rights of peasants and other people working in rural areas"** prepared by Human Rights Council in its Nineteenth session defines farmers as - 'The term peasant can apply to any person engaged in agriculture, cattle-raising, pastoralism, handicrafts-related to agriculture or a related occupation in a rural area. This includes indigenous people working on the land'. (**A/HRC/19/75 -dt. 24th February,2012)** .

DRCSC entrusted Centre For Study In Economic Appraisal (CSEA), an independent agency comprising renowned economists, to conduct the study. The data collection was done by Economic Information Technology, Kolkata.

Given the stringent constraints on time and resources, the present study sought to dwell upon and restrict itself to the supply side considerations only despite the awareness about the importance of the demand side factors including externality issue**.**

In our continuous effort to engage with the government, we requested the Director of Agriculture to appoint their representative in the study team. As a good gesture, the Director appointed Dr. Samaresh Haldar, Joint Director of Agriculture (Survey and Evaluation), Directorate of Agriculture, Government of West Bengal as representative to the study team. In spite of his busy schedule, Dr. Haldar participated in the preliminary meetings and also went to Purulia for a monitoring visit.

Dr. Haldar made his observations regarding the study and it is our duty to give credence to his viewpoint and hence we are publishing his views in the Appendix. Some of the points made by Dr Haldar has been accepted by CSEA and some not. We are also publishing the rejoinder of Dr. Nabinananda Sen of CSEA to the comments made by Dr. Haldar in the Apendix. We think that this is the transparent way to initiate greater discussions and debate over the issue. The report published is an edited report taking into consideration of some of the views of Dr. Haldar by CSEA. It will be aparent from the clarifications given by CSEA about the portions of the report those have been edited.

Moreover, GR agriculture associates with itself many issues regarding degradation of natural systems, bio-diversity and ecology. The eco-system development and management and eco-system services rendered by the sustainable farmers have not been taken in the present purview. The present study is exclusively for the purpose as detailed in the scope of the study of Economic Viability of Sustainable agriculture.

We hope that the finding of this study is not an end in itself and will act as a booster for undertaking more profound studies in future by several agencies.

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Acknowledgement

Primarily, we are thankful to Sri Pradip Majumdar for invoking interest for conducting such a study. We are also thankful to Dr. Paritosh Bhattacharjee, Director of Agriculture, Government of West Bengal for his support by appointing Dr. Samaresh Haldar, Jt. Director of Agriculture in the study team. Thanks to Dr. Haldar for his relentless persuasion during the study, questionnaire framing, important inputs during meetings and his valuable comments on the study findings.

The sampled farmers of this study are associated with various organizations apart from DRCSC like Kajla Janakalyan Samity, Swanirbhar, Indraprastha Srijan Welfare Society, Kisan Swaraj Samity, Tarai Research Society and Palash. Their efforts towards organising data collection and rationalization were immense. There were also individual farmers who practice sustainable farming by default and participated in the process with vigor. We are thankful to all of them for their participation and help.

Economic Information Technology, Kolkata conducted field survey in seven districts of the state within a very short span of time to facilitate the completion of the study within specified time limit. Thanks to the field surveyors and the whole team of EIT for their efforts.

DRCSC entrusted Centre For Study In Economic Appraisal (CSEA) to conduct the study and that with very meager resource. The full team of CSEA comprising Dr. Ratan Khasnabis, Dr. Nabinananda Sen and the researchers Ms. Abira Roy and Ms. Anusri Mahato did utmost to complete the study report. Considering the complexity of issues arising out of the study, the whole team of CSEA strived hard to complete the study and prepare the report. We sincerely thank the whole team of CSEA for their outstanding role in the study.

For finalization of the study report, a session with important personalities from the academia was organised by CSEA in a meeting held at Calcutta University, Alipore Campus. The dignified members of the academia present were Prof. Dilip Mukherjee, Prof. Dipankar Kundu,ISI, Prof. Pradip Maity, ISI, Prof. Soumen Sikdar, CU, Prof. Sharmila Banerjee,CU, Prof. Suvasish Saha, CU(BM), Prof. Sitanath Majumder, CU(BM), Ms. Mahua Bhattacharya, CU(BM) and Prof. Ananda Mohan Pal, CU(BM)

Sri Sujit Mitra and Ms. Chandrani Das, both in charge of implementation of sustainable agriculture in various agro-climatic zones of the state by DRCSC, took active roles in organizing the whole field survey and gave important inputs to the study. Sri Ardhendu Sekhar Chatterjee, the mentor of DRCSC, gave important inputs to the study team. Sri Anshuman Das of Welthungerhilfe also gave important inputs.

Sri Abhijit Das of the Production Team of DRCSC and other members of his team made possible the publication of the study report.

We are also thankful to our donors Welthungerhilfe, Christian Aid and Swissaid for their help to conduct this study.

The whole study was coordinated by Raj Krishna Mukherjee of DRCSC.

The Research Team

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Introduction

Viability of organic farming is usually discussed on the basis of the logic of negative externality of the production system. The critique of the production of crops under Green Revolution (GR) technology is that GR technology creates high negative externalities which the society has to bear; the producing unit does not bear this cost. The criticism is quite robust in view of the fact that such technology creates environmental problems that deny both intra-generational and inter-generational equity in access to natural resources. It is rightly argued that the strategy of adopting the green revolution technology is unsustainable; the society cannot sustain this kind of crop culture for a long period because of the negative externalities in the form of environmental hazards. With organic farming, there is no such problem. The associated environmental hazards of organic farming are almost zero.

Why then organic farming is not practiced widely? Why does then GR technology rule the roost in contemporary agriculture? The reason is simple. In market economy of GR, the external cost remains entirely external to the producing unit. The cost is inflicted upon the society at large which is hardly measured in terms of damage cost which the producing unit should bear. The viability of a production is thus considered only on the basis of internal cost and here the GR technology is supposed to perform better compared to the technology of organic farming.

Economists would argue that the problem can be met by adopting a strategy by which the cost of negative externalities is made to get internalized by the unit (the farm) that adopts the strategy of green revolution. The problem, however, is that it is almost impossible to enforce such measures. The ground reality is that the internalization of negative externalities can hardly be done either by market mitigated ways or by enforcing strong regulatory measures. The reason is almost obvious. The major stakeholders of the economy of green revolution are powerful multinational enterprises that run business worth millions of dollars all over the globe by selling GR inputs. As external costs are made to get internalized, the effective total cost per unit of production would increase manifold. It is quite likely that the farmer would not buy green revolution inputs under such a dispensation, they would voluntarily adopt traditional technology where the external cost is low and therefore the total cost per unit is lower than that under GR strategy. Agribusiness will lose heavily under such a situation which is why the MNEs in agribusiness would keep no stone unturned to foil this move, if the policymakers pursue such a policy seriously.

The alternative prescription that often comes from various stakeholders is that the farmers themselves should take recourse to the technology of organic farming which has no negative externality so to say, in spite of the fact that the GR technology is available, because it is environment-friendly. One may point out that the prescription based on such logic might not get adequate response from the farmers. No enterprise would be

eager to take up any economic project just on the ground that the negative externality of the venture is low, unless there are strong regulations against GR that serve as incentives for adopting organic farming. This is based on the economic logic that internalization of externality increases private cost, the addition to cost coming from the cost that the society refuses to pay by not enacting the regulations for checking negative externality .Why should the farmer bear the additional cost just for serving a social cause?

Given such economic reality organic farming cannot replace GR farming unless farming with non-GR practices is found to be economically competitive with GR-based farming. The received wisdom is that organic farming may become economically viable if (a) there is state subsidy for such practices and / or (b) there develops a niche market which can pay higher prices for organic products. If this is so, the critics would argue that the prospect of organic farming is rather poor, organic farming cannot replace GR farming at mass production level. This is so because (a) the society cannot go on providing subsidy on perpetual basis (and possibly at a higher rate) for promoting organic farming, and (b) niche market cannot provide the required space for every producer in the farm sector; neither would one advocate such a policy, i.e., producing only for niche market, because the macro-economic consequence of such a strategy would be disastrous (how to feed the commoners who do not belong to niche market?)

The advocates of organic farming for promoting sustainable agriculture should therefore address the basic issue, namely, *is organic farming economically viable at the farm level even if there is no subsidy from the state or even if there does not exist any niche market where the product prices can be fixed at a higher level?* There is a view that organic farming can be made economically viable at the enterprise level, even if the state policy remains tilted in favour of GR farming, by adopting the strategy of integrated farming based on non-GR technology. There are some field level data which provide some evidence in favour of this argument.. The case of Banamali Das, who resides in Gayadham village of Patharpratima block and has been practising organic farming for around 5 years now, can be mentioned in this connection *(Bio Farm: Action Research on Integrated Farming System, Ecology and Economics, DRCSC, p 126)*. A preliminary survey conducted by the project team in a south Bengal village indicates that even for a marginal farm (net area less than 0.4 ha.) organic farming was economically viable because there had been a plan for optimum use of the land under integrated farming. There are also other case studies in various other agro-climatic zones which provide strong evidences in favour of this argument.

The problem however is that one cannot generalize on the basis of isolated case studies. Since the issue is quite important in view of the fact that the adoption of organic farming is still rare compared to overall farm practices in India, the hardcore economic rationale for adopting non- GR strategy of farm practices, based on calculation of private cost and private gain needs to be worked out with respect to a representative set of farmers. The present research project aims at addressing this issue on the basis of a sample survey covering all the agro-climatic zones of West Bengal.

The filed survey was conducted in March, 2014. The survey covered a sample of 200

farming households selected from 5 agro-cilmatic zones of the state. The findings of the field survey are being presented in details in the following pages of the report. What transpired from the field survey is that there exists a strong case in favour of integrated farming based on non-GR strategy. There does exist hardcore economic rationale for adopting non- GR strategy of farm practices, based on calculation of private cost and private gain only. With respect to the representative set of farmers visited by us, it was observed that for the organic farmers enjoying high net earnings per bigha, the major contributing factor is the substantial amount of own labour and family labour that goes into such type of farming, which often remains undisclosed and hidden. In a labour surplus economy, a farmer with a tiny plot of land can adopt organic farming which is more labour-intensive as a better option because farming here would yield a higher net income on the personal and family labour. For the big farmers, integrated farming based on non-GR technology may also be viable, although for a different reason. The large scale farming can be integrated with niche market so that the products would fetch a higher price and thus the private benefit would be higher than the private cost associated with non-GR technology. However, a typical large farmer, as we observed in the field area, usually sticks to GR technology because the possibility of fetching a better price in a niche market by cultivating organic products does not usually catch the imagination of such farmers; usually the farmers are risk averse and do not take recourse to non-chartered paths of portfolio selection.

A typical big farm survives by encashing the benefits of scale and of productivity-enhancing technology (at the cost of environment and social factors). In the field area some of the big farms adopt the strategy of combining GR with non-GR technology. However, such farmers often face the bottlenecks and constraints of inelastic supply of indigenous organic inputs. This coupled with the practice of having arbitrary combination of organic and inorganic inputs and strategies in the absence of proper organized and systematic extension services and know-how put impediments on the practice of adopting full organic farming. But those who venture for or muster the confidence for fully organic farming perform substantially better than their mixed farmer counterparts vis-a-vis the fully inorganic big farmers because they are better equipped to handle the fully organic cultivation where an overdose of organic manure or pest repellant is not harmful, but the same overdose of chemicals can have a significant and even substantial toll on productivity. Moreover such farmers are found to be better equipped to catch the benefit of organic farming in the product market.

Chapter 2 Economic Viability of Sustainable Agriculture

Literature Review

The fact that chemical-intensive agricultural practices under the Green Revolution introduced in early 1070s has silently and seriously harmed not only human health but also soil health and biodiversity almost irrevocably is by now very well documented in the relevant literature. But scholarly studies on an alternative practice known as organic agriculture particularly in the Indian context are far from adequately available. This is not to deny the fact that some sporadic literature is available on organic farming.

One of the major enquiries in this regard is relative cost-benefit aspect of this alternate practice, organic farming, vis-a-vis the preceding practice of chemical-based farming: whether the former is as much, or more remunerative, than the latter. This brings to the fore the more complicated questions of considering not only the private monetary costs but also the oft- hidden social and environmental costs. It is here that scholarly literature based on authentic empirical findings is scarce.

Sustainable practices are supposed to vary both spatially and temporally, and can actually be identified in retrospect. It is not a matter of tools and inputs but the context in which they are used. (Rigby and Caceres, 2000).

A widely held view in India is that cost of production of organic agricultural/ horticultural crops is significantly higher than those produced by chemical farming methods, and the price of organic crops is therefore higher. However, in the United States of America (USA) and in several countries under the European Union organic farming is more viable than conventional farming due to higher yield, lower cost and/or higher market prices (Lampkin, 1994). A study of organic basmati rice in Uttarakhand, India (Alam, 2007) has explored and validated financing mechanisms, marketing strategies and value-adding opportunities in the organic sector as tools for enhancing farmers' income-generation with reference to the rice variety that enjoys a huge demand in the international market.

The production of organic farms in India stood at about 14,000 tonnes during 2002, nearly 85 per cent of that was exported. Domestic consumption was marginal and was concentrated in the metropolitan cities in the country. The major weaknesses of organic agriculture in the country were absence of linkages between the farmers and markets and absence of financial support from the governments. These observations were made in an Occasional Paper of NABARD. It was also noted that India has the potential to become a major organic producing country given the high international demand for our farm products, different agro-climatic regions in the country for cultivation of a diverse basket of crops, the size of the domestic market and above all the long tradition of environment-friendly farming and living. (NABARD, 2005).

In India, however, the predominant rationale for adopting or promoting organic farming by farmers, NGOs, CBOs and government mainly hover around social, environmental

and livelihood concerns. High and rising cost of modern farming has prompted farmers to embrace organic farming in many regions of the country. This has been found to be true for mainly the small farmer. With lower costs, government can also reduce its subsidy bill on agriculture. Besides, organic Indian farm products, particularly certified organic fruits and vegetables, have a greater acceptability in the international markets than the products produced with GR technology because of compatibility with the sanitary and phyto-sanitary agreement under the WTO. (Singh,2004). The Working Group of the Planning Commission of India on Organic and Bio-dynamic farming for the Tenth Plan had already championed the cause of organic farming and made a number of recommendations and suggestions regarding research and development, major developmental strategies, marketing infrastructure, etcetera about one and half decade ago. (Planning Commission, 2001).

Vandana Shiva, the well-known Indian environmentalist and advocate, claims in many of her writings that organic farming produces more food and nutrition than conventional methods.

In a 2011 study of the Agro-Economic Research Centre of Visva Bharati the impacts and constraints of organic farming in West Bengal were attempted to be evaluated, and a number of recommendations were made. However, the study was actually based on purposive selection of only two districts of the state, namely, North 24 Parganas and Jalpaiguri. (Biswas, Majumder and Sinha, 2011).

On the basis of a study of four multi-purpose and multi-functional liquid organic products with low cost conducted by the School of Agriculture and Rural Development, Ramakrishna Mission Vivekananda University, organic technologies have been found to be effective with higher productivity, profitability, sustainability and higher input use efficiency in sustainable agriculture. This has been tested in Narendrapur, West Bengal (Gangetic alluvial Zone) and Ranchi, Jharkhand (Chotanagpur plateau region) and at Belur Math, West Bengal (headquarters of RKMVU) for four years besides the project activity. (Ramakrishna Mission Vivekananda University, 2012).

A recent study has observed that organic farming, has made significant progress in many parts of India mainly for international markets. But it faces several obstacles like high wage cost because of highly labour-intensive method of cultivation, information and knowledge gathering and certification and labeling (an essential requirement for the export market); the last mentioned being exorbitantly costly for small farmers who dominate till now the scene of organic farming. Institutional support by the government can help overcome the hurdles and promote faster growth of this sector. (Das, 2007).

In states like Sikkim and Meghalaya, organic farming is thriving noticeably with generous support from the respective state governments but in the absence of initial financial support for conversion from chemical-based farming practices to organic farming, the area under organic farming has been declining in Kerala, a report published by the Times of India revealed. (Shenoy, Karun (2014).

With growing awareness and investigation, organic agriculture today is credited with a

host of direct and indirect benefits. It claims to directly enhance biodiversity, protect fragile soils, improve nutritional quality of food, ensure livestock health and provide increased employment in rural areas. Indirectly, it reduces green house gas emissions and fossil fuel energy use, decreases nutrient and pesticide pollution and stops potentially harmful pesticide residues entering our food chain. Thus it helps in combating climate change and securing local food supplies. It is also highly effective in carbon sequestration. I-FOAM (2009).

Organic agriculture, as practised in different parts of West Bengal (and most likely in other areas) is found to be most viable as scientifically and economically integrated farming practice where agro-climatic zone-specific and soil-specific crop selection, crop rotation pattern, organic/bio-fertiliser and pesticide use, appropriate livestock rearing, etcetera are intricately woven together to minimise costs and/or support livelihood on a sustainable basis. This is particularly true for small and marginal farmers. This is borne out by the resource-integrated models of BIOFARM (Biological Integration of Farming Activities and Resource Management) implemented in various agro-ecological zones of India. (DRCSC,2013). However, the macro reality is that the GR technology is still being practiced widely in all states in India which is why the issue of maintaining fertilizer subsidy as an important component of the Union Budget still remains a politically sensitive issue in Indian politics.

One may therefore conclude that despite all these studies, a thorough academic empirical study into the pros and cons of sustainable organic farming practices as well as their possible elevation as sustainable integrated farming practice under a 'total cost approach' was seriously wanting. Such a study was also to identify/ establish the spectrum of optimum farm-sizes and the corresponding socio-economic groups for such practices for different crop baskets. The present study is a modest attempt at that direction.

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Chapter 3 Economic Viability of Sustainable Agriculture

Survey Methodology and Selection of Sampled Households

Methodological Issues

The study was based on a field survey covering 200 farming households. The choice of the sample size was primarily based on the size of the budget and the extent of reach out of the agency (Development Research Communication Service Center) among the farming households. The agency was found to operate in all the agro-climatic zones of West Bengal and therefore the sample could be designed in such a way the zonal variations would be captured. The problem however was that the population from which the sample was drawn was not uniformly spread over various zones. Multistage sampling based on the population of the farming households in various agro-climatic zones of West Bengal could not also be considered while designing the sample frame for this study. At the very outset, we should therefore point out that the findings reported here cannot be considered here as representative for the entire state; neither should it be claimed as the features of various agro-climatic zones to be fully be captured in this study (because the spread of the population did not maintain any order). What one can submit is that the findings of the study would represent a fair picture of the strength and weakness of non-GR based farming practices in the field area (where the intervention of DRCSC for promoting sustainable agriculture is present).

The basic sampling unit had been the farming households. The sampling units for organic farmers were drawn on the basis of the sampling design that divided the population in various strata and the individual units were drawn by the method of stratified random sampling. On the basis of this sampling design, 100 farming households were selected. An equal number of matching units of such farmers who were supposed to practice GR farming were then included in the study. The idea was to consider the economics of farm management pertaining to the non-GR farmers in comparison to that of the GR farmers. In order to perform this exercise the matching units were selected from those villages in which the sampling units of non-GR farmers were identified. Maintaining one-to-one correspondence between GR and non-GR farmers, the total units on which the analysis was performed had been increased from 100 to 200. We should however mention that the initial listing of the non-GR farmers provided by the DRCSC had a limitation. Many of the farmers included in this list were found to combine non-GR with GR farming practices (in various degrees and specific to certain crops). The matching units were therefore selected accordingly, i.e., in such a way that the practice of 'mixed farming' (non-GR with GR practices) had been present in these households as well. As a result, ultimately the coverage of this study boiled down to the following: it included only 56 farmers who had been practicing organic farming in the strict sense of the term (fully organic), there had been 48 farming households which practiced GR farming in the strict sense of the term (fully inorganic) and there were 96 farmers who were engaged in mixed farming (combining GR with non-GR technology). The details of the sampling design would be presented in the subsequent part of this Chapter.

The field study was conducted by an agency hired by DRCSC. The field investigators were trained on the basis of a structured questionnaire which had been pre-tested by the experts. Basic design of the questionnaire followed the *Survey on Cost of Cultivation* Schedule of Ministry of Agriculture, Government of West Bengal. The basic questionnaire was revised according to requirements of the present study. The final questionnaire was drawn after analyzing the experience of a pilot study in 24 Parganas (S) (Patharrpratima block) and a follow up discussion by the experts. The field staff of the DRCSC in the selected blocks of the districts were instructed to monitor the field survey. The filled-in questionnaires were placed under scrutiny; the errors and omissions were indentified, following rectifications and revisits. The data editing had been done by the desk scholars and the excel files were designed. The data entry operators were engaged to enter the data. Following further scrutiny a few basic tables were prepared. Several problems with the data set were identified at this stage and a few corrective measures were undertaken. These issues have been discussed later in the report. But before entering into this part of the discussion on methodology an outline of what is intended to be obtained out of the data set has been presented.

The kernel of what was wanted to get out of the data set had been the extent of cost effectiveness in organic farming (cost here includes only private cost, imputed and paid out). In order to take up this exercise the components of cost as well as earnings (imputed and net cash) from various agricultural (allied agriculture included) and non-agricultural activities of the farming households were to be taken into consideration. The idea can be presented in a schematic way.

Schematic Presentation of Components of Cost and Earnings

E_1: Imputed + Cash Earnings, E_2: Only Cash Earnings

Total Earning of Farmers (E_1) = Σ(Agricultural Income 1+ Income from other Activities 1 + Non Agricultural Income)

Total Earning of Farmers (E_2) = Σ (Agricultural Income 2+ Income from other Activities 2 + Non Agricultural Income)

Agricultural Income 1= Σ ($Y_{1aman} + Y_{1boro} + Y_{1potato} + Y_{1prekharif\ veg} + Y_{1kharif\ veg} + Y_{1rabi\ veg}$

Agricultural Income 2= Σ ($Y_{2aman} + Y_{2boro} + Y_{2potato} + Y_{2prekharif\ veg} + Y_{2kharif\ veg} + Y_{2rabi\ veg}$)

(Derivation of Y_{1aman} and Y_{2aman} has been given below).

Income from Other Activities 1 = Income from Livestock + Income from Horticulture + Income from Allied Agriculture (pisci culture)

=Net Cash Earnings from Livestock + Imputed Earning from Livestock + Net Cash Earning from Horticulture + Imputed Earning from Horticulture + Net Cash Earnings from Allied agriculture + Imputed Earning from Allied Agriculture

Income from Other Activities 2 = Net Cash Earnings from Livestock +Net Cash Earnings from Horticulture + Net Cash Earnings from Allied agriculture Activities 2 + Non Agricultural Income)

Derivation of Y_{1aman} and Y_{2aman}

Net Income (Y) from Aman = Revenue – Cost

Net Income 1from Aman (Y_1) = R- Cost 1

Net Income 2 from Aman (Y_2) = R- Cost 2

Cost of Cultivation (Aman) = Labour Cost (A) + Non Labour Cost(B)

Labour Cost (A) = Σ (a_1+a_2+……+a_{11})

= Σ (a_{1p} + a_{1l} + ……..+ a_{11p} + a_{11l})

Where $a_i = a_{ip}+a_{il}$ (i=1,……11)

a_i → ith stage of Cultivation of Aman (for description of stages, see the Questionnaire in Annexure)

a_{ip} → paid out cost for the activities

a_{il} →Imputed cost for the activities

Non Labour Cost (B) = Cost of Irrigation (b_1) + Cost of seed (b_2) + Cost of Fertiliser (b_3) + Cost of Pesticide (b_4)

= Σ (b_1+ b_2 + b_3 + b_4)

= Σ (b_{1p}+ b_{1l}+ b_{2p}+ b_{2l} + b_{3p} + b_{3l}+ b_{4p}+ b_{4l})

Where $b_i = b_{ip}+b_{il}$ (i=1,……4)

b_{ip} → paid out input cost

b_{il} →Imputed cost of the input

Cost 1= Σ(A+B) (Paid out cost + Imputed Cost)

Cost 2= Σ(a_{1p} + ……..+ a_{11p} + b_{1p} + b_{2p} + b_{3p} + b_{4p}) (considering only paid out cost)

Revenue (R) = Total Production (TP) X Price of Aman (P)(District wise average price in Kg as reported by DRCSC)

While drawing the quantitative estimates on cost of cultivation following the schematic outline presented above we faced several challenges which had to be mitigated by improvising the techniques of calculation of cost of production.

It was realized that there had been reporting bias due to confusion with the unit of measurement. For example, the farmers often reported the labour time spent on the specific activity in terms of 'days'; hours of the day spent on such activity had not been reported properly when the activity was performed by the family labour. Only in case of paid outside labour the recording had been proper. We checked the data, contacted the individual respondents and rectified the mistake.

In some cases, particularly with respect to certain production operations, there had been no such problem with the field data. However, there were reasons to believe that there were outliers in the dataset. We had to edit these data because such outliers were suspected to contaminate the entire data set in such a way that the statistical operations on the data set might fail to reveal the true state of affairs with respect to the surveyed households.

While revising the labour cost related data, every information on the paid out part of the labour cost had been retained (unless these were suspected to be outliers). The imputed cost assigned to the family labour had however been adjusted by following a norm which we derived after a series of consultations with the stakeholders. The standard cost of cultivation data, as available from the official sources was also consulted. For the non labour components of cost also, the same procedure was followed. It was observed that the norms chosen here had not been differing much from what have been revealed from the official sources. The micro level comparison based on plot specific data on cost of cultivation however revealed that there had been consistent over reporting in the official data, particularly with respect to the labour cost component. We rechecked our field data, re-discussed with the individual respondents and did not find any reason to suspect the quality of the field data collected by us.

Selection of Sampled Households

To arrive at a fairly representative sample of organic farmers, spatial segments were considered at different levels: first, the geographic regions, then the agro-climatic sub-regions and thereafter the districts. In identifying the districts (and the villages) with a preponderance of organic farming, importance was given to the ones where DRCSC (Development Research communication and Service Centre) has been actively engaged with organic farming for a considerable period. This was also necessitated by the scarcity of specific and reliable information about organic farming practices at the district level and lower down.

Once the districts were identified, the total number of farming households involved in organic farming was ascertained with the help of DRCSC functionaries, and the final sample of households was drawn from the selected zones/districts. The following table presents the sample design of the study.

Table 3.1: District and Zone -wise Distribution of Sampled Farmers

Region	Agro climatic Sub Region	Districts	Total Number of Farmers *	Zone Total	Total Quota of Farmers	District wise Quota of Farmers
Lower Gangetic Region	New Alluvium Zone	24 Parganas (N)	69	69	23	23
	Coastal Saline	24 Parganas (S)	86	148	49	28
		Purba Medinipur	62			21
	Red Laterite	Bankura	29			10
		Birbhum	20	49	16	6
Eastern Plateau and Hill Region	Eastern PlateauPurulia and Hill Region	18	18	6	6	
Eastern Himalayan Region	Terai	Jalpaiguri	15	15	6	6
			299	**299**	**100**	**100**

Source: State Agricultural Plan for West Bengal, Common Property Resources in India, NSS 54th Round for Zone division

**As listed by DRCSC*

The study is based on a primary survey of 200 farmers (100 farmers who are engaged with organic farming partly or fully, and the other 100 who do not practice organic farming) from seven selected districts of West Bengal. The primary unit of survey has been the farmer who is directly related to farming. They have been chosen from a diverse set of villages with different types of infrastructural facilities. The basic idea has been to capture the economic viability of organic farming. As mentioned earlier, the Districts belong to Regions which can be categorized under several agro-climatic sub regions or zones. From a total population of 299 farmers (List obtained from DRCSC) distributed over several districts and sub-regions 100 farmers who are engaged with organic farming partly or fully were selected randomly. Zonal quota was obtained by dividing the total number of farmers in a zone by total population of farmers in all zones. Thus the quota of New Alluvium zone was obtained by 69/299*100 =23. Since North 24 Parganas is the only district from this zone, the quota of North 24 Parganas was 23. The selected districts were North 24 Parganas, South 24 Parganas, Purulia, Bankura, Birbhum, Purba Medinipur and Jalpaiguri.

After calculating the quota of the districts, the farmers who are engaged in organic farming, partly or fully, were selected randomly from the available population of farmers. In a sense, this was the basic referral category of this study. In the following table the block wise distribution of these farmers is presented.

Table 3.2: District and Block wise Distribution of Selected Farmers

Dist	Block	Total	Sample	Total
24-Pgs (N)	Baduria	2		
	Basirhat-I	5	5	
	Hingalgunj	58	16	
	Swarupnagar	4	2	
24-Pgs (N) Total		**69**		**23**
24-Pgs (S)	Basanti	22	3	
	Mathurapur-I	4	2	
	Patharpratima	60	23	
24-Pgs (S) Total		**86**		**28**
Bankura	Chatna	29	10	
Bankura Total		**29**		**10**
Birbhum	Lavpur	5	2	
	Sriniketan	15	4	
Birbhum Total		**20**		**6**
Jalpaiguri	APD-II	15	6	
Jalpaiguri Total		**15**		**6**
Purba Medinipur	Bhagabanpur	1		
	Bhagabanpur-2	6		
	Chandipur	39	19	
	Contai III	1		

	Deshpran-2	3		
	Kanthi Deshapran	1		
	kanthi-2	1		
	Kanthi-3	4		
	Khejuri	4	2	
	Patashpur-2	2		
Purba Medinipur Total		**62**		**21**
Purulia	Hura	7	2	
	Kashipur	11	4	
Purulia Total		**18**		**6**
Grand Total		**299**	**100**	**100**

Source: DRCSC

After selecting the 100 farmers who are engaged in organic farming partly or fully, our task was to select the matching group of other 100 farmers who are not practicing organic farming. The district-wise quota was just doubled for including these farmers. For example, for 100 organic farmers, the quota of North 24 Parganas was 23. For a sample of 200 farmers, now the quota of the district becomes 46 (23 inorganic farmers). The farmer in the matching sample engaged in inorganic farming would be selected from the same village or locality in which the randomly selected organic farmer was located. The net cropped area of the specific person should be approximately the same as that of the selected organic farmer. The identification of the person was to be made by the enumerators in the field with the help of selected farmer.

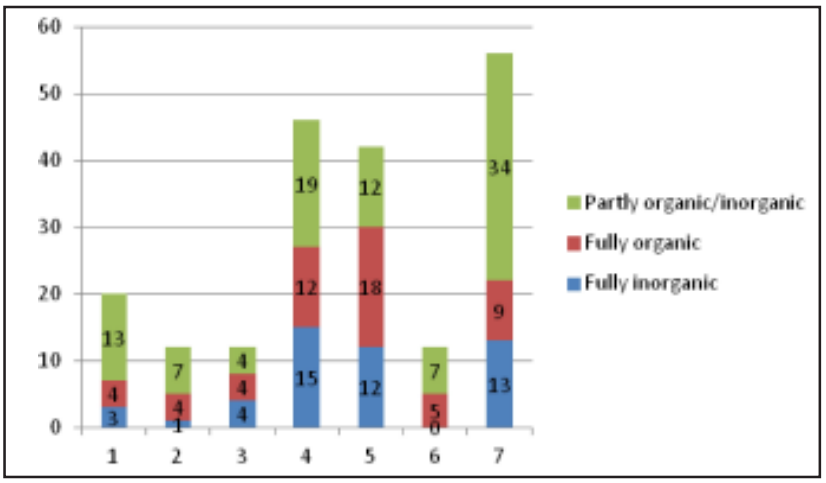
As the field survey was conducted, it was observed that the ground reality had been different from what we had expected. The farmers who are supposed to practice fully inorganic farming were found to use some of the organic inputs as well. It was quite difficult to identify a farmer in the matching sample who did not use any of the organic inputs. The investigators were instructed to stick to the locality of the randomly selected (organic, partly or fully) farmer and identify one farmer in the same locality who was practicing inorganic farming. This distorted the final set of selected farmers and the distribution of the farmers according to their degree of adoption of organic farming changed remarkably. The distribution of the selected farmers in the field area according to nature of farming, which forms the basis of this study, is given below.

Table 3.3: District wise Distribution of Selected Farms According to Nature of Farming

Farmer Type	Bankura	Birbhum	Jalpaiguri	N 24 Parganas	Purba Medinipur	Purulia	S 24 Parganas	Grand Total
Fully inorganic	3	1	4	15	12	0	13	48
Fully organic	4	4	4	12	18	5	9	56
Partly organic/inorganic	13	7	4	19	12	7	34	96
Grand Total	**20**	**12**	**12**	**46**	**42**	**12**	**56**	**200**

Source: Field Survey 2014

Figure 3.1: District wise Distribution of Sampled Farmers



1: Bankura, 2: Birbhum, 3: Jalpaiguri, 4: North 24 Parganas, 5: Purba Medinipur, 6: Purulia and 7: South 24 Parganas

Source: Field Survey 2014

Table 3.4: Block wise Distribution of Sampled Farmers

District	Block	Fully inorganic	Fully organic	Partly organic/ inorganic	Grand Total
Bankura	Chatna	3	4	13	20
Bankura Total		**3**	**4**	**13**	**20**
Birbhum	Lavpur	1	1	2	4
	Sriniketan		3	5	8
Birbhum Total		**1**	**4**	**7**	**12**
Jalpaiguri	Alipurduar-II	4	4	4	12
Jalpaiguri Total		**4**	**4**	**4**	**12**
N 24 parganas	Basirhat I	4	2	4	10
	Hingalganj	9	8	15	32
	Swarupnagar	2	2		4
N 24 parganas Total		**15**	**12**	**19**	**46**
Purba Medinipur	Chandipur	12	15	9	36
	Khejuri-I		3	3	6
Purba Medinipur Total		**12**	**18**	**12**	**42**
Purulia	Hura		2	2	4
	Kashipur		3	5	8
Purulia Total			**5**	**7**	**12**

S 24 Parganas	Basanti	3	3		6
	Mathurapur-I	2	1	1	4
	Patharpratima	8	5	33	46
S 24 Parganas Total		**13**	**9**	**34**	**56**
Grand Total		**48**	**56**	**96**	**200**

Source: Field Survey 2014

Farm Size of the Sampled Households

Table 3.5: Percentage Distribution of Farmers according to Net Cropped Area (in Bigha)

Net Cropped Area (in bigha)	Fully inorganic	Fully organic	Partly organic/ inorganic	Total
Upto 1 bigha	27.08	25.00	10.42	18.50
greater than 1-2 bigha	20.83	16.07	20.83	19.50
greater than 2-3bigha	10.42	17.86	14.58	14.50
greater than3-4 bigha	8.33	10.71	13.54	11.50
greater than4-5bigha	2.08	3.57	12.50	7.50
greater than 5-8bigha	22.92	14.29	17.71	18.00
greater than 8-10bigha	2.08	7.14	5.21	5.00
greater than 10 bigha	6.25	5.36	5.21	5.50
Grand Total	100.00	100.00	100.00	100.00

Source: Field Survey 2014

The sample composition of organic farmers according to net cropped area shows that fully organic farming is dominated by marginal farmers having less than 3 bigha of land. A similar pattern is observed for those engaged in fully inorganic farming. However, in case of farmers engaged in partly organic and partly inorganic farming the pattern is slightly different in the sense that those having 3 bigha to 10 bigha land or above constitute more than 50 percent of the total sampled farmers.

Table 3.6: District wise Distribution of Farmers according to Net Cropped Area (in Bigha)

District	Farm size	Fully inorganic	Fully organic	Partly organic/ inorganic	Total
Bankura	greater than 10 bigha		1	1	2
	greater than 2-3 bigha	1		3	4
	greater than 5-8 bigha	1	1	24	
	greater than 8-10 bigha	1	1	2	4
	greater than3-4 bigha			3	3
	greater than4-5bigha		1	2	3
Bankura Total		**3**	**4**	**13**	**20**

Birbhum	greater than 10 bigha			1	1
	greater than 1-2 bigha		2	1	3
	greater than 2-3bigha			1	1
	greater than 5-8bigha	1		1	2
	greater than 8-10bigha		1	1	2
	Upto 1 bigha		1	2	3
Birbhum Total		**1**	**4**	**7**	**12**
Jalpaiguri	greater than 10 bigha	1		1	2
	greater than 2-3bigha		1		1
	greater than 5-8bigha	1	1	2	4
	greater than 8-10bigha		1		1
	greater than3-4bigha	2	1		3
	greater than4-5 bigha			1	1
Jalpaiguri Total		**4**	**4**	**4**	**12**
North 24 parganas	greater than 10 bigha	1			1
	greater than 1-2 bigha	5	1	6	12
	greater than 2-3 bigha		5	3	8
	greater than 5-8 bigha	6	1	4	11
	greater than3-4 bigha	2	2	3	7
	greater than4-5bigha		1	2	3
	Upto 1 bigha	1	2	1	4
N 24 parganas Total		**15**	**12**	**19**	**46**
Purba Medinipur	greater than 1-2 bigha	2	4	5	11
	greater than 2-3bigha	1	1	1	3
	greater than 5-8bigha		1	1	2
	greater than3-4 bigha		2	1	3
	greater than4-5bigha			1	1
	Upto 1 bigha	9	10	3	22
Purba Medinipur Total		**12**	**18**	**12**	**42**
Purulia	greater than 10 bigha		1	1	2
	greater than 2-3bigha		1	1	2
	greater than 5-8bigha		2	3	5
	greater than 8-10bigha		1	1	2
	greater than4-5bigha			1	1
Purulia Total			**5**	**7**	**12**
South 24 parganas	greater than 10 bigha	1	1	1	3
	greater than 1-2 bigha	3	2	8	13

	greater than 2-3bigha	3	2	5	10
	greater than 5-8bigha	2	2	4	8
	greater than 8-10bigha			1	1
	greater than3-4 bigha		1	6	7
	greater than4-5bigha	1		5	6
	Upto 1 bigha	3	1	4	8
South 24 parganas Total		**13**	**9**	**34**	**56**
Grand Total		**48**	**56**	**96**	**200**

Source: Field Survey 2014

It appears that small farming does dominate in each of the selected districts. However it appears that in Purulia, Birbhum and Bankura, the scenario is marginally different. In Purba Medinipur there does not exist any farm in our sample for which the net cropped area is above 8 bighas.

Chapter 4 Economic Viability of Sustainable Agriculture

Socio Economic Profile of the Sampled Households

4.1 Introduction

Surveyed households were primarily selected from the population of 399 households identified by DRCSC. The households belonged to 7 districts in which DRCSC was promoting sustainable agriculture. The field survey covered 200 households (see Chapter 3). The total number of family members of the surveyed households was 1047. The average family size was 5. In this Chapter, we shall discuss the occupational pattern and the level of education of the members of the surveyed households. The major issue that we would address in this Chapter can be placed in the following way. As farming practice, organic farming has some special features. It is supposed to be more labour intensive. Again, some sort of awareness about long term sustainability of agriculture is considered as one of the motivational factors behind adopting organic farming. To what extent these are reflected in the occupational pattern and the level of educational attainment of the farmer households? In this Chapter we would address this issue.

4.2 Profile of the Selected Farmer Households

Gender Distribution of the Farming Households

There is not much gender variation across the farmer groups among the surveyed households.

Table 4.1: Gender Distribution of the Sampled Households

Type	Male	Female	Total
Fully inorganic	115	113	228
Fully organic	144	149	293
Partly organic/inorganic	279	247	526
Grand Total	**538**	**509**	**1047**

Source: Field Survey 2014

51.39 per cent of the total household members have been male whereas the comparable percentage had been 48.61 for the female. This is almost the same as Census 2011 sex ratio (940 female per 1000 male in India and 950 female per 1000 male in West Bengal). As the data indicate, the gender ratio had been in favour of the female members and it was slightly tilted towards male members (53 per cent had been male and 47 per cent had been female). For such households which were practicing partly organic/inorganic farming. One should not read too much from this information. It appears that it was just due to the way in which the population of farming households was distributed in the original listing provided by DRCSC. We should however report that the gender distortion had been more prevalent in 3 districts in the list of households from which the sample was drawn primarily.

Occupation Profile of the Sampled Households

Table 4.2 Distribution of Principal Occupation (Usual Status) of the Household Members

Principal Occupation	Frequency	Percentage
Agricultural labour	8	0.76
Allied agriculture	2	0.19
Business	14	1.34
Farming	276	26.36
Household work	267	25.50
Too Young	68	6.49
Non agricultural labour	84	8.02
Too Old	33	3.15
Pensioner	1	0.10
Service	11	1.05
Skilled Worker	21	2.01
Student above 18 years	34	3.25
Teacher	6	0.57
Unemployed	5	0.48
Student below 18 years	217	20.73
Grand Total	**1047**	100.00

Source: Field Survey 2014

Table 4.2 reveals that farming had been the major principal occupation of the adult members of the sampled households. 26.36 per cent of the household members had been engaged in farming according to their usual principal status. 25.50 per cent of the household members were engaged in household chores, which happen to be the next major principal occupation. The occupational distribution of the members of the sampled households also reveal that the students below 18 years which constituted 20.73 per cent of 1047 persons for which the occupation related information was collected had been the next major occupational group. It appears that emphasis on education for the minor members of the households had been increasing among the farmer households of the field area.

Table 4.3 Principal Occupation among the Adult Members Male and Female (Usual Status)

Principal Occupation	Male	Male Percentage	Female	Female Percentage	Total	Total Percentage
Agricultural labour	8	2.01	0	0.00	8	1.05
Allied agriculture	2	0.50	0	0.00	2	0.26
Business	12	3.01	2	0.55	14	1.84
Farming	226	56.64	50	13.77	276	36.22
Household work	0	0.00	267	73.55	267	35.04

Non agricultural labour	73	18.30	11	3.03	84	11.02
Too Old	14	3.51	19	5.23	33	4.33
Pensioner	1	0.25	0	0.00	1	0.13
Service	8	2.01	3	0.83	11	1.44
Skilled Worker	21	5.26	0	0.00	21	2.76
Student above 18 years	23	5.76	11	3.03	34	4.46
Teacher	6	1.50	0	0.00	6	0.79
Unemployed	5	1.25	0	0.00	5	0.66
Grand Total	**399**	**100.00**	**363**	**100.00**	**762**	**100.00**

Source: Field Survey 2014

The gender wise distribution of occupation among the members of the surveyed households further reveals that the second major principal occupation of the households which was identified as household work had been primarily due to the pattern of occupational distribution of the female members of the farming households. 73.55 per cent of the female members were found to remain engaged in household work. As expected from the design of the sample, farming had been the major principal activity for the adult male members of these households (56.64 per cent). (Table 4.3) Next to farming, principal occupation for male members had been non agricultural work (18.30 per cent) as labour. One interesting observation is that farming was found to be the second major area of occupation (13.77 per cent) for the female members of these households.

The district wise distribution of adult members of the surveyed households (Table 4.3a) does not indicate anything special for any particular district. As in case of the aggregate data the district wise

Table 4.3a District wise Distribution of Principal Occupation (Usual Status) of the Adult Members of the Sampled Household

District	Principal Occupation	Male	Male percentage	Female	Female Percentage	Total	Total Percentage
Bankura	Agricultural labour	1	1.89		0.00	1	1.05
	Farming	38	71.70	1	2.38	39	41.05
	Household work		0.00	36	85.71	36	37.89
	Non agricultural labour	2	3.77	4	9.52	6	6.32
	Too old	2	3.77	1	2.38	3	3.16
	Service	1	1.89		0.00	1	1.05
	Student	9	16.98		0.00	9	9.47
Bankura Total		**53**	100.00	**42**	100.00	**95**	100.00
Birbhum	Farming	14	87.50	5	25.00	19	52.78
	Household work		0.00	13	65.00	13	36.11

	Too old		0.00	1	5.00	1	2.78
	Skilled Worker	1	6.25		0.00	1	2.78
	Student		0.00	1	5.00	1	2.78
	Teacher	1	6.25		0.00	1	2.78
Birbhum Total		**16**	100.00	**20**	100.00	**36**	100.00
Jalpaiguri	Business	1	4.55		0.00	1	2.38
	Farming	14	63.64	3	15.00	17	40.48
	Household work		0.00	10	50.00	10	23.81
	Non agricultural	3	13.64		0.00	3	7.14
	labour						
	Too old		0.00	3	15.00	3	7.14
	Service	1	4.55	1	5.00	2	4.76
	Skilled Worker	1	4.55		0.00	1	2.38
	Student	1	4.55	3	15.00	4	9.52
	Unemployed	1	4.55		0.00	1	2.38
Jalpaiguri Total		**22**	100.00	**20**	100.00	**42**	100.00
North 24	Agricultural labour	2	2.27		0.00	2	1.21
Parganas	Allied agriculture	2	2.27		0.00	2	1.21
	Business	2	2.27	1	1.30	3	1.82
	Farming	53	60.23		0.00	53	32.12
	Household work	0	0.00	69	89.61	69	41.82
	Non agricultural	12	13.64		0.00	12	7.27
	labour						
	Too old	4	4.55	6	7.79	10	6.06
	Service	3	3.41		0.00	3	1.82
	Skilled Worker	2	2.27		0.00	2	1.21
	Student	4	4.55	1	1.30	5	3.03
	Teacher	1	1.14		0.00	1	0.61
	Unemployed	3	3.41		0.00	3	1.82
North 24 Parganas Total		**88**	100.00	**77**	100.00	**165**	100.00
Purba Medinipur	Agricultural labour	2	2.74		0.00	2	1.40
	Business	4	5.48		0.00	4	2.80
	Farming	31	42.47	11	15.71	42	29.37
	Household work	0	0.00	53	75.71	53	37.06
	Non agricultural labour	23	31.51	1	1.43	24	16.78
	Too old	3	4.11	3	4.29	6	4.20
	Service	1	1.37	1	1.43	2	1.40
	Skilled Worker	5	6.85		0.00	5	3.50

	Student	4	5.48	1	1.43	5	3.50
Purba Medinipur Total		**73**	100.00	**70**	100.00	**143**	100.00
Purulia	Agricultural labour	1	3.57		0.00	1	1.96
	Business	1	3.57	1	4.35	2	3.92
	Farming	18	64.29	12	52.17	30	58.82
	Household work		0.00	9	39.13	9	17.65
	Non agricultural labour	5	17.86	1	4.35	6	11.76
	Too old	1	3.57		0.00	1	1.96
	Pensioner	1	3.57		0.00	1	1.96
	Student	1	3.57		0.00	1	1.96
Purulia Total		**28**	100.00	**23**	100.00	**51**	100.00
South 24 parganas	Agricultural labour	2	1.68		0.00	2	0.87
	Business	4	3.36		0.00	4	1.74
	Farming	58	48.74	18	16.22	76	33.04
	Household work	0	0.00	77	69.37	77	33.48
	Non agricultural labour	28	23.53	5	4.50	33	14.35
	Too old	4	3.36	5	4.50	9	3.91
	Service	2	1.68	1	0.90	3	1.30
	Skilled Worker	12	10.08		0.00	12	5.22
	Student	4	3.36	5	4.50	9	3.91
	Teacher	4	3.36		0.00	4	1.74
	Unemployed	1	0.84		0.00	1	0.43
South 24 parganas Total		**119**	100.00	**111**	100.00	**230**	100.00
Grand Total		**399**		**363**		**762**	

Source: Field Survey 2014

distribution also reveals that farming had been the major occupation for male members in all the districts. Again, for female members household work had been the predominant principal activity under usual status (Table 4.3a) in all the districts covered under this survey.

Table 4.4a Farmer Group Specific Distribution of Principal Occupation (Usual Status) Among the Adult Members

Farmer Type	Principal Occupation	Male	Male percentage	Female	Female Percentage	Total	Total Percentage
Fully inorganic	Agricultural labour	1	1.23		0.00	1	0.64
	Business	6	7.41		0.00	6	3.82
	Farming	42	51.85	4	5.26	46	29.30

	Household work	1	1.23	61	80.26	62	39.49
	Non agricultural labour	11	13.58	1	1.32	12	7.64
	Too old	3	3.70	4	5.26	7	4.46
	Service	2	2.47	1	1.32	3	1.91
	Skilled Worker	6	7.41		0.00	6	3.82
	Student	5	6.17	5	6.58	10	6.37
	Teacher	2	2.47		0.00	2	1.27
	Unemployed	2	2.47		0.00	2	1.27
Fully inorganic Total		**81**	100.00	**76**	100.00	**157**	100.00
Fully organic	Agricultural labour	4	3.57		0.00	4	1.86
	Business	4	3.57	1	0.97	5	2.33
	Farming	61	54.46	18	17.48	79	36.74
	Household work		0.00	71	68.93	71	33.02
	Non agricultural labour	24	21.43	2	1.94	26	12.09
	Too old	3	2.68	7	6.80	10	4.65
	Service	4	3.57	2	1.94	6	2.79
	Skilled Worker	5	4.46		0.00	5	2.33
	Student	5	4.46	2	1.94	7	3.26
	Teacher	1	0.89		0.00	1	0.47
	Unemployed	1	0.89		0.00	1	0.47
Fully organic Total		**112**	100.00	**103**	100.00	**215**	100.00
Partly organic/ inorganic	Agricultural labour	3	1.46		0.00	3	0.77
	Allied agriculture	2	0.97		0.00	2	0.51
	Business	2	0.97	1	0.54	3	0.77
	Farming	123	59.71	28	15.22	151	38.72
	Household work	2	0.97	135	73.37	137	35.13
	Non agricultural labour	35	16.99	8	4.35	43	11.03
	Too old	8	3.88	8	4.35	16	4.10
	Pensioner	1	0.49		0.00	1	0.26
	Service	2	0.97		0.00	2	0.51
	Skilled Worker	10	4.85		0.00	10	2.56
	Student	13	6.31	4	2.17	17	4.36
	Teacher	3	1.46		0.00	3	0.77
	Unemployed	2	0.97		0.00	2	0.51
Partly organic/inorganic Total		**206**	100.00	**184**	100.00	**390**	100.00
Grand Total		**399**		**363**		**762**	

Source: Field Survey 2014

Considering the same information with respect to farmer type (Table 4.4a), one understands that farming remains the major principal occupation for the male members in all types of farmer groups. However, with respect to fully organic farming and partly organic farming, the percentage of male members reporting farming as major principal occupation had been found to be higher than that in fully inorganic farming. With respect to the female family members household chores remains the major principal occupation with respect to each type of farmer group; however, the data indicate that the percentage of female family members reporting farming as principal occupation (under usual status) had been higher than the corresponding percentages in other two groups of farmers .

In fact, the percentage of female family members reporting farming as principal occupation had been much higher in fully organic as well as in partially organic/inorganic farmer households, compared to that in fully inorganic farmer. It appears that such farming households require the involvement of family labour in farming practices more intensively. This has something to do with organic based integrated farming—an issue which we would discuss in Chapter 6 of this report.

Table 4.4b Distribution of Subsidiary Occupation (Usual Status) Among the Adult Members

Subsidiary Occupation	Male	Male Percentage	Female	Female Percentage	Total	Total Percentage
Agricultural Labour	9	3.70	1	0.40	10	**2.03**
Allied Agriculture	9	3.70	1	0.40	10	**2.03**
Business	8	3.29		0.00	8	**1.62**
Farming	82	33.74	174	69.60	256	**51.93**
Household work	6	2.47	42	16.80	48	**9.74**
Job in a NGO	1	0.41		0.00	1	**0.20**
Non Agricultural Labour	116	47.74	25	10.00	141	**28.60**
Pensioner		0.00	1	0.40	1	**0.20**
Skilled Worker	10	4.12	4	1.60	14	**2.84**
Teacher	2	0.82	2	0.80	4	**0.81**
Grand Total	**243**	100.00	**250**	100.00	493	**100.00**

Source: Field Survey 2014

In order to explore this point further we considered the nature of the subsidiary occupation of the adult members of the surveyed households under usual status. Involvement as non agricultural labour had been the most important area of subsidiary activity for the male members of the surveyed households (47.74 per cent) (Table 4.4b). However, for such adult male members whose principal activity under usual status had not been farming, a very important area of subsidiary occupation for these persons had also been farming (33.74 per cent). For the female members of the surveyed households, the information on usual subsidiary occupation as captured in Table 4.4b reveals that farming had by far the most important area of subsidiary occupation under usual status. Thus 69.60 per cent of the female members of the surveyed households reported farming as the subsidiary area of occupation. Probing the data further, we understood that

importance of farming as subsidiary occupation under usual status is most prevalent in the sampled households in North 24 Parganas (Table 4.4c). More than 90 per cent of the female members of these households who have reported usual subsidiary occupation reported agriculture as the subsidiary occupation under usual status.

Table 4.4c District wise Distribution of Subsidiary Occupation (Usual Status) Among the Adult Members

District	Subsidiary Occupation	Male	Male Percentage	Female	Female Percentage	Total	Total Percentage
Bankura	Agricultural Labour		0.00	1	3.13	1	1.47
	Farming	6	16.67	21	65.63	27	39.71
	Household work		0.00	2	6.25	2	2.94
	Non Agricultural Labour	30	83.33	8	25.00	38	55.88
Bankura Total		**36**	100.00	**32**	100.00	**68**	100.00
Birbhum	Allied Agriculture	3	42.86		0.00	3	17.65
	Farming		0.00	7	70.00	7	41.18
	Household work	1	14.29	3	30.00	4	23.53
	Non Agricultural Labour	3	42.86		0.00	3	17.65
Birbhum Total		**7**	100.00	**10**	100.00	**17**	100.00
Jalpaiguri	Business	2	20.00		0.00	2	9.09
	Farming	1	10.00	8	66.67	9	40.91
	Household work		0.00	3	25.00	3	13.64
	Non Agricultural Labour	4	40.00		0.00	4	18.18
	Skilled Worker	3	30.00		0.00	3	13.64
	Teacher		0.00	1	8.33	1	4.55
Jalpaiguri Total		**10**	100.00	**12**	100.00	**22**	100.00
N 24 Parganas	Agricultural Labour	3	5.56		0.00	3	2.75
	Allied Agriculture	2	3.70		0.00	2	1.83
	Business	2	3.70		0.00	2	1.83
	Farming	16	29.63	50	90.91	66	60.55
	Non Agricultural Labour	29	53.70	4	7.27	33	30.28
	Pension		0.00	1	1.82	1	0.92
	Skilled Worker	1	1.85		0.00	1	0.92
	Teacher	1	1.85		0.00	1	0.92
N 24 Parganas Total		**54**	100.00	**55**	100.00	**109**	100.00
Purba Medinipur	Farming	18	46.15	34	69.39	52	59.09
	Household work	2	5.13	4	8.16	6	6.82

	Non Agricultural Labour	16	41.03	7	14.29	23	26.14
	Skilled Worker	3	7.69	3	6.12	6	6.82
	Teacher		0.00	1	2.04	1	1.14
Purba Medinipur Total		**39**	100.00	**49**	100.00	**88**	100.00
Purulia	Agricultural Labour	1	5.00		0.00	1	2.50
	Allied Agriculture	4	20.00	1	5.00	5	12.50
	Farming	5	25.00	8	40.00	13	32.50
	Household work	1	5.00	10	50.00	11	27.50
	Non Agricultural	9	45.00	1	5.00	10	25.00
	Labour						
Purulia Total		**20**	100.00	**20**	100.00	**40**	100.00
S 24	Agricultural Labour	5	6.49		0.00	5	3.36
Parganas	Business	4	5.19		0.00	4	2.68
	Farming	36	46.75	46	63.89	82	55.03
	Household work	2	2.60	20	27.78	22	14.77
	Job in a NGO	1	1.30		0.00	1	0.67
	Non Agricultural Labour	25	32.47	5	6.94	30	20.13
	Skilled Worker	3	3.90	1	1.39	4	2.68
	Teacher	1	1.30		0.00	1	0.67
S 24 Parganas Total		**77**	100.00	**72**	100.00	**149**	100.00
Grand Total		**243**		**250**		**493**	

Source: Field Survey 2014

Considering the occupational profile of the households under usual status with respect to both principal and secondary activities of the adult members of the households, one observes that agriculture is indeed the main stay of life of the households included in this survey. There are 762 adult members covered in this study. 69.82 per cent of these adult members are engaged in farming under usual (principal plus subsidiary) status. Even in case of female family members, involvement in farming either in principal or in subsidiary status is quite high in this sample. Thus, in case of fully inorganic farmer group 60.53 per cent of the adult female members were found to remain engaged in agriculture under usual (principal plus subsidiary) status. Table 4.5 also reveals that involvement in farming is more intense in case of fully organic farmer group. 77.68 per cent of the male adult members of these families remain involved in agriculture under usual (principal plus subsidiary) status. The comparable percentage for the female members is also as high as 66.99 per cent. One may note that the percentage of female members engaged in farming in other two groups of farmer is significantly lower than what has been reported in case

Table 4.5 Percentage of Adult Members engaged in Farming (Usual Principal plus subsidiary)

Farmer Type	Gender	Adult members engaged in Farming	Adult Members in the Family	Percentage of adult members engaged in Farming (Principal+ Subsidiary)
Fully inorganic	**Male**	61	81	75.31
	Female	46	76	60.53
Fully inorganic Total		**107**	**157**	**68.15**
Fully organic	**Male**	87	112	77.68
	Female	69	103	66.99
Fully organic Total		**156**	**215**	**72.56**
Partly organic/inorganic	**Male**	161	206	78.16
	Female	108	184	58.70
Partly organic/inorganic Total		**269**	**390**	**68.97**
Grand Total		**532**	**762**	**69.82**

Source: Field Survey 2014

Of fully organic farmer group. One may therefore conclude that the overall scenario with respect to the sampled households is that the fully organic farmers practice more intense use of family labour. As we shall discuss later the viability of organic farming for the small producers is attained largely by more intense use of family labour. The information on the occupational distribution of the members of the surveyed households provides indirect evidence in favour of this contention.

Educational Status of the Households

Illiteracy among the adult members of the surveyed households is rather low. Even then about 15 per cent of the individuals covered in this survey were illiterate (Table 4.6). The general scenario however, had been such that the members of the farmer family had exposure to formal education. A sizeable percentage had the school level degree (secondary). The percentage of persons at higher secondary plus educational group had been quite low (8.7 per cent). Inter farmer group variation with respect to the educational level of the members of the households does not appear to be noteworthy. Again, at the outset it does not appear that the awareness and interest about organic farming has little to do with formal education in the family.

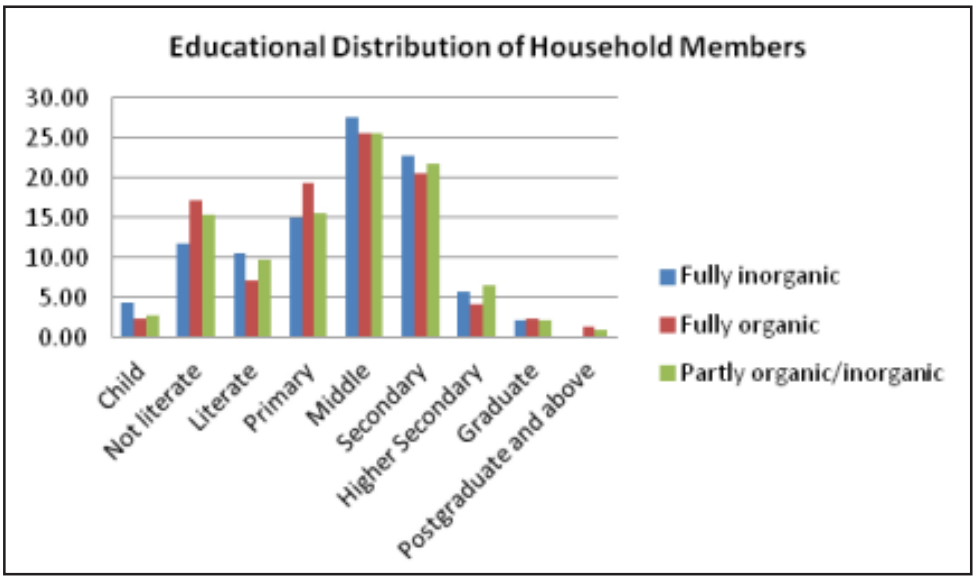
Table 4.6: Educational Distribution of Household Members

Educational Status	Fully inorganic	Fully organic	Partly organic/inorganic	Total
Child	4.39	2.39	2.66	2.96
Not literate	11.84	17.06	15.40	15.09
Literate	10.53	7.17	9.70	9.17
Primary	14.91	19.45	15.59	16.52

Middle	27.63	25.60	25.48	25.98
Secondary	22.81	20.48	21.67	21.59
Higher Secondary	5.70	4.10	6.46	5.64
Graduate	2.19	2.39	2.09	2.20
Postgraduate and above	0.00	1.37	0.95	0.86
Total	100.00	100.00	100.00	100.00

Source: Field Survey 2014

Figure 4.1: Educational Distribution of the Household Members of the Sampled Farmers



Source: Field Survey 2014

In order to examine this point more thoroughly, we considered (Table 4.7) the information on the educational level of such members of households who were principally engaged in farming.

Table 4.7: Education level of the members of the farmer family principally engaged in Farming according to farmer group

Farmer Type	Educational Level	Frequency	Percentage
Fully inorganic	Not literate	6	13.04
	Literate	4	8.70
	Primary	6	13.04
	Middle	12	26.09
	Secondary	15	32.61
	Higher Secondary	3	6.52
Fully inorganic Total		**46**	100.00

Fully organic	Not literate	11	13.92
	Literate	9	11.39
	Primary	15	18.99
	Middle	23	29.11
	Secondary	15	18.99
	Higher Secondary	5	6.33
	Graduate	1	1.27
Fully organic Total		**79**	100.00
Partly organic/ inorganic	Not literate	19	12.58
	Literate	11	7.28
	Primary	24	15.89
	Middle	46	30.46
	Secondary	34	22.52
	Higher Secondary	13	8.61
	Graduate	4	2.65
Partly organic/inorganic Total		**151**	100.00
Grand Total		**276**	——

Source: Field Survey 2014

As the data indicate, the inter farmer group variation with respect to educational level of the persons who were principally engaged in agriculture is not quite high. There is no evidence in favour of the argument that the consciousness about organic farming had anything to do with the level of formal education of the farmers. Thus, considering secondary plus level of education as the benchmark, the percentage of farmers practicing fully inorganic type of farming had been as low as 6.52. The comparable percentage for fully organic farmers had been slightly high (7.6); it had been higher (11.26) with respect to the farmers practicing partially organic/inorganic farming (Table 4.7).

Concluding Observations

The information on the occupational distribution of the members of the surveyed households indicate that there are reasons to believe that organic farmers mobilize family labour more intensively than the other types of farmers for sustaining the non GR based farming practices. It does not seem that awareness about organic farming has a strong and positive association with the level of educational attainment of the farmer households. It seems that the awareness about organic farming in the field area is primarily based on the 'hand holding' practices of DRCSC, the NGO which is operating in the field area from which the information had been collected.

Chapter 5 Economic Viability of Sustainable Agriculture

Farming Activities in the Field Area

5.1 Introduction

The survey covered 200 farmers from 7 districts of West Bengal. 56 of these farmers were practicing non-GR technology (organic farming) and 48 were sticking to the GR technology. The rest, 96 in number were under mixed farming practices—they were combining organic farming with inorganic farming in different degrees. In this Chapter we shall consider the farming practices of these households. Crop Rotational Pattern and the extent of cropping intensity practiced by these farms would be the major points of consideration in this Chapter. The nature of farm practices as well as the extent of cropping intensity are expected to differ according to the size class of farms, and also according to the type of farming (i.e., whether the farm is under non-GR technology or not). We shall examine these issues on the basis of the information that we have collected from these farmer households. This Chapter also contains information on non-farm sources of income for these households.

5.2 Intensity of Cropping in the Surveyed Farms

The average cropping intensity of West Bengal is 181 (Gross Cropped /Net Cropped *100). The average cropping intensity of the selected farms is 143. At the very outset, it should therefore, be pointed out that the average scenario as regards cropping intensity depicted in this study cannot be taken as representative for the state. We should also mention that even at the district level the extent of intensity of farming reported in the selected farms had mostly been below the average intensity of farming of the respective districts.

Table 5.1: Average Cropping Intensity in the Selected Districts and in the Surveyed Farms

District	Cropping Intensity (Official Sources)	Cropping Intensity (from surveyed data)
Bankura	147	111.04
Birbhum	164	153.92
North 24 Parganas	215	148.98
South 24 Parganas	147	148.76
Purulia	105	119.10
Jalpaiguri	163	163.56
Purba Medinipur	192	169.68
West Bengal	181	143.04 (average for 200 farms)

Source: West Bengal State Marketing Board (http://www.wbagrimarketingboard.gov.in/Area/Grosscropped.html), 2009-10, *Field Survey 2014*

Thus, in North 24 Parganas the average cropping intensity, as reported in the official data had been 215; the average cropping intensity of the farms selected for our study had been only 148.98

In Purba Medinipur, the average cropping intensity for the district was 192, The average intensity of farming in the selected farms had been 169.68 only. In Bankura, the average cropping intensity in the surveyed farms was 111.04, the district average, on the other hand, had been as high as 147. In the other selected districts, the difference had not been quite high. One point however, must be mentioned. The average cropping intensity in the farms under study had hardly been higher than what was reported with respect to the average farms in the districts. The reason might be that the field area in which the survey was conducted had been the area under DRCSC intervention; and DRCSC usually intervenes mostly in agriculturally backward regions of a district where the cropping intensity is expected to be lower than that of the district average.

Table 5.2: Farm size wise Cropping Intensity

Farmer Class	No of farms	Average Net cropped area (bigha)	Average Gross cropped area (bigha)	Average Cropping Intensity
less than 1-4 bigha Total	127	1.82	2.99	165.16
greater than 4-8 bigha Total	52	5.60	7.74	138.12
more than 8 bigha Total	21	12.51	16.15	129.09
Grand Total	**200**	**3.92**	**5.61**	**143.04**

Source: Field Survey 2014

The farms under study were divided in 3 size classes in Table 5.2. There had been 127 farms in the smallest size class (less than 1 bigha to 4 bigha). The average net cropped area had been 1.82 bigha (1 bigha=33 decimal) which indicates that a typical farm in this size class did not have more than 2 bigha under operation. The average cropping intensity however, had been 165.16. In the median group (greater than 4 bigha to 8 bigha, there were 52 farms with average net cropped area of 5.60 bigha. The average cropping intensity was 138.12. In the highest size class, there had been only 21 farms. The average cropping intensity of these farms had been 129.09. This is consistent with the conventional wisdom that the small farms in West Bengal are more intensively cropped. In fact, the cropping intensity for the selected farms varies inversely as the size of farm.

48 out of 200 farms were under fully inorganic farming. The average net cropped area was 3.63 bigha. The cropping intensity for these farms was 151.99. In 56 farms the farming practice was fully organic in nature. The average cropping intensity of these farms was only 137.59. The rest, 96 in number had been under mixed farming practices. The cropping intensity for these farms was 142.05. It appears that contrary to what is conventionally believed, farms under GR technology are more intensely cultivated. In fact, intensity of cropping under mixed farming practices is also higher than that under organic farming.

Table 5.3: Farm Type wise Cropping Intensity

Farmer Type	No of farmers	Average Net cropped area	Average Gross cropped area	Average Cropping Intensity
fully inorganic Total	48	3.63	5.51	151.99
fully organic Total	56	3.80	5.22	137.59
partly organic/inorganic Total	96	4.15	5.89	142.05
Grand Total	**200**	**3.92**	**5.61**	**143.04**

Source: Field Survey 2014

Probing the issue further (Table 5.4), it appears that intra size class variation across farm types is not as sharp as it was projected in Table 5.3. Thus within the smallest size class of farms fully organic farms have more or less the same level of cropping intensity as the fully inorganic farms. The inter farm type variation in intensity of farming increases as we move to the higher size classes where the fully organic farms are found to be less intensively cultivated.

Table 5.4: Farm Type wise Cropping Intensity Across Various Size Classes

Farmer Type	Size Class of land	No of farmers	Average Net cropped area	Average Gross cropped area	Average Cropping Intensity
fully inorganic	less than 1-4 bigha	32	1.58	2.63	166.75
fully organic	less than 1-4 bigha	39	1.73	2.90	167.27
partly organic/ inorganic	less than 1-4 bigha	56	2.01	3.28	163.19
fully inorganic	greater than 4-8 bigha	12	6.05	8.42	139.13
fully organic	greater than 4-8 bigha	10	5.93	7.59	127.81
partly organic/ inorganic	greater than 4-8 bigha	30	5.31	7.52	141.50
fully inorganic	more than 8 bigha	4	12.72	19.80	155.69
fully organic	more than 8 bigha	7	12.26	14.83	121.01
partly organic/ inorganic	more than 8 bigha	10	12.61	15.61	123.85
Grand Total		**200**	**3.92**	**5.61**	**143.04**

Source: Field Survey 2014

As we shall discuss later, organic farms mostly depend on family labour. As the farm size increases it becomes difficult to manage organic farming with family labour only. It involves higher paid out cost. A big farmer can of course afford to meet this cost. He would however, do so provided the farming is commercially viable. The viability would exist provided the farmer can get a niche market for the products of organic farm. The peasants usually do not have such opportunity. Typically they stick to the softer option of producing for the general market where the logic of cost effectiveness favours GR technology. Apparently, this is the reason for less intensive farming in fully organic farms

at higher size classes. However, we shall probe this point further when discuss the issues related to farm business income (Chapter 6).

5.3 Cropping Pattern in Surveyed Farms

Major Crops

There are three recognized cropping seasons in which the season specific crops are cultivated. The main stay of agriculture in West Bengal is rice production and traditionally the farmers of West Bengal cultivate rain fed paddy (Aman) during the Khariff season. With respect to the farmer households surveyed by us, reality had not been different. In fact, there was no farmer type variation in this regard. We should however, point out that a few among the selected farmers were not found to have cultivated aman crop during the production cycle for which the data had been collected (8 out of 200 farmers were not cultivating aman). As Table 5.5 indicates, there had not been much farmer type bias in this regard. 3 out of 56 organic farmers did not cultivate aman during 2012-13. The comparable numbers among the fully inorganic and partly organic/inorganic had been 2 out of 48 and 3 out of 96. The 3 farmers in our sample practicing fully organic farming, who were not producing aman had tiny plots of land (mainly homestead and pond). It was almost impossible to produce aman in such tiny plots of land. The reasons had been different for other farmers. In case of fully inorganic type of farmers, both the non-aman producing farmers had comparatively larger plots of land (one having net cropped area 1.55 bigha and for the other farmer the comparable number had been more than 14.73 bigha) farmers.

Table 5.5: The Major Crops Cultivated by the Surveyed Farmers

Crop Name	Fully inorganic	Fully organic	Partly organic/inorganic	Total
Total Farmers	48	56	96	**200**
Aman	46	53	93	**192**
Potato	23	33	45	**101**
Boro	18	13	27	**58**

Source: Field Survey 2014

They cultivate boro, potato and a variety of vegetables that fetch better revenue. Among the partially organic /inorganic farmers, one farmer is a big one and cultivates boro and seasonal vegetables. The other 2 farmers are very small farmers. On their tiny available land in homestead they produce a variety of vegetables seasonally. It seems that there exists a trade-off between traditional aman and the seasonal vegetables that motivates some farmers to opt for a non-traditional crop basket.

The other major crops in the field area had been potato and boro (a summer paddy). The percentage of farmers cultivating potato had been 50, the corresponding percentage for boro cultivator among the surveyed farms had been 29. The inter district variation with respect to potato and boro cultivation had been quite high. Thus, among the selected farmers of North 24 Parganas (46) potato as post khariff crop had been cultivated by 38 farmers. On the other hand, out of 20 farmers of Bankura, only 5 were found to cultivate

potato during the post khariff season of 2012-13 production cycle. The opportunity for boro cultivation largely depends on the availability of irrigation during the rabi season. Many of the farmers in the field area did not have that opportunity. Among the farmers reporting boro cultivation during 2012-13 production cycle, the inter farm type variation had not been very high. 37.5 percent of inorganic farmers were found to cultivate boro during 2012-13. The comparable percentage of organic and partially organic /inorganic had been 23.21 and 28.12 respectively. What one should highlight is the fact that the organic farms cultivating boro were actually opting for an alternative technology which is not advocated by the promoters of summer crop. The usual package for boro cultivation is chemical fertilizer-water-pesticide driven GR technology. In the field area, 13 out of 56 organic farmers who were found to cultivate boro did not use the typical GR technology based package of inputs and pesticides. What we should point out further is that such farmers were spread over five out of seven selected districts from which the sample farmers were selected. Organic farmers of Bankura and Purulia from our selected list of farmers, did not cultivate boro crop. In this context, we should mention that boro crop cultivation is not widely practiced in Purulia and Bankura mainly because of the non-availability of sufficient water during the dry season.

Other Crops

Table 5.6A: Distribution of other Crops According to Farmer Type (Number)

Name of the crops	fully inorganic	fully organic	partly organic/inorganic	Grand Total
Urad Dal	0	1	2	**3**
Red Lentil	1	10	6	**17**
Mustard	9	4	17	**30**
Jute	5	2	5	**12**
Sesame (Til)	3	2	2	**7**
Sunflower			1	**1**
Flax Seeds (Tishi)		3		**3**
Grand Total	**18**	**22**	**33**	**73**

Source: Field Survey 2014

A section of the farmers with reasonable level of holding cultivate pulses and Jute during rabi and pre-khariff season. Among the surveyed households, 12 were found to cultivate jute during pre-khariff season (Table 5.6A). However, they were all from two out of seven districts (4 were from Jalpaiguri and 8 from North 24 Parganas), as Table 5.7 indicates. Oilseeds were cultivated by 40 farmers, spread over all seven districts under study. 20 farmers were producing pulses during the rabi season (chaitali). Such farmers were from 6 out of 7 districts. As we get from Table 5.6B, 73 out of 200 farmers were engaged in rabi and pre-khariff production. Production of pulses has been prevalent among the fully organic farmers (55 per cent of such farmers were from the fully organic group). Oilseeds were cultivated mostly by partly organic/inorganic farmers. However, oilseeds are chaitali crops have been cultivated by some of the fully organic farmers as well as the fully inorganic farmers. Production of jute however has been concentrated mostly in inorganic and partly organic/inorganic type farmers. From the field level

information, it was understood that most of the farmers in our sample had not been engaged in such rabi and pre khariff production (127 out of 200). This does not however mean that they mostly keep their land fallow after khariff production. The information on average cropping intensity of these farmers (143 per cent) also provide indirect evidence in support of this statement. In fact, most of the farmers, the organic farmers in particular, opt for vegetable cultivation following khariff production. The extent of such endeavour varies widely (mostly due to availability or non availability of ground water). As we have observed, the farmers in the sample produce vegetables in each season, even during the khariff season.

Table 5.6B: Distribution of other Crops According to Farmer Type (Percentage)

Name of the crops	fully inorganic	fully organic	partly organic/inorganic	Grand Total
Pulses	1	11	8	**20**
Pulses (Percentage)	5.00	55.00	40.00	**100.00**
Oil seeds	12	9	19	**40**
Oil seeds (Percentage)	30.00	22.50	47.50	**100.00**
Jute	5	2	5	**12**
Jute (Percentage)	41.67	16.67	41.67	**100.00**
Sunflower	0	0	1	**1**
Sunflower (Percentage)	0.00	0.00	100.00	**100.00**
Grand Total	**18**	**22**	**33**	**73**
Grand Total (Percentage)	**24.66**	**30.14**	**45.21**	**100.00**

Source: Field Survey 2014

Table 5.7: District wise Distribution of other Crops According to Farmer Type

District	Farmer Type	Flax Seeds	Jute	Mustard	Red Lentil	Sesame	Sunflower	Urad Dal	Grand Total
bankura	fully inorganic			1					**1**
bankura Total				1					**1**
birbhum	fully organic	1			1	1			**3**
	partly organic/ inorganic			3	1	1		1	**6**
birbhum Total		1		3	2	2		1	**9**
Jalpaiguri	fully inorganic			1					**1**
	fully organic		1	1	3				**5**
	partly organic/ inorganic		3	2	1				**6**
jalpaiguri Total			4	4	4				**12**
N 24 parganas	fully inorganic		5	6		3			**14**
	fully organic		1		1	1			**3**
	partly organic/		2	5		1			**8**

	inorganic								
N 24 parganas Total			8	11	1	5			**25**
Purba	fully organic			1	1				**2**
Medinipur	partly organic/ inorganic			1					**1**
Purba Medinipur Total				2	1				**3**
Purulia	fully organic	1		2					**3**
	partly organic/ inorganic			4				1	**5**
Purulia Total		1		6				1	**8**
S 24 Parganas	fully inorganic			1	1				**2**
	fully organic	1			4			1	**6**
	partly organic/ inorganic			2	4		1		**7**
S 24 parganas Total		1		3	9		1	1	**15**
Grand Total		**3**	**12**	**30**	**17**	**7**	**1**	**3**	**73**

Source: Field Survey 2014

Production of Vegetables

We should report that in all the households at least some parts of the agricultural land had been under cultivation during the production cycle (2012-13). Besides the major seasonal crops, the basket of crops included vegetables during all the cropping seasons. The types of vegetables in various seasons as listed during the field survey are described (in local names in some cases) in Table 5.8. It was observed that during the pre khariff season, the fully inorganic farmers were cultivating 12 types of vegetables; the number of vegetables cultivated by the fully organic farmers during the pre khariff season had been 16 and the number of vegetables by the partial inorganic/organic farmers had been 19. The number of vegetables during the khariff season had been lower (as expected). As we recorded, there had been 8 types of vegetables which had been produced by the inorganic farmers during this season. The number of vegetables observed in the farms of organic farmers had been 9 and that in case of the partially inorganic/organic farmers had been 10. The number of vegetables during the rabi season had been the highest in all types of farms. In inorganic farms we counted 21 types of vegetables, the com parable number in case of organic farms had been the same. In the partially organi/inorganic farms, on the other hand, the number of vegetables during the rabi season had been 24.

Table 5.8 A: Season wise Distribution of Vegetables According to Farmer Types (Pre Khariff)

Pre Khariff			
	Fully inorganic	**Fully organic**	**Partly organic/ inorganic**
1	Amaranth	Amaranth	bitter gourd
2	ash gourd	bitter gourd	bottle gourd
3	bitter gourd	bottle gourd	brinjal
4	brinjal	brinjal	cucumber
5	cucumber	cucumber	elephant foot yam
6	elephant foot yam	elephant foot yam	ginger
7	lady's finger	ghosla	green chilly
8	Turmeric	ginger	turmeric
9	kochumukhi	kochumukhi	kham alo
10	pumpkin	ladies finger	kochumukhi
11	ridge gourd	pumpkin	lady's finger
12	yam	ridge gourd	papaya
13		snake gourd	kalmi shak
14		turmeric	pumpkin
15		turul	ridge gourd
16		yam	snake gourd
17			strings beans
18			tomato
19			yam

Source: Field Survey 2014

Table 5.8 B: Season wise Distribution of Vegetables According to Farmer Types (Khariff)

Khariff			
	Fully inorganic	**Fully organic**	**Partly organic/ inorganic**
1	bitter gourd	brinjal	ash gourd
2	brinjal	cucumber	brinjal
3	green chilly	green chilly	Corriander Leaves
4	Pointed Gourd	korai	cucumber
5	pumpkin	Pointed Gourd	green chilly
6	red amaranth	pumpkin	kalmi
7	strings beans	red amaranth	lady's finger
8	sweet potato	strings beans	pointed gourd
9		yam	pumpkin
10			red amaranth

Source: Field Survey 2014

Table 5.8 C: Season wise Distribution of Vegetables According to Farmer Types (Rabi)

	Rabi		
	fully inorganic	**fully organic**	**partly organic/inorganic**
1	beetroot	beetroot	amaranth
2	bottle gourd	brinjal	beans
3	brinjal	cabbage	beetroot
4	cabbage	carrot	bitter gourd
5	cauliflower	cauliflower	bottle gourd
6	Ceylon spinach	ceylon spinach	brinjal
7	coriander	coriander	cauliflower
8	cucumber	elephant foot yam	ceylon spinach
9	green chilly	green chilly	chilly
10	lady's finger	halud	cucumber
11	olcopi	kalmi	elephant foot yam
12	onion	lady's finger	green chilly
13	pointed gourd	onion	kalmi
14	pumpkin	pumpkin	kundri
15	raddish	raddish	lady's finger
16	salgam	red amaranth	onion
17	snake groud	spinach	pumpkin
18	spinach	string beans	raddish
19	tomato	tomato	red amaranth
20	turnip	turnip	spinach
21	yam	yam	string beans
22			tomato
23			turnip
24			yam

Source: Field Survey 2014

Summarising the information on vegetable production, we would point out that the highest number of types of vegetables under cultivation was found in the portfolio of partially organic/inorganic farms which was followed by fully organic farms. The variation had been the least in inorganic farms. The other information that we should record here is that the incidence of commercial cultivation is concentrated in a select set of vegetables. From the field visits we gathered that the organic farmers do not usually get a better price for their products. It appears that there is no incentive from the product market for switching over to organic farming of vegetables.

Table 5.9 A: Marketing Infrastructure for Vegetables (Pre Khariff)

Farmer type	Area Under Cultivation (in decimal)	Number of Crops Cultivated	Market destination	Name of the crops
fully inorganic	16	1	Local Market	kham aloo
fully inorganic	16	1	Local Market	pumpkin
partly organic/inorganic	25	3	No	elephant foot yam
partly organic/inorganic	20	5	Local Market	Lady's finger
partly organic/inorganic	24	3	Local Market	elephant foot yam
partly organic/inorganic	33	1	Wholesale	brinjal
partly organic/inorganic	16.5	2	Wholesale	bottle groud
partly organic/inorganic	21	1	Local Market	brinjal
partly organic/inorganic	32	1	Local Market	ridge groud

Source: Field Survey 2014

We also studied the marketing infrastructure that the farmers can avail of, pertaining to such vegetables which were being produced by bulk amount. For this we identified the farms under bigger size classes (16 decimal plus). The summary information with respect to vegetables in each season is contained in Tables 5.9 A, 5.9 B and 5.9 C. Most of the vegetables produced by these farmers find local market as the natural destination during every season and also for most of the crops. Inter-farmer type variation in this regard does not appear to be noteworthy. For example, we identified 22 farmers who were producing the vegetables in big scale during khariff season. Only one among these farmers had been sending the product (tomato) to the wholesale market. The others including 7 fully organic farmers were found to sell their products in the local market only. Selling the products in the wholesale market was recorded in relatively larger numbers with respect to vegetables produced during the rabi season. However, this practice was mostly confined in the group of inorganic farmers. It is disquieting to note that not a single organic farmer who was producing vegetables in large scale was linked with wholesale market. Implication is obvious. There had been no niche market for products produced strictly with non-GR inputs that the sampled organic farmers could target. One may infer that there is no market linked incentive for adopting non-GR technology with respect to the group of organic farmers which had been included in this study. What then motivates this farmers to adopt organic farming? We shall address this issue in the next Chapter.

Table 5.9 B: Marketing Infrastructure for Vegetables (Khariff)

Farmer type	Area Under Cultivation (in decimal)	Mixed cropping	Market destination	Name of the crops
fully inorganic	16.0	1	Wholesale	tomato
fully inorganic	33.0	1	Local Market	gourd
fully inorganic	16.0	2	Local Market	amaranth
fully inorganic	33.0	1	Local Market	brinjal
fully inorganic	16.0	2	Local Market	gourd
fully inorganic	16.0	3	Local Market	pointed gourd
partly organic/inorganic	16.0	1	Local Market	tomato
partly organic/inorganic	33.0	1	No	brinjal
partly organic/inorganic	33.0	1	Local Market	brinjal
partly organic/inorganic	66.0	2	Local Market	tomato
partly organic/inorganic	66.0	1	Local Market	brinjal
partly organic/inorganic	33.0	2	Local Market	pointed gourd
partly organic/inorganic	24.0	2	Local Market	ash gourd
partly organic/inorganic	21.0	1	Local Market	brinjal
partly organic/inorganic	32.0	1	Local Market	brinjal
fully organic	40.0	1	Local Market	tomato
fully organic	18.0	2	No	green chilly
fully organic	16.0	1	Local Market	yam
fully organic	33.0	1	Local Market	brinjal
fully organic	33.0	2	Local Market	tomato
fully organic	16.0	1	Local Market	pointed gourd
fully organic	16.0	1	Local Market	brinjal

Source: Field Survey 2014

Table 5.9 C: Marketing Infrastructure for Vegetables (Rabi)

Farmer type	Area Under Cultivation (in decimal)	Mixed cropping	Market destination	Name of the crops
fully inorganic	16	2	Local Market	green chilly
fully inorganic	27	1	Wholesale	cucumber
fully inorganic	41	1	Wholesale	cabbage
fully inorganic	16	2	Wholesale	Lady's finger
fully inorganic	33	3	Wholesale	snake gourd
fully organic	18	7	No	kalmi
fully inorganic	30	2	Local Market	coriander
fully inorganic	16	1	Local Market	pointed gourd
fully inorganic	16	1	Wholesale	coriander

fully inorganic	33	2	Wholesale	tomato
fully inorganic	66	1	Local market	pumpkin
fully inorganic	16	2	Local market	ceylon spinach
partly organic/inorganic	16	1	Wholesale	green chilly
partly organic/inorganic	16	1	Wholesale	green chilly
partly organic/inorganic	33	1	Local market	cucumber
partly organic/inorganic	25	1	Local market	turnip
partly organic/inorganic	30	2	Local market	radish
partly organic/inorganic	50	3	Local market	beet root
partly organic/inorganic	16	2	Local market	elephant foot yam
partly organic/inorganic	66	1	Wholesale	cucumber
partly organic/inorganic	16.5	3	Local market	ridge gourd
partly organic/inorganic	24.5	4	Local market	brinjal
partly organic/inorganic	49	1	Local market	pumpkin
partly organic/inorganic	16	2	Local market	ceylon spainch
partly organic/inorganic	32	1	Local market	Lady's finger
fully organic	16.5	2	Local market	onion
fully organic	16	1	Local market	cauliflower

Source: Field Survey 2014

Other Sources of Income

79 per cent of the farmers were engaged in allied agricultural activities (which included fishing, horticulture, livestock). Inter-farmer group variation in this regard appears to be noteworthy. 82.14 per cent of the fully organic farmers had been engaged in such activities. The comparable percentage with respect to fully inorganic farmers had been 75. Involvement in such activities had also been higher (compared to fully inorganic farmers) with respect to partly organic/inorganic group of farmers. We should however, point out that for the families who still possess some land for cultivation consider agriculture as a way of life which is why most of them still remain involved with allied agricultural activities. This tendency is very strong with respect to farmers engaged in fully organic farming.

Table 5.10: Allied Agricultural Activities and Other Sources of Income

	fully inorganic	**fully organic**	**partly organic/ inorganic**	**Total**
Total Farmers in the sample	48	56	96	200
Farmers Engaged in Allied Agricultural Activity	36	46	76	158
Percentage	75.0	82.14	79.17	79.0
Farmers having non agricultural income	42	50	75	167
Percentage	87.5	89.28	78.25	83.5
Farmers receiving remittance	3	7	10	20
Percentage	6.25	12.5	10.42	10

Source: Field Survey 2014

Since the families cannot sustain their livelihood from agriculture and allied agricultural activities alone (mostly for such families where per capita holding is very small), in the country side of Bengal it is now quite a common phenomenon that the members of the identified farmer families do get engaged in non-farm activities. Agriculture cannot cope with the pressure of population which is why the families typically search for non-agricultural sources of income along with cultivation of the land that they still possess. The information contained in Table 5.10 (Row 5 and Row 6) vindicates this point. Some of the farmer households are receiving remittances from the members of the family who are earning their livelihood from non-agricultural activities outside the locality. However, there had been only 20 such households (only 10 per cent). Inter-farm group variation is noteworthy. We would however, point out that the percentage itself being very low such variations should not be considered as significant.

Earnings of the Sampled Households

6.1 Introduction

In the previous Chapter we have discussed about the different types of crops our surveyed farmers produce. We have also considered the allied agricultural activities in which the surveyed households were found to remain engaged. Since the families cannot sustain their livelihood from agriculture and allied agricultural activities alone (mostly for such families where per capita holding is very small), quite a large number of the members of the identified farmer families do get engaged in non-farm activities. In this Chapter we would discuss first the earnings of these households from all such activities. The major concern for us is to consider the economic viability of fully organic farmers belonging to our sample, *vis a vis* farmers who are using GR technology fully or partially. Economic viability of a farm depends on the level of Farm Business Income (net of direct and indirect costs). In the next section we will discuss, in details, the yearly farm business income of our sampled farmers, first with respect to all the major crops and then with respect to the vegetables that the farmers were found to produce. Sustainability of a farmer household also depends on the other incomes including the incomes from non-farm activities. This point has also been taken care of. Aggregate income from all economic activities that the households are engaged in has been considered for discussing the issues of sustainability. Organic farming is advocated as a part of integrated farming for which agriculture has to be taken as 'a way of life'. To what extent this point is vindicated with respect t to the sampled organic farmers, would be a major point of consideration in this Chapter.

6.2 Farm Business Income

The total earning of a farmer is the summation of various types of earning of the farmer family. Total earning of a farmer depends on his agricultural income, income from allied agricultural activities and earnings from non agricultural activities. We have calculated the farmer specific total income from the field data (for limitations of the field data, see Chapter 3). The exercise has been done first by considering both paid out costs and imputed costs. Income net of both paid out costs and imputed costs is indicated by $E_{1..}$ Considering only the operational cost, in which no imputed cost is considered, we get a second measure of net income of a farmer which we indicate as $E_{2.}$ The above facts, if expressed in a stylished form boil down to

Total Earning of Farmers (E_1) = Σ(Agricultural Income$_1$ + Income$_1$ from allied and other Activities + Non Agricultural Income)

Total Earning of Farmers (E_2) = Σ (Agricultural Income$_2$ + Income$_2$ from allied and other Activities + Non Agricultural Income)

Income from Agricultural Activities

We shall now consider the components of agricultural income. In the field area, during

the production cycle 2012-13, the farmers were found to produce three major crops (aman, boro and potato) and other crops such as pulses and oilseeds in the farmland (for details see Chapter 5). Along with these the farmers were found to produce vegetables during every season (as listed in Chapter 5). Major components of farm income were calculated by considering each of these products corresponding to each farmer. The procedure, in stylished form is described below.

Adding Income from major crops aman, boro and potato, other crops and also income from vegetables we get a farmer's yearly agricultural income

$$\text{Agricultural Income}_1 = \Sigma (Y_{1aman} + Y_{1boro} + Y_{1potato} + Y_{1other\ crops} + Y_{1prekharif\ veg} + Y_{1kharif\ veg} + Y_{1rabi\ veg}$$

$$\text{Agricultural Income}_2 = \Sigma (Y_{2aman} + Y_{2boro} + Y_{2potato} + Y_{2other\ crops} + Y_{2prekharif\ veg} + Y_{2kharif\ veg} + Y_{2rabi\ veg})$$

Following this procedure, we calculated farm specific yearly agricultural income. The exercise was carried out with respect to all three major crops and other crops as well as with respect to the vegetables that the farmers produce. Crop specific farm business incomes had been calculated first with respect to each farmer. Farmer type and farm size specific aggregations were then done. Crop specific farm business income with respect to farm type and size class of copped area, as derived from the field data would now be presented in the format of bivariate tables.

6.2.1Farm Business Income: Aman

Table 6.1A: Farm Business Income (Aman)

Net Income/ bigha (net of paid out cost only) (in Rs.)						
Farm size	**No. of Farmers**	**Fully inorganic**	**No. of Farmers**	**Fully organic**	**No of Farmers**	**partly organic/ inorganic**
Less than 1 bigha to 4 bighas	32	4522.09	38	4848.47	64	5139.93
Greater than 4 bigha to 8 bighas	12	3657.47	11	4810.16	22	4676.32
Greater than 8 bighas	2	6400.92	4	6564.80	7	2561.09
	46	**4403.25**	**53**	**5389.57**	**93**	**4376.61**

Source: Field Survey 2014

Considering Net income per bigha (net of paid out costs only) *across farming type / farm size :* the following facts can be culled from Table 6.1A.

- Fully organic farming is more gainful compared to fully inorganic farming irrespective of the three size classes of landholding [for example, Rs. 4848.47 compared to Rs. 4522.09 in farm size less than 1 bigha to 4 bigha].
- Mixed farming (partly organic, partly inorganic) is the most gainful for the small farmers (<1b - 4b) vis-à-vis the middle farmers and especially the big farmers [Rs. 5139.93 compared to Rs. 4676.32 and Rs. 2561.09 respectively].
- Among fully inorganic farmers, the big farmers (>8 b) earn the highest amount of net income per bigha distantly followed by the small farmers (<1b - 4b). Middle

farms (>4b to 8b) are inefficient because their net income per bigha is substantially low.

- *There is a case to go fully organic mainly for the middle farmers (less than 4 bigha to 8 bigha land), and also for the big farmers. Even for the small farmers (<1b - 4b of land), going partly organic (or fully organic) is distinctly more gainful than going inorganic all the way*.

Viability of Organic Farming: The Issue of Own Labour/Family labour

From extensive field survey, it was intuitively realized that

- Organic farmers enjoy high net earnings per bigha by intense use of own and family labor.
- This often remains undisclosed and hidden in economics of farm management.
- Small farmers, in particular, take their own/ family labor for granted because such labor is closely and intricately interwoven with their life process.
- It is often extremely difficult to identify and isolate these fragments of labor; therefore it is most challenging to get them recorded in the total labor in the production and exchange process of organic farming.

We tried to capture the ground level reality by reconsidering the cost related data. For each crop we considered the imputed cost elements by contingent valuation method and recalculated the farm business income. Typically, this is also done in the official procedure of the economics of farm management. Following the official procedure, we also dis-aggregated the production process in 11 stages and calculated the imputed cost by considering the current market price of the service, as reported by the farmer.

Table 6.1B: Farm Business Income (Aman)

Net Income/ bigha (net of paid out *and* imputed costs) (in Rs.)						
Farm size	No. of Farmers	**Fully inorganic**	No. of Farmers	**Fully organic**	No of Farmers	**partly organic/ inorganic**
Less than 1 bigha to 4 bighas	32	2718.92	38	2419.75	64	3040.30
Greater than 4 bigha to 8 bighas	12	2816.50	11	2236.30	22	2781.78
Greater than 8 bighas	2	5179.05	4	4802.34	7	1104.49
	46	**3186.86**	**53**	**3125.18**	**93**	**2499.95**

Source: Field Survey 2014

In some operations, the required labour type had been reported in terms of hours. Current market prices however are reported in terms of wage per day or in terms of price for a piece of work (piece rate). Linear approximations were done for valuation of such work in a specific farm. We should also report that in plot specific calculations, labour costs reported by our respondents were found to be consistently lower than what we get from the official micro level data corresponding to available nearby farms for which

the official micro level data were available (Analogous cases). The probable reason is that the imputed cost component of the aggregate labour cost as reported by the farmers had been lower in the farms that we visited in the same location at which the comparable micro level official data had been available. Ruling out the possibility of consistent under-reporting by re-checking the information by revisits and consulting the knowledgeable persons, including the DRCSC filed staff, we decided to retain the information received from the field and calculate the farm business income net of both paid out and imputed costs. The findings with respect to aman crop are summarized in Table 6.1B. In brief, the findings are as follows.

- Small farmers can reap the highest benefit, i.e., highest net income per bigha, if they practice mixed farming. [Rs. 3040 compared to Rs. 2718.92 for 'fully inorganic' and Rs. 2419.75 for 'fully inorganic farming'.
- Fully organic farmers earn the lowest income per bigha in the small and medium farms. From the field visits, it appears that such farmers use other (own) inputs like home grown vermi-compost and 'free-of-cost' azola and cow-dung (from home-bred cattle) by intuitively adopting an optimum combination which often keeps the production at sub optimum level.
- Such uneconomic use of inputs are largely overcome in big farms (greater than 8 bigha) when they opt for fully organic farming by carefully developing pits for sufficient vermi compost, required level of azola in own ponds etc. and cow dung from own live stocks. If required, they even buy such inputs from other farmers. It seems that organic farming is economically viable for such size class of farmers who can afford to spend for the required level of organic inputs for optimum output in the farm land.
- Almost half of the small and medium farmers (up to 8 bigha) adopt the strategy of mixed farming, i.e., combining inorganic with organic inputs. It seems that such a strategy is most rewarding (Table 6.1B, Row 1 and 2) for such farmers who cannot create provisions for organic inputs at the optimum level.
- In our field data there had been 7 farmers in mixed farmer category having area under aman crop at more than 8 bigha per farmer. It was observed that average output per bigha net of both paid out and imputed costs had been the lowest in such farms (Rs. 1104.49). It was observed that the labour cost components (as reported by the farmers) had been very high in these cases. We would suggest that no generalization should be done on the basis of what we have collected from such households as regards paid out cost and imputed cost elements of economics of farm management.
- For big farms, inorganic farming is still most rewarding in terms of farm business income. One should however, point out that fully organic farming with respect to aman crop does not result in a very small return for the big farms, compared to what a typical farmer would get by sticking to GR technology. In fact, if we consider short- and long- term social / environmental costs of production and exchange, the negative externalities of the fully inorganic farming would far outweigh their

marginally higher net incomes vis-à-vis their organic counterparts. We would however, point out that even without considering the issues of externality, the marginally higher net income in fully inorganic farming might be neutralized in fully organic farming in the ambit of internal cost and benefit related to economics of farm management itself, in the long run, if the long run productivity benefits of non-GR technology are taken in consideration.

6.2.2 Farm Business Income: Boro

Only 58 farmers were found to take up boro cultivation following aman. Cropped area under boro had however been quite low. Even the big farmers were not found to take up boro cultivation on their entire farm land. Typically, the big farmers cultivate boro in a relatively smaller parcel of land following aman. The other part of land is usually kept fallow or the peasants cultivate other crops which are less water intensive. The reason is that boro is a water intensive cultivation and the farmers do not find cheap and easily available sources of water which is why about 70 per cent of the farmers included in the sample do not opt for boro cultivation at all. The others usually do not take up boro cultivation in the en tire agricultural land under their possession. Leasing out farmland for boro is not also found to be prevalent among the farmers included in the sample.

Table 6.2A: Farm Business Income (Boro)

Net Income/bigha (paid out and imputed cost) (Rs.)						
Farm size	**No. of farmers**	**Fully inorganic**	**No. of farmers**	**Fully organic**	**No. of farmers**	**Partly Organic/ Inorganic**
Upto 1 bigha	12	1317.23	10	2194.04	16	2700.05
greater than1 bigha to 2 bigha	2	498.65	3	4177.30	9	1734.71
greater than 2 bigha	4	3139.02	0	—	2	-606.02
	18	2348.44	13	3085.99	27	1315.89

Source: Field Survey 2014

The findings with respect to boro crop are summarized in Table 6.2A and 6.2B. Considering net income per bigha (net of both paid out and imputed cost), the findings in brief are as follows (Table 6.2A)

- Net income figures including paid out costs & imputed costs strongly support fully organic cultivation *irrespective of farm size-class*. These findings do not consider social and environmental costs. Had those been considered, the case would be even stronger against fully inorganic farming and generally in favor of organic farming.
- Notably, organic farming on *middle size* farms is the optimum from the perspective of net income per bigha
- Mixed farming is the most gainful for *small farmers* (land up to 1bigha).
- For the *middle farmers* (>1b - 2b) mixed farming is more beneficial than fully

inorganic farming though it is very much less beneficial than fully organic farming.

- For the *big farmers* (>2b), mixed farming entails negative net income, i.e., dead weight loss. This was largely because 2 farmers in this group failed to apply input combinations in proper doses. The issue of selecting a proper blending of GR and non GR inputs was found to be a major challenge with respect to every mixed farm under boro cultivation in our sample, as and when these farms tried to cultivate boro in a bigger scale (greater than 1 bigha)
- In medium size class (greater than 1 bigha to 2 bigha), net income under inorganic farming had been abysmally low. Since there was no reporting error we conclude that such farmers (only 2 in number) furnish a special case from which no generalization should be made.
- *However, these observations are quite challenging because they contest conventional wisdom that boro cultivation has to depend very much on GR technology*.

Table 6.2B: Farm Business Income (Boro)

We shall now recalculate farm business income under boro net of paid out cost only.

Net Income/bigha (net of paid out cost only) (Rs.)						
Farm size	**No. of farmers**	**Fully inorganic**	**No. of farmers**	**Fully organic**	**No. of farmers**	**Partly Organic/ Inorganic**
Upto 1 bigha	12	4818.53	10	7072.69	16	6570.19
greater than1 bigha to 2 bigha	2	1775.92	3	9038.24	9	4706.61
greater than 2 bigha	4	2384.60	0	—	2	800.38
Total	18	2952.45	13	7956.68	27	4264.84

Source: Field Survey 2014

The findings in brief suggest as follows.

- If one considers only paid out cost not bothering about own/ family labor, similar results are obtained.
- Organic farming brings down the cost elements, particularly of fertilizer and pesticides, so drastically that the net income realized from fully organic farming becomes substantially *higher* than fully inorganic farming and even mixed farming.
- Mixed farming, because of the non-scientific, if not arbitrary, combination of inputs and strategies chosen by the farmers themselves often leads to sub-optimal results: the worst of both the types of farming, organic and inorganic.
- Because even if the farmer is well equipped with the required traditional knowledge he is more often than not saddled with the competence of the Green Revolution technology and know-how, and less so in the context of mixed farming.

6.2.3 Farm Business Income: Potato

There had been 101 farmers engaged in potato cultivation in the production cycle 2012-13. The initial observation is that some of the farmers produce potato in tiny plots of land (even in a part of homestead) for domestic consumption. Potato as a commercial crop, taken up largely by the big farmers appears to be based on GR technology. Farm Business income of potato with respect to 101 farmers of our sample is summarized in Table 6.3. Both paid out cost and imputed cost elements have been taken care of while preparing this table.

Table 6.3: Farm Business Income (Potato)

Farm size	Farmer Type	No of Farmers	Net Income/Bigha (Rs) (net of paid out costs)	Net Income/Bigha (Rs.) (net of paid out and imputed costs)
less than 1 to 4 bigha	fully inorganic	21	4896.32	2508.32
	fully organic	33	3761.66	1373.66
	partly organic/ inorganic	44	11000.23	8612.23
greater than 4 to 8 bigha	fully inorganic	1	20418	17218
	partly organic/ inorganic	1	11897.5	10321.25
greater than 8 bigha	fully inorganic	1	24927.68	18227.68
Grand Total		**101**	12816	9710

Source: Field Survey 2014

As we get from Table 6.3, there does not exist any organic farmer in the higher size classes opting for potato cultivation. Commercial production of potato in big scale is taken up either with full GR technology or with a mixed technology. There are 33 organic farmers in the smaller size class reporting potato cultivation. Net income per bigha calculated on the basis of net of paid out costs only had been the lowest for these farmers. With respect to fully inorganic farmers also, net income had been quite low. Economically attractive farming for this size class of farmers was found to be cultivation under mixed farming (combining GR with non GR inputs). Mixed farming was also found to be most rewarding for potato cultivation in higher scale (greater than 4 bigha to 8 bigha) as well. In the sample there had been 1 farmer operating on more than 8 bigha for potato cultivation. This farmer was cultivating potato under fully inorganic technology. Net income per bigha had been the highest for this farmer. It seems that cultivation of potato in a bigger scale might be conducive to mixed farming up to a certain level. For such farms that operate on larger size classes still do not find mixed farming as a lucrative option. We should however point out that the sample size is too low to arrive at a generalize conclusion with respect to the farmers at higher size classes. What best we can infer is that only the farmers under mixed farming at the smallest size class are producing potato at a remunerative level. Use of chemicals partly / fully to maximize crop yield and capture the biggest chunk of the competitive market is common among those who can afford to bear the high input costs of fully/partly inorganic cultivation.

The other part of the story is that fully organic farmers cultivate potato only on *small farms* (<1b – 4b) and generate the least net income when we consider only the paid out costs. We should however, add that, this cost component is very small for the small organic farmers.

6.2.4 Farm Business Income: Vegetables

The farmers in the sample were found to cultivate vegetables at different scales in every season. This was true with respect to every size classes of farmer as also with respect to every type of farmers. The types of vegetables produced by the farmers in various seasons have been listed Chapter 5. In this Chapter we shall discuss the farm business income out of vegetable cultivation with respect to the farmers that we have visited. First we furnish the quantitative information on farm business income with respect to pre-khariff, Khariff and rabi season specific vegetables (Table 6.4, Table 6.5 and Table 6.6). Major points have been highlighted following each of tables.

Table 6.4: Farm Business Income (Pre-Khariff Vegetables)

Farmer Type	Farm size	No of farmers	Net Income/decimal (net of paid out cost only) (Rs.)
Fully inorganic	**Less than 1 decimal to 4 decimal**	13	187.782
Fully organic		27	515.865
Partly organic/inorganic		33	219.993
Fully inorganic	**greater than 4 decimal to 8 decimal**	8	220.057
Fully organic		13	168.121
Partly organic/inorganic		16	190.385
Fully inorganic	**greater than 8 decimal**	5	404.044
Fully organic		5	283.637
Partly organic/inorganic		12	114.568
	Total	**132**	

Source: Field Survey 2014

Data on Net Farm Business Income (after meeting paid out costs) from pre-Kharif vegetables reveals:

- For *small farmers* (<1 decimal - 4 decimal land) **fully organic** farming is most beneficial.
- For *middle-level farmers* cultivating (>4 decimal - 8 decimal land) **fully inorganic** farming is the preferred option but **mixed farming** is also a competing alternative.
- For *bigger farmers* (>8 decimal land), growing pre-Kharif vegetables, the clear choice would be fully inorganic farming.
- But all options and combinations taken together it is clearly seen that **fully organic small farmers** reap the maximum return per unit of land from pre-Kharif vegetable farming.

Cost of own/family labor and own/ indigenous inputs, though not negligible for vegetables, have not been considered; but the small farmers still cultivate these crops to meet their family consumption.

Table 6.5: Farm Business Income (Khariff Vegetables)

Farmer Type	Farm size	No of farmers	Net Income/decimal (net of paid out cost only) (Rs.)
fully inorganic	**less than 1 to 4 decimal**	19	441.61
fully organic		23	262.53
partly organic/inorganic		38	261.62
fully inorganic	**greater than 4 to 8 decimal**	5	534.82
fully organic		12	219.17
partly organic/inorganic		16	1183.54
fully inorganic	**greater than 8 decimal**	7	1428.65
fully organic		12	549.16
partly organic/inorganic		15	928.30
		147	

Source: Field Survey 2014

For Kharif vegetables, the field data suggest :

- **Fully inorganic** farming practiced by the relatively *big farmers* yield by far the highest net income per unit (decimal of land). This is followed by **mixed farming** on *big plots of land* though the net income per unit is much less.
- **Fully organic** farming is not non-remunerative in absolute terms but is a 'poor' choice vis-a-vis fully inorganic farming and/or mixed farming so far as the financial returns are considered.

Bluntly put, the observations are as follows:

- *Big farmers* farming in **fully inorganic** method stand to gain most in terms of per unit (decimal) net income after meeting paid out costs.
- The **mixed farmers** cultivating on big plots (>4 to 8 decimal) follows closely.
- **Fully organic farming** is not an optimum option for any size-class of holding for Kharif vegetable cultivation.

The Big Question

- This is quite in contrast to the impression gained from the field visits. It also falls short of capturing the small farmers' rationale of cultivating Kharif vegetables extensively.
- This needs further examination and cross-checks and possibly a more elaborate study on the basis of a larger sample. Because vegetable cultivation is considerably and fundamentally different from paddy or potato cultivation.
- Would organic vegetables need a niche market for its viability?

Table 6.6: Farm Business Income (Rabi Vegetables)

Farmer type (in decimal)	Area Under Cultivation Farmers	Number of decimal (Rs.)	Net Income/
fully inorganic	**Less than 1 decimal to 4 decimal**	23	516.61
fully organic		35	257.01
partly organic/inorganic		47	167.25
fully inorganic	**Greater than 4 decimal to 8 decimal**	6	1083.07
fully organic		9	181.80
partly organic/inorganic		14	290.61
fully inorganic	**Greater than 8 decimal**	12	465.88
fully organic		8	42.79
partly organic/inorganic		13	297.57
		167	

Source: Field Survey 2014

Regarding Rabi crop cultivation, the following observations are important:

- Within *each of the farm-size classes*, those practicing **fully inorganic** farming earn the highest net income per unit (decimal) of land.
- Within the *small farm-size class*, the **fully organic** farmers earn the second highest net income per decimal, but the amount is almost half that of their fully inorganic counterparts; the **mixed farmers**' earning per decimal is even much lower.
- On *middle-size farms*, the **mixed farmers** fare substantially better than the fully organic farmers from the net income perspective.
- The **fully organic** farmers show a dismal picture on the *big' farms* (>8 decimal) in terms of net income earned per decimal of Rabi crop cultivation.
- In case of Rabi vegetables, too, the field observations/ impressions/ understanding do not tally with the field survey data, and needs more elaborate re-examination.
- The prima facie explanation is rather similar to the Kharif vegetables.

A Plausible Explanation

- Inorganic farmers in the sample appeared to cultivate some early winter cash crops (like peas, cauliflower, cabbage, etc) that fetch a reasonably high market price.
- These are based on GR technology, and feed multiple high-income niche/small markets, mostly urban and diversely spread .
- Organic farmers can ill afford to exercise such an option of growing 'high value crops'; nor do they have access to that type of market.
- In fact, that type of a market segment or niche market has not yet developed.

Concluding Observations on Vegetable Cultivation

While considering the economic rationale of vegetable cultivation, one should point out that even the small farmers with a tiny plot of land produce some vegetables; vegetables

are produced even in the homestead. The basic reason of course is that the small farmers cultivate these crops to meet their family consumption in the first place; surplus, if any, would be marketed (for small farmers, mostly in the local market at a very low price). While calculating the farm business income cost of own/family labor and own/ indigenous inputs, though not negligible for vegetables, is not considered at all. For the family labour, the consideration is that the members would supply their own labour up to the point where the marginal productivity of labour is zero or near zero (this is possible because there exists 'surplus labour' in the consideration of the farmer).

Vegetable cultivation on a large scale is taken up on the basis of market consideration only. Since there does not exist a niche market for organic vegetables, there does not exist any special incentive for adopting organic farming, *per sa.* The farmer's logic follows the cost aspect. The extent a farmer can afford to apply inorganic inputs at the appropriate level, he would opt for inorganic farming of vegetables. Inorganic farmers adopt a strategy of income maximisation while producing some vegetables in large scale. For example, big farmers in the sample appeared to cultivate some early winter cash crops (like peas, cauliflower, cabbage, etc) that fetch a reasonably high market price. Such farmers will definitely adopt GR technology. Again such farmers will not maintain large number of items in their portfolio of vegetable cultivation. For large scale production, they would concentrate on a select set of vegetables (eg, brinjal, green chilly, pumpkin, cabbage, cauliflower, Lady's finger, radish and tomato).

For large scale production, organic farming with respect to vegetables is yet to pick up. As we have pointed out, this is so, largely because there does not exist any niche market for such products. The other important point, as we have observed in the field area, is that production in large scale, strictly on the basis of non GR technology needs an integrated farming in which the required inputs are produced mostly within the farm. The farmers with tiny plots of land can hardly opt for producing such inputs at the required level. There of course exists a market for organic fertilizer. One should however, point out that market prices of such input are quite high; in some cases inorganic substitutes are found to be sold at a lower price in the same market. A properly developed input and output market for organic farmers is the basic requirement for promotion of organic farming in the state where the large majority of the farmers operate in tine plots of land and a small homestead so much so that integrated farming at the optimum level often remains un-attained at the farm level.

6.3 Income from Other Activities

Other activities from which a farmer family is expected to earn include income from livestock, horticulture and allied agricultural activities, pisciculture in particular. While canvassing the questionnaire, we took care of the possibility of having some earning from these sources. In a typical farmer family such activities are taken up at varied scale. Earnings constitute cash earning by selling the product in the market (for example, milk from livestock, fish from allied agricultural activity or fruits from horticulture) and the imputed earning with respect to the part of the product which is consumed by the family members. While canvassing the questionnaire, the relevant information had been

collected from the farmer family (from oral statements). The information had then been computed and organized the form of a bi-variate table in which type of farmer had been placed row wise and information on net cropped area of the farmers (referral category on the basis of net area under cultivation), number of farmers in particular class having income from any of these sources, cash earning with respect to a particular activity (eg, income from horticulture in Table 6.7), imputed earning (the part consumed by the household) and total earning (cash earning plus imputed earning). Considering income or earning from all these sources we have prepared the following tables. The schematic outline of what we have done in this section is given below.

$Income_1$ from Other Activities = Income from Livestock + Income from Horticulture + Income from Allied Agriculture

=Net Cash Earnings from Livestock + Imputed Earning from Livestock + Net Cash Earning from Horticulture + Imputed Earning from Horticulture + Net Cash Earnings from Allied agriculture + Imputed Earning from Allied Agriculture

$Income_2$ from Other Activities = Net Cash Earnings from Livestock +Net Cash Earnings from Horticulture + Net Cash Earnings from Allied agriculture

At the very outset, we should point out that all the farmers in our sample of 200 households were found to get engaged in horticulture, livestock and allied agricultural activities in varied scale. On an average, cash earning had been quite low compared to imputed earning with respect to all these items (last row, Table 6.7, Table 6.8 and Table

Table 6.7: Income from Horticulture

Farmer Type	Net Cropped area class	No of Farmers	Cash Earning from horticulture on an average	Imputed Earning from horticulture on an average	Total Earning horticulture on an average
fully inorganic	**less than 1 to 4 bigha**	32	810.94	3355.63	4166.56
fully organic		39	1285.90	3436.28	4722.18
partly organic/ inorganic		56	753.04	3744.11	4497.14
fully inorganic	**Greater than 4 to 8 bigha**	12	1237.50	8141.67	9379.17
fully organic		10	630.00	3910.00	4540.00
partly organic/ inorganic		30	708.33	5496.17	6204.50
fully inorganic	**Greater than 8 bigha**	4	492.50	4037.50	4530.00
fully organic		7	142.86	4128.57	4271.43
partly organic/ inorganic		10	510.00	6235.00	6745.00
fully inorganic Total		**48**	**891.04**	**4608.96**	**5500.00**
fully organic Total		**56**	**1025.89**	**3607.41**	**4633.30**
partly organic/ inorganic Total		**96**	**713.75**	**4551.09**	**5264.84**
Grand Total		**200**	**843.70**	**4300.75**	**5144.45**

Source: Field Survey 2014

6.9). Farmer type variation in this regard had not been very high. If we consider total income from horticulture (Table 6.7) for the small farmers, fully organic farmers were found to perform better compared to other types of farmers. In the middle size class, the story however had been different. Total income from horticulture had been the highest with respect to fully inorganic farmers. For big farms (greater than 8 bigha), the total income appeared to be the highest for the partly organic/inorganic farmers. The overall scenario had been such that inter-farmer type variation with respect to total earning from horticulture had not been very high. However, the average earning for fully organic farmer had been the lowest (Rs. 4633.30).

Table 6.8: Income from Allied agriculture

Farmer Type	Net Cropped area class	No of Farmers	Earning from allied agriculture on an average	Imputed Earning from allied agriculture on an average	Total Earning from allied agriculture on an average
fully inorganic	**less than 1 to 4 bigha**	32	7076.25	8142.31	**15218.56**
fully organic		39	1308.97	8814.36	**10123.33**
partly organic/ inorganic		56	1091.07	8187.79	**9278.86**
fully inorganic	**Greater than 4 to 8 bigha**	12	8206.67	14640.00	**22846.67**
fully organic		10	6840.00	9944.00	**16784.00**
partly organic/ inorganic		30	2083.33	9663.33	**11746.67**
fully inorganic	**Greater than 8 bigha**	4	6825.00	16075.00	**22900.00**
fully organic		7	2285.71	9428.57	**11714.29**
partly organic/ inorganic		10	1800.00	8520.00	**10320.00**
fully inorganic Total		**48**	**7337.92**	**10427.79**	**17765.71**
fully organic Total		**56**	**2418.75**	**9092.86**	**11511.61**
partly organic/ inorganic Total		**96**	**1475.00**	**8683.50**	**10158.50**
Grand Total		**200**	**3146.35**	**9216.75**	**12363.10**

Source: Field Survey 2014

For allied agricultural activities, the overall scenario was more or less the same as in case of horticulture. Cash earning had been low compared to imputed earning. However, with respect to fully inorganic farmer the ratio between the two had been much higher than that in case of organic or mixed farming. Inter size class variation in this regard is noteworthy. Inter farm type variation did not appear to follow a systematic pattern (Table 6.8). On an average total earning from allied agricultural activities had been Rs. 12363.10 for the households covered in this survey.

Table 6.9: Income from Livestock

Farmer Type	Net Cropped area class	No of Farmers	Earning from livestock on an average	Imputed Value from livestock on an average	Earning (Total) Livestock on an average
fully inorganic	less than 1 to 4 bigha	32	2512.50	16094.53	**18607.03**
fully organic		39	6536.79	30924.51	**37461.31**
partly organic/ inorganic		56	3227.86	26090.00	**29317.86**
fully inorganic	Greater than 4 to 8 bigha	12	2586.67	47161.67	**49748.33**
fully organic		10	2954.00	47467.00	**50421.00**
partly organic/ inorganic		30	1967.67	45575.80	**47543.47**
fully inorganic	Greater than 8 bigha	4	1200.00	23500.00	**24700.00**
fully organic		7	20442.86	110987.14	**131430.00**
partly organic/ inorganic		10	9360.00	79460.00	**88820.00**
fully inorganic Total		**48**	**2421.67**	**24478.44**	**26900.10**
fully organic Total		**56**	**7635.27**	**43886.36**	**51521.63**
partly organic/ inorganic Total		**96**	**3472.81**	**37738.69**	**41211.50**
Grand Total		**200**	**4386.03**	**36277.58**	**40663.60**

Source: Field Survey 2014

With respect to income from livestock, the overall scenario is such that the income (imputed plus cash) had been Rs. 40663.60 per family which appears to be quite impressive. However, the cash component of this earning had been abysmally low. In this context, we should highlight a particular finding of this study. With respect to 7 big farmers (greater than 8 bigha) practicing organic farming, the average earning per family with respect to live stock had been Rs. 131430.00. The cash earning had been as high as Rs. 20442.86. These families were practicing integrated farming in which cow dung was being utilized in a large scale for producing organic fertilizer. For organic farmers operating on smaller scales also, earning from livestock had been quite high. It seems that such farmers were taking care of the livestock more seriously because they understood the necessity of having home grown organic fertilizer for promoting non GR technology as a cheaper option.

6.4 Total Income of the Farmer household

We shall now consider the total earning of the farmer household. At the very outset, we should point out that the total earning in this context refers to earning from agriculture, allied agricultural activities, Horticulture, livestock and also from non agricultural activities including remittance if any received by the family. Earnings net of paid out and imputed cost with respect to farm business income have been added to total earning (cash plus imputed) from other activities mentioned above; with this net yearly earnings from non agricultural activities as reported by the farmer family and the sum received from remittance during the year (2012-13) had been added to get information contained in

Column A of Table 6.10. Earnings net of paid out cost only with respect to farm business income have been added to total earning (cash plus imputed) from other activities mentioned above; with this net yearly earnings from non agricultural activities as reported by the farmer family and the sum received from remittance during the year (2012-13) had been added to get information contained in Column B With this there are two additional columns C and D in Table 6.10. Adding Agricultural income, only cash earning from other agricultural activities and non agricultural income and earnings from remittance, we calculated Column C. The last column (column D) describes the income that the families get on an average from agriculture and the related activities.

Table 6.10: Net Earnings of Farmer Households

Farmer Type	Net Cropped Area Class	No of Farmers	Farm Income E_1 /per farmer on an average	Farm Income E_2 / per farmer on an average	Farm Income excluding imputed earning/ per farmer on an average	Farm Income income excluding non agricultural and remittance / per farmer on an average
fully inorganic	less than 1 to 4 bigha	32	96741.03	104938.55	69148.56	58819.15
fully organic		39	104940.90	116418.49	61765.75	59715.26
partly organic/ inorganic		56	90434.87	103565.77	52412.98	63745.58
fully inorganic	Greater than 4 to 8 bigha	12	163090.67	168521.25	93147.33	108274.00
fully organic		10	120878.37	137122.10	59557.37	85858.37
partly organic/ inorganic		30	122560.38	130837.03	61825.08	80831.05
fully inorganic	Greater than 8 bigha	4	178373.47	198204.70	134760.97	141123.47
fully organic		7	239126.02	253752.16	114581.74	187268.88
partly organic/ inorganic		10	176700.49	188220.89	82485.49	114620.49
fully inorganic Total		**48**	**109389.59**	**114142.92**	**69874.40**	**67300.01**
fully organic Total		**56**	**122350.07**	**130180.62**	**65763.44**	**78117.92**
partly organic/ inorganic Total		**96**	**103862.44**	**110911.19**	**52889.16**	**68786.60**
	Grand total	**200**	**115961.86**	**127339.59**	**66166.78**	**76638.96**

Source: Field Survey 2014

Note: Income net of both paid out costs and imputed costs is indicated by $E_{1.}$ Considering only the operational cost, in which no imputed cost is considered, we get a second measure of net income of a farmer which we indicate as $E_{2.}$

Average income with respect to 200 families visited by us had been Rs. 115961.86 if we exclude both paid out and imputed cost elements in the agricultural activities. Considering only the operational cost (excluding imputed cost), the yearly earning , on an average, is found to be Rs. 127339.59 which is much above the poverty level expenditure (which is Rs. 58320 for rural with a family of 5 according to Rangarajan Committee Report). For the poorer households, the scenario is not promising particularly if we concentrate on farm income excluding non agricultural income and remittance (column D). Thus, a typical organic farmer belonging to the lowest size class could earn Rs. 59715.26 from farming and related activities in 2012-13. The earning per month being Rs. 4976.27, such a family

is not expected to meet the Rangarajan determined poverty level of expenditure. The scenario had not been much better with respect to fully inorganic or mixed farming households at the lowest size class. For the higher size class however, the scenario appears to be better. Even then as one may point out from the field data agriculture alone does not appear to provide a viable option for these households (column D compared with Column A and Column B). Only redeeming feature is that 7 fully organic farmers operating in the highest size class were found to earn an average level of income (Rs. 187268.88) from agriculture and related activities alone, which, one may point out is the highest among all the size classes of households considered here. It seems that organic farming on a large scale might provide an answer to the prevailing impasse in agriculture of West Bengal.

Conclusions and Recommendations

Chapter-7

Introduction

With growing interest about organic farming (OF) that is already being practiced in different parts of the country but only to a limited extent, an obvious question arose regarding the economic viability of this type of agricultural production activity. This general question has its different aspects. The major ones are: (a) Is the success of the OF practice, wherever it is in vogue within the country , specific to certain agro-climatic conditions?, (b) Does it have to do with the size of landholding of the practicing farmers?, (c) Is it confined to the educational attainment of the farmers or any other member(s) in the family?, (d)Does the OF practice depend on availability of water, in particular, or any other input(s)?, and most importantly, (e) Is the return from OF attractive enough from a pecuniary view-point to expand the practice on a wider scale or to replicate the same by others? (f)Are there any other type of returns to the farmer or his household besides the monetary returns? (g) What about the market/ marketing constraints of the OF produce?, and so forth.

These are the enquiries that were taken up in the present study which have been dealt with as much elaborately as possible within the given stringent time constraint on the basis of hard data obtained from field surveys of a rationally selected sample of farmer households as elaborately narrated earlier. While the pros and cons of Green Revolution (GR) technology-based farming vis-à-vis organic farming as learnt from the received wisdom has been dealt with elaborately at the outset, the sample design and the sample composition of the study have been discussed at length in one of the early chapters. It is important to note that the sample households had been chosen from diverse geographical zones and different agro-climatic sub-zones within the zones in order to see if the success of OF depends significantly on any particular zonal/sub-zonal factor. To add rigour to the study, households known to be practicing fully inorganic farming were taken in equal number alongside those known organic farmers from each of the zones/ sub-zones. However, while analysing the field data, it was found that a number of the farmers known to be organic farmers do indulge in mixing inorganic inputs (fertilizers, pesticides), to a very small extent or in significant amount, along with organic inputs. However, this has incidentally added a new dimension and opportunity to consider them, *post facto,* as another category and discover interesting facts about the viability of such farm households. Thus the farmers captured in the sample have been in the ultimate analysis categorized as fully organic farmers, fully inorganic farmers and 'mixed' farmers. The motivation and outlook of the farmers have also been studied from the point of view of different size classes of the farming households particularly with respect to the land under cultivation.

Observations

A few of the very crucial observations about organic farming in this state (west Bengal) deserve special attention. *First*, the organic farmer (as well as the mixed farmer) culti-

vates, without exception, a diverse basket of a large number of crops; some of them too many. This is true even if, and often if, the farmer is a small landholder. It may seem surprising but it is true that in all the zones and sub-zones as it is likely to save them from the risks/ uncertainties of any crop failure and / or pest attack. Multi-crop farming is not only a good hedging strategy but also a means of preserving /enriching biodiversity.

Secondly, the organic farmers judiciously employ innovative practices like relay crop cultivation (sowing a crop right on the heels of another crop, and that overlapping another, and so on), simultaneous cropping of a number of crops together, and the like. These help reduce cost significantly.

Thirdly, many of the small farmers practicing fully organic or partly organic farming (i.e., mixed farming) find their farming practice, by and large, economically viable, and often profitable. For those who find the organic (or 'mixed') farming marginally viable, still want to persist with the *status quo* because they can meet a good part of their survival needs and nutrition requirements from the health-friendly organic practices. For small and marginal farmers who abound in this country and the state, organic farming has proved to be a boon. This is more so, because most, if not all of them, are 'converts' from fully inorganic practices. They had once given up their age-old traditional practices of farming based exclusively on natural resources in the myopic lure of 'leap-frogging' productivity in the immediate short run. But over time, with their over-dependence (or even exclusive dependence) on chemical inputs they experienced the declining productivity, soaring prices of chemical fertilizers and pesticides (purchased from the market) and the concomitant rising costs and diminishing government subsidies adding to their woes. The disastrous impact on the health of the soil and ground water as well as of the members of farmer families has also taught them a hard lesson. The small and marginal farmers' stickiness to organic farming despite nominal profit or even marginal losses in monetary terms is more than compensated by his 'other' gains as stated above. These had been narrated by the farmers themselves to the field investigators, pilot surveyors and the field supervisors. The lesson from the survey in this respect is not to judge the gains from organic farming by monetary returns alone.

Fourthly, The big farmers also are found to be gaining from practicing organic farming which vindicates the position of the champions of organic farming. Only in case of 'mixed' farming it is found that going even partly organic has paid off adequately. The ground reports confirm the fact that the farmers hardly ever do any soil testing or take recourse to laboratory testing of the harm that pests might have caused to the crops or plants. In the circumstances, it is only likely that input combination (fertilisers or pesticides) is not applied optimally optimal for growing the crops as a mixed bag.

Fifthly, organic farming is very labour-intensive. But the labour is neither continuous, nor systematic. Even actual daily labour-use for organic farming is too much fragmented, more than in the case of inorganic farming, as labour is required to be applied by fits and starts, in very small to large quantum, beyond the normal 8-hour working day. That is why there is a preponderance of family labour in organic farming.

Sixthly, women play a much bigger role in organic farming because it calls for frequent and continual care and attention for long hours of the day, and at times even in the evening.

Seventhly, organic farming is extremely environment-friendly in the short-run as well as in the long-run — something that inorganic farming can never assure.

Finally, and importantly, organic farming is also economically viable, as borne out by the present study. This has been established by hard facts from the ground taking into consideration actual paid-out costs as well as imputed costs of those inputs that are not purchased from the market, namely family labour, self-produced manures and pest-repellents, freely available resources from Nature, etc. However, the externality costs (i.e., costs of environmental damage, wasteful erosion of natural resources, etc.,) have not been considered. Inclusion of those costs would only strengthen the case for organic farming.

A couple of more important issues are there in the study. One is the space-neutrality of the viability of organic farming irrespective of zones and sub-zones. Another is non-dependence of organic farming on educational attainments of the farmer households.

The conclusions that can be derived from the study are important and noteworthy. These are narrated below:

Contrary to popular misconception, organic farming is not economically unviable. The ground realities suggest that it is more suited to small, and especially marginal, farmers in more than one way. It reduces their risk of non-viability, provides them an assured regular minimum source of nutrition that is health-safe. As we have pointed out in chapter 6 of this report, in many cases, organic farming can compete with GR technology base farming even under the existing market condition even if it does not receive any government incentive for their contribution in the form of positive externalities associated with non-GR technology. Such farming is replicable as it is neutral of the geographical zones or agro-climatic sub-zones.

In our opinion, organic farming would be adopted on bigger scales, particularly with respect to vegetable production, if some promotional support targeting the niche market for such products is developed. For large scale production, organic farming particularly with respect to vegetables is yet to pick up. As we have pointed out, this is so, largely because there does not exist any niche market for such products. The other important point, as we have observed in the field area, is that production in large scale, strictly on the basis of non GR technology needs an integrated farming in which the required inputs are produced mostly within the farm. The farmers with tiny plots of land can hardly opt for producing such inputs at the required level. There of course exists a market for organic fertilizer. One should however, point out that market prices of such input are quite high; in some cases inorganic substitutes are found to be sold at a lower price in the same market. A properly developed input and output market for organic farmers is the basic requirement for promotion of organic farming in the state where the large majority of the farmers operate in tine plots of land and a small homestead so

much so that integrated farming at the optimum level often remains un-attained at the farm level. This contextualizes our recommendations on the nature of support that organic farming should receive from the state.

Recommendations

It is important to provide some government support to the organic farmers, particularly the small and the marginal ones, in the form of venture capital for initial investment, and small doses of working capital support for making their own inputs like vermi-composting, and azola growing, facilitating transport of the organic produce to the nearby markets at least.

The government should also cater to the important macro issues of supporting dedicated R&D in inputs for organic farming (which some voluntary organisations have been doing for years on with reasonable success) combining traditional knowledge and modern science and technology without compromising the essence of environment and health. This would be very useful particularly for the small and marginal farmers.

Another issue where the government can do something very useful is to provide extension services to the farmers, like soil testing, making them aware of optimum input combinations, providing them innovative organic/bio inputs and their proper use.

The government has also to play a significant role in making all and sundry farmers, especially those practicing inorganic farming, aware about the myriad merits of organic farming and motivating them to take up such farming and expanding them. Awareness about organic farming and organic produce has also to be disseminated among consumers at large by the government.

With these little interventions, a pro-poor welfare-seeking government can really make some precious little contribution to the multitude of marginal and small farmers in helping them survive decently, in providing them livelihood opportunities (employment) and in saving our environment.

This study only assures that organic farming is very much economically viable preferably with the said interventions/ support from the government in the short run. The farmers, even the marginal and small ones, will be able to fend for themselves in the long run thereafter.

Economic Viability of Sustainable Agriculture
Appendix

Chapter 5:

Intensity (Gross/net cropped): Farmer Type: District wise Variation

Farmer Type	District	Class	No of farmers	Average Net cropped area	Average Gross cropped area	Average Cropping Intensity
Fully inorganic	Bankura	less than 1-4 bigha	1	3.00	3.00	100.00
		greater than 4-8 bigha	1	6.00	6.03	100.51
		more than 8 bigha	1	9.00	12.39	137.71
	Bankura Total		**3**	**6.00**	**7.14**	**119.02**
	Birbhum	greater than 4-8 bigha	1	6.06	6.06	100.00
	Birbhum Total		**1**	**6.06**	**6.06**	**100.00**
	Jalpaiguri	less than 1-4 bigha	2	4.00	6.48	162.12
		greater than 4-8 bigha	1	7.15	14.64	204.66
		more than 8 bigha	1	14.73	16.97	115.23
	Jalpaiguri Total		**4**	**7.47**	**11.14**	**149.19**
	North 24 Parganas	less than 1-4 bigha	8	2.01	3.46	172.65
		greater than 4-8 bigha	6	5.73	7.40	129.04
		more than 8 bigha	1	15.00	32.76	218.38
	North 24 Parganas Total		**15**	**4.36**	**6.99**	**160.21**
	Purba Medinipur	less than 1-4 bigha	12	0.92	1.47	160.06
	Purba Medinipur Total		**12**	**0.92**	**1.47**	**160.06**
	South 24 parganas	less than 1-4 bigha	9	1.39	2.55	184.07
		greater than 4-8 bigha	3	6.33	9.97	157.42
		more than 8 bigha	1	12.15	17.09	140.65
	South 24 Parganas Total		**13**	**3.36**	**5.38**	**160.37**
Fully inorganic Total			**48**	**3.63**	**5.51**	**151.99**
Fully organic	Bankura	greater than 4-8 bigha	2	5.50	5.77	104.96
		more than 8 bigha	2	10.14	10.33	101.87
	Bankura Total		**4**	**7.82**	**8.05**	**102.96**
	Birbhum	less than 1-4 bigha	3	1.51	3.24	215.44
		more than 8 bigha	1	8.97	8.39	93.58
	Birbhum Total		**4**	**3.37**	**4.53**	**134.38**
	Jalpaiguri	less than 1-4 bigha	2	2.79	3.86	138.59
		greater than 4-8 bigha	1	6.00	10.33	172.22
		more than 8 bigha	1	9.00	7.86	87.37
	Jalpaiguri Total		**4**	**5.14**	**6.48**	**125.99**
	North 24 Parganas	less than 1-4 bigha	10	2.24	3.77	168.45
		greater than 4-8 bigha	2	6.14	6.11	99.51
	North 24 parganas Total		**12**	**2.89**	**4.16**	**144.03**
	Purba	less than 1-4 bigha	17	1.22	2.30	189.24
	Medinipur	greater than 4-8 bigha	1	6.58	9.64	146.54

	Purba Medinipur Total		**18**	**1.52**	**2.71**	**178.94**
	Purulia	less than 1-4 bigha	1	2.48	3.30	132.93
		greater than 4-8 bigha	2	5.65	7.16	126.68
		more than 8 bigha	2	17.20	25.83	150.11
	Purulia Total		**5**	**9.64**	**13.85**	**143.73**
	South 24 parganas	less than 1-4 bigha	6	1.97	2.55	129.03
		greater than 4-8 bigha	2	6.10	8.90	146.00
		more than 8 bigha	1	13.15	15.27	116.13
	South 24 parganas Total		**9**	**4.13**	**5.37**	**130.03**
Fully organic Total			**56**	**3.80**	**5.22**	**137.59**
Partly organic/ inorganic	Bankura	less than 1-4 bigha	6	3.04	3.45	113.64
		greater than 4-8 bigha	4	5.21	6.80	130.52
		more than 8 bigha	3	9.94	9.89	99.49
	Bankura Total		**13**	**5.30**	**5.97**	**112.62**
	Birbhum	less than 1-4 bigha	4	1.55	2.64	170.24
		greater than 4-8 bigha	1	8.00	16.53	206.63
		more than 8 bigha	2	9.74	15.33	157.39
	Birbhum Total		**7**	**4.81**	**8.25**	**171.45**
	Jalpaiguri	greater than 4-8 bigha	3	5.35	10.99	205.28
		more than 8 bigha	1	25.27	46.67	184.65
	Jalpaiguri Total		**4**	**10.33**	**19.91**	**192.67**
	North 24 Parganas	less than 1-4 bigha	13	2.10	2.98	141.63
		greater than 4-8 bigha	6	5.43	7.48	137.85
	North 24 Parganas Total		**19**	**3.15**	**4.40**	**139.58**
	Purba Medinipur	less than 1-4 bigha	10	1.44	2.59	180.49
		greater than 4-8 bigha	2	5.48	7.86	143.23
	Purba Medinipur Total		**12**	**2.11**	**3.47**	**164.35**
	Purulia	less than 1-4 bigha	1	2.85	5.88	206.38
		greater than 4-8 bigha	4	5.39	6.84	126.83
		more than 8 bigha	2	14.97	9.82	65.59
	Purulia Total		**7**	**7.77**	**7.55**	**97.27**
	South 24	less than 1-4 bigha	22	1.98	3.72	187.94
	parganas	greater than 4-8 bigha	10	4.94	6.09	123.29
		more than 8 bigha	2	10.77	14.74	136.85
	South 24 Parganas Total		34	3.37	5.07	150.43
Partly organic/Inorganic Total			**96**	**4.15**	**5.89**	**142.05**
Grand Total			**200**	**3.92**	**5.61**	**143.04**

Chapter 7

Table-7.1: The structure of different costs and their components

Cost A2 = Cost A1 + Rent Paid for leased in-land

Cost B1 = Cost A1 + Interest on value of owned fixed capital assets

(excluding land)

Cost B2 = Cost B1 + Rental value of owned land (net of land revenue)

and rent paid for leased-in land

Cost C1 = Cost B1 + imputed value of family labour

Cost C2 = Cost B2 + Imputed value of family labour

Cost C2* = Cost C2 + Additional value of human labour based on use of

higher wage rate in consideration of statutory minimum wage

rate. (This is an intermediate concept).

Cost C3 = Cost C2* + 10 percent of cost C2* to account for managerial

input of the farmer

Source: Mannual Cost of Cultivation Surveys 23 July, 2008

Cost A1 – includes

(xiii) Land revenue cesses and other taxes

(xiv) Interest on working capital

(xv) Misc. expenses (artisans etc.)

We have considered cost A1 (Actual expenses in cash and kind in production by the farmer, excluding land revenue, interest on working capital and miscellaneous expenditure-item 13, 14, 15.

We did not consider cost A2 Rent and Cost B Rental value of own land + own fixed capital excluding Land.

We however considered cost C which in our case is cost A1+imputed value of family labour.

Questionnaire
Economic Viability of Sustainable Agriculture
Survey on Cost of Cultivation

Note: Reference Year: 1st July 2012 to 30th June 2013 Questionnaire Code: Zone wise

Block A: Farmer's Identification (Fully Organic/Partly Organic/Fully In-organic)

1	Farmer's Name	
2	Farmer's Father's/ Husband's Name	
3	Village	
4	Mouza and J.L .No	
5	GP	
6	Block	
7	District	

Block B: Demographic Profile of the Family

SL No	Name of Members* (including those absent)	Sex (Male-1, Female-2)	Age (Years)	Education (Code)	Occupation Principal	Occupation Subsidiary
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

*Please tick the respondent

Code list: Educational status:

Not literate	1	Middle (V – VIII)	4	Graduate	7
Literate	2	Secondary (IX & X)	5	Postgraduate and above	8
Primary (class I – IV/V	3	Higher secondary	6	Technical Education	9

Block C: Farmer's Land Area (in Decimal)

			Terms	Agriculture land	Homestead	Pond	Non Agriculture Land	Others (specify)
1		Own Land (family)	——					
2	Leased in*	Crop (s)**						
		Crop (s)**						
		Crop (s)**						
		Crop (s)**						
		Season(Specify)						
		Yearly						
		Share Cropping						
3	Leased out*	Crop (s) **						
		Crop (s)**						
		Crop (s)**						
		Crop (s)**						
		Season(Specify)						
		Yearly						
		Share Cropping						
4		Mortgaged in *						
		Mortgaged out *						
5		Land otherwise occupied	——					

***Specify the terms **Specify crops**

Block D: Crop wise information on Production

Name of the crops	Season Sowing	Season harvesting	Area Under Cultivation (in Bigha)	Total Production (in Kg)	Last 5 Year Production trend (code)	Market destination
1	**2**	**3**	**4**	**5**	**6**	**7**

Code: increasing 1, decreasing 2, same rate 3, fluctuating 4.

E: Crop wise Information on Human Labour use pattern

	Family labour	Agricultural Labour				Contract Cultivation		
Stages of Cultivation	Male Female	Male		Female		Male	Female	Total expenses
		No	Wages	No	Wages	No	No	
Name of Crop								
Ploughing and Land Preparation								
Seed Treatment								
Seed bed treatment								
Sowing/Transplantation								
Basal application of fertilizer								
Top Dressing								
Irrigation								
Intercultural								
Application of P.P.Chemicals/Weedicides								
Harvesting and Drying in Field								
Weighing, transporting, packing and storing								
Total								

Block F: Crop wise information on Irrigation

Name of the crops	Irrigated:1, Not Irrigated:0	Irrigation		Mode of irrigation (code)	Total Paid out cost of Irrigation (in Rs)	Total Imputed cost of Irrigation (in Rs)
		Number	Hours			
1	2	3	4	5	6	7

Mode of Irrigation: Canal, Pond, Shallow tube well, wells, others (specify)

Block G: Crop wise information on Seed

Name of the crops	Type of seed (hybrid:1, high yielding:2, local:3)	Quantity applied (kg)	Source of seed*	Purchase value (Rs.) (if purchased)	Imputed Value (Rs.)	Cost of seed treatment (including transport cost)
1	2	3	4	5	6	7

*Code: Own 1, purchased 2, exchanged 3.

Block H: Crop wise information on Chemical Fertiliser and Bio Fertilizer

Name of Chemical Fertiliser / Bio Fertilizer	Name of the crops	Name of Fertilizer	Quantity applied (including Basal and Top Dressing)(kg)	Source of Purchase	Cost of Fertilizer (including transport cost)
1	2	3	4	5	6

Block I: Crop wise information on Chemical Fertiliser and Manure

Name of Chemical Fertiliser / Bio Fertilizer	Name of the crops	Type applied	Quantity Purchase	Source of (including	Cost of Manure transport cost)
1	2	3	4	5	6

Block J: Crop wise information on Chemical Pesticides and Bio Pesticides

Name of Chemical Pesticide / Bio Pesticide	Name of the crops	Quantity applied	Source of Purchase	Cost of chemical (in pesticides and weedicides (in Rs.) cluding transport cost)
1	2	3	4	5

Block K: Cost Specific to Organic Farming

SL. No	Type	Quantity received from household source (Total for the year)	Cost incurred by the household (in Rs)		Quantity received from other sources (Total for the year)		Purchase Cost (in Rs)	
			One time cost	Other cost during the year	Market	Peer Group	Market	Peer Group
1	Preparation of Vermi compost							
2	Preparation of solid compost							
3	Preparation of Azola							
4	Other Bio/organic fertilizers							
4.1								
4.2								
4.3								
5	Bio Pesticides							
5.1								
5.2								
5.3								

Block L: Information on Occupational Status (Time*)

SL No	Name of family members related to agriculture and farm management	Usual Status	Principal_ Weekly status	Principal _ Daily Status	Subsidiary Occupation_ Yearly Status	Subsidiary Occupation_ Weekly Status	Subsidiary Occupation_ Daily Status
		Months engaged in a year	No of days in a week	No of hours in a day	Months engaged in a year	No of days in a week	No of hours in a day
1	2	3	4	5	6	7	8

***For those who are engaged in agriculture either in principal or in subsidiary status**

Block M 1: Income (in Rs)

Crop wise	Farm Business income	Crop wise	Farm Business income

Block M 2: Income (in Rs)

Non Agriculture Income	External Remittance Yearly (If any)

Block N: Information on Bank Account and Loan

1. Whether the farmer holds bank account?		Yes/No		
2. Whether the farmer has any loan?		Yes/No		
3.If yes, Sources of Loan		Institution/Private		
Name of the Institution	Amount of loan	Collateral security	Terms of repayment	Rate of interest
4	5	6	7	8

Block O: Information on SHG and Other

1. Whether any member is attached to SHG?	Yes/No
2. If yes, how many members?	
3. Post held, if any	
4. If yes, Details of the Post	

Name of the Group	Grade	Amount of loan(If any)	Purpose of loan	Rate of Interest (%)
5. Whether family is BPL?			Yes/No	
6. Any support received from Govt. (in last 5 year)			Yes/No	

Block P: For Organic Farmer

1	When was organic farming initiated?	
2	Years of organic farming	
3	Whether soil testing has been done?	
4	Influenced by	NGO/Govt/Peer Group
5	Encouraged anybody, if any	
6	Problems of organic farming	
7	Benefits obtained from SHG, if any	
8	Experience of chemical based farming, if any	
9	Years of experience	
10	Problems faced, if any	

Block Q: Livestock for 1year

SL No	Type of live stock	Number	By product (if any)	Earning (Rs.) if any	Benefit, if any	Imputed Value (Rs.)
1	2	3	4	5	6	7

Block R: Horticulture

Name of the tree	Number	By product (if any)	Production	Cost	Earning (Rs.) if any	Benefit, if any	Imputed Value (Rs.)
1	2	3	4	5	6	7	8

Block S: Allied Agriculture

Allied Agriculture	Area	Production	Cost	Earning (Rs.) if any	Benefit, if any	Imputed Value (Rs.)
1	2	3	4	5	6	7

Note of the Investigator:

Contact Number of the Farmer:

Signature of the Enumerator:

Date of Survey:

Economic Viability of Sustainable Agriculture: A note on the draft report

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I feel myself privileged to have a draft copy of the said report even before it reaches academicia and to other stakeholders in the related line. I also express my sincere regret for not being able to go through the valuable report early, due to my official engagements. I wish I may be excused for the delay.

The report entitled " Economic Viability of Sustainable Agriculture'' attempts to find an answer to the pre-set question of this study : *Is organic farming economically viable at the farm level even if there is no subsidy from the state or even if there does not exist any niche market where the product prices can be fixed at a higher level?* (Chapter1). The report sets up the tone by announcing *''a through academic empirical study into the pros and cons of sustainable organic farming practices as well as their possible elevation as sustainable integrated farming practice under a total cost approach''.*(Chapter 2). No doubt, the area is not very well explored particularly in this State with back up from the empirical evidence gathered from representative farm families.

The Report therefore has generated a big expectancy.

Unfortunately, the Report has announced *''at the very outset ..... that the findings reported here cannot be considered as representative for the entire State; neither should it be claimed as the features of various agro-climatic zones*''. (Chapter 3). Then why and for what purpose is this report developed?

The review of existing literature has given total production of organic farms at about 14,000 tonnes during 2002 (Chapter 2). This information is too old, and needs updated information. It may be mentioned that currently, India ranked 33rd in terms of total land under organic cultivation and 88th position for agricultural land under organic crops to total farming area. The cultivated land under certification is around 4.43 million hectares (2010-2011). There is no provision of MSP in respect of organic farm produce. However, the government is promoting organic farming by providing incentives to cultivators of organic food products under the NHM at Rs. 10,000/- per hectare for maximum area of 4 hectares per beneficiary. (Organic Farming Newsletter, Vol 9 No. 1, March 2013).

On an average, the productivity of crops in organic farming is lower by 9.2% compared to conventional farming. However, due to availability of premium price (20 – 40 %) for organic produce in most cases, the average net profit was 22.0% higher in organic compared to conventional farming. (Organic Farming Newsletter, Vol 6 No. 2, June 2010).

The literature review would have been more enriched if it had referred to the UN-sponsored wonderful and priceless 2500 page document [International Assessment

of Agricultural Knowledge, Science and Technology for Development (IAAKSTD report)] prepared by vastly qualified team of 400 international experts (along with about 1000 reviewers) who tirelessly volunteered to work for four years to produce the document suggesting a range of options for decision makers on global and sub global regional basis with practically no other alternatives for the next 50 years.

In the methodological portion, elaborate space is allotted to describe selection of farmers from regions and agro-climatic sub regions; but in no stage, the type of sample design (described in any standard textbook) is clearly stated. It appears that the report is a comparison between GR farming practices and non-GR farming practices. (Chapter 3). As stated earlier, the report attempts to find out economic viability of sustainable agriculture; and the report begins with the simplistic assumption that GR farming practice is not sustainable.

From Table- 3.1 it is seen that total number of farmers in lower Gangetic Region is 266, in Eastern Plateau Hill Region it is only 18 and in Eastern Himalayan Region it is only 50. There are only 334 farmers in these three regions! It appears that these farmers are directly brought under the extension activities of the DRCSC and hence are listed by the DRCSC and further samples are drawn based on these 334 farmers ! As a result, one gets perplexed whether this report is a case study of benefits generated by DRCSC or it is an attempt to see ''Economic Viability of Sustainable Agriculture''! The report elaborately explained the selection of number of farmers in each district but remains absolutely silent on selection of blocks. And how the sampled farmers are selected at the village level without considering gram panchayat/ mouza/ village as any kind of stratum in any stage is not explained. It is not understood why detailed logic is given to select three categories of farmers namely, fully organic, fully inorganic and mixed farming. The entire exercise, therefore, becomes a purposive case study instead of much vaunted 'thorough academic empirical study'.

''The imputed cost assigned to the family labour had however been adjusted by following a norm which we derived after a series of consultations with the stakeholders''. (Chapter – 3). Interested reader, however, is deprived of that "derived cost of family labour" as in the entire report, this valuable derivation is not clearly stated.

The unit of area in the entire report is 'Bigha' – a unit which is very confusing and not followed in any official report at the state/national/international level. Also no definition of Bigha is given in the report. We know the area of one Bigha varies from 33 decimals to 40 decimals in many areas in South Bengal districts and even goes up to 41 to 52 decimals in North Bengal districts. It is hoped that in the final report, the unit 'Bigha' will be transformed into an acceptable unit like 'acre' or 'hectare'.

In Chapter – 4, the socio economic profile of the sampled households is given. The report shows the study has covered 200 households with a total of 1047 family members. It is seen that only 286 members (out of 1047 members) i.e. 27 per cent are engaged in agriculture as primary occupation. Section 4.2 deals with gender distribution. After tabulating the gender distribution of the sampled households, the report comments

that '' *one should not read too much from this information''*. Alas! Then why is this table! In the present day agricultural development, gender issue is a serious issue in the face of male labour migration from agriculture. Feminization of agriculture has recently acquired a sensitive area of intervention. Gender sensitive technology and gender sensitive farm implements have already been innovated to suggest that the area requires more in-depth study to realise viability of agriculture. The tables - 4.3a, table – 4.4a, table – 4.4c practically generate no linkage or conclusive findings in regard to 'economic viability of sustainable agriculture'.

Section 5.2 relates to farm size wise cropping intensity. In early 1980's, a popular debate had developed between two groups relating to farm size and productivity. But is there any conclusive relationship between farm size and cropping intensity? The report states *'with conventional wisdom' that the small farms in West Bengal are more intensively cropped*'. We do not know how many people attached with farming community in the State has 'wisdom' to say that small farms are intensively cropped ! Average cropped area and average gross cropped area often depend on availability of irrigation water followed by proper selection of cropping pattern. It has absolutely got no relation with farm-type like fully organic, partly organic or fully inorganic. The report jumps to the statement that "*organic farms mostly depend on family labour''*. The report has not given any data (even if collected from a purposive case study) to reach to this generalised statement.

The report highlights 3 farmers practising fully organic farming, but they own only homestead land and pond ! Can they be defined as farmer at all? Again, the findings say 13 out of 56 organic farmers cultivate Boro without using the typical GR Technology based package of input practices. The readers then become very eager to know which inputs / package they are using to grow Boro paddy. It may be a good learning to other debt ridden farmers in West Bengal too. Table – 5.8 (a,b,c) show long list of names of vegetables grown by three different types of farmers, but there is basically no difference in selection of types of vegetables among the three groups. What is tried to be stated? The report says *" organic farmers do not usually get a better price for their products. It appears that there is no incentive from the product* market for switching over to organic farming of vegetables''. Then, why are they growing organic crops? The report is silent.

In this context it may be noted that in the entire report, no clear definition of organic farming vis-a-vis inorganic farming is placed before the readers. It appears that non-application of chemical fertiliser and pesticides by a farmer is treated as organic farming!! If one reader gets this wrong definition of organic farming, then the liability goes with the report, not with the reader.

The report states with anguish that *''there had been no niche market for products produced strictly with non-GR inputs that the sampled organic farmers target''*.'(Chapter 5). The authors of the report may be reminded that in the entire state of West Bengal, there is not a single authorised agency to certify an agricultural product as 'Organic'.

Table – 5.9A, Table- 5.9B and Table – 5.9C, therefore, have practically no relationship with the declared mission of the report.

In Chapter – 6, earnings of the sampled farmers are presented in tabular forms. The exercise is done based on E_1 cost (considering both paid out cost and imputed cost) and E_2 cost (considered with only the operational cost). However, in the entire chapter, no further mention of E_1 cost and E_2 cost is found. On the contrary, farm business income of aman, boro and vegetables are shown separately. It is universally known that farm business income is calculated taking into account income from all crops throughout the year and farm business income of farmers/of a group is calculated on annual basis. Crop specific farm business income is a new presentation of this report! Practically, it is simply the gross / net income from raising one crop.

In the entire exercise, no production / productivity data are given to make any comparison between the organic and inorganic farming. No cost brake-up and no income details are also given. Therefore, the readers have to remain satisfied with statements made in the report.

The report has captured the ground level reality by reconsidering the cost related data and for each crop, imputed cost elements are considered by *contingent valuation method.* It is further claimed that this method is followed in the official procedure of the economics of farm management. This is quite perplexing. Firstly, how the contingent valuation method is developed ? A detailed note on this method should have been given in the annexure. Secondly, some references are to be stated where 'official procedure' has followed such contingent valuation method !

The report has stated that ''organic farmers enjoy high net earnings per bigha by intense use of own family labours. This often remains undisclosed and hidden in economics of farm management''. (Chapter – 6). It must be a resounding derivation stated in this report !

The report has also utilised '' official micro level data''. What is it?

The report has categorised farmers into 3 (three) groups – small farmers (land upto 1 bigha; middle farmers (1 bigha to 2 bigha) and big farmers (more than 2 bighas). It is suggested that such arbitrary grouping may lead to very confusing results. In any official farm management study and also in any standard literature, it will be found that the lowest group of land holding is called 'marginal farmers' with an average land holding upto 1 hectare. 'Small' category farmers are those who operate on 1 to 2 hectares of land. 'Medium' category farmers are those who operate on 2 to 4 hectares of land. Remaining farmers are called 'Big' who operate on more than 4 hectares of land. Going by this standard of landholding categories, all farmers as reported in this report are basically only 'marginal' farmers.

No explanation of price, where harvest price or market price or imputed price etc. is given in the report. But it is the most important area to arrive at any conclusion on

sustainability. Since, major portions of gross produce are consumed by the sampled farmers at home, question of valuation arises justifiably. Hence arriving at 'farm business income' appeared to be not explained fully in the report.

Lastly, in any present day orthodox farm management reports, it will be seen that (A_2 + FL) cost or C_2 cost is the main yard-stick of any discussion, but the cost concept stated in this report, in that sense, is a new innovation.

At the end, it is proposed that the report should have concentrated more intensively on the following points :

1) Unit of land holding should be changed to any official standard.

2) Concept of organic farming and inorganic farming may be clearly stated.

3) Concept of GR technology and non-GR technology, vis-a-vis organic farming and inorganic farming, if any, may also be stated.

4) To arrive at any generalised conclusions, strict statistical sampling procedure has to be followed. Otherwise, it will get status of a purposive case study.

5) Unnecessary table may be trimmed so that the aim of the report does not get diluted. If necessary, those tables may be sent to the appendix.

6) Value of output depends on price, since a major portion of gross product (paddy/vegetables) is not sold in the market and is consumed domestically. To arrive at the value of these produces, it is to be stated clearly whether harvest price/market price/any price index is used.

7) Size class-wise Income-Expenditure statements for different crops have to be shown to give the report some level of acceptance.

The report aims at reaching economic viability of sustainable agriculture without touching the areas like seed quality, soil quality, irrigation infrastructure, and above all, farmers' level of adoption of technology.

Finally, if the findings are seen in the light of aims stated at the beginning, it will obviously be seen that the report has completely deviated from its own path and appears to have reached a pre-set conclusion. In one sentence, the present report can be awarded the status of a purposive case study to highlight benefits generated to a few farmers through extension activities of the DRCSC.

Rejoinder to the Comments/ observations on the draft of the Final Report of the project,

"Economic Viability of Sustainable Agriculture".

Let us start with the admission of the commentator in para-2 of the 9-page comments / observations that '…. the area is not very well explored particularly in this State with back up from the empirical evidence gathered from representative farm families'. However, the commentator has chosen to 'read' the report with a partial selective excerpt (from a longer sentence) that is misleading and different from the authors' intent.

> According to him, The report sets up the tone by announcing *''a through academic empirical study into the pros and cons of sustainable organic farming practices as well as their possible elevation as sustainable integrated farming practice under a total cost approach''.(Chapter 2).*

As a matter of fact, the excerpt is from the chapter on Literature Review, where customarily one or more research gap is briefly identified to conclude the survey of existing work on the subject. The objective(s) is (are) normally given in the Introduction chapter. The authors had done exactly the same, and continued the sentence as "… under a 'total cost approach' was seriously wanting. Such a study was also to identify / establish the spectrum of optimum farm-sizes and the corresponding socio-economic groups for such practices for different crop baskets. The present study is a modest attempt at that direction." This is a custom widely followed in the university scholars' PhD dissertations. The commentator seems to be blissfully unaware in this regard. But he should have in all fairness read and mentioned the following small sentence, which is the last sentence of the chapter; i.e., "The present study is a modest attempt at that direction". Regrettably, he has confused the 'research gaps' with the 'objectives'.

> A couple of sentences later, the commentator notes that "Unfortunately, the Report has announced *''at the very outset … .... that the findings reported here cannot be considered as representative for the entire State; neither should it be claimed as the features of various agro-climatic zones*''. (Chapter 3). Then why and for what purpose is this report developed?

In fact, the commentator has again been selective ('with prejudice'?) in chucking out half-sentences from a compact paragraph that puts forth what is to be expected from the report. The full paragraph may be quoted underneath to underline 'why and for what purpose is this report developed'.

"At the very outset, we should therefore point out that the findings reported here cannot be considered as rigorously representative for the entire state; neither should it be claimed that the diverse features of various agro-climatic zones have been comprehensively be captured in this study (because the spread of the population did not maintain any order). What one can submit is that the findings of the study would represent a fair picture of the strength and weakness of non-GR based farming practices

in the field area (where the intervention of DRCSC for promoting sustainable agriculture is present). Within these limitations, the study leads to some significant conclusions – the constrained optimum solutions — that are by and large valid and gives one valuable insights regarding the relative position of organic farming vis-à-vis industrial agriculture or farming by GR technology".

In other words, the purpose of the study was to get insights into the relative strength/ weakness of organic farming versus industrial agriculture (based on a total cost approach) and reflect on the economic viability of sustainable agriculture.

The authors would like not to believe that the commentator does not understand the meaning and implications of 'constrained optimization', particularly when he had full knowledge that the study was to be conducted within six months and with meagre resources as mandated by the sponsors. This is why the study stops short of claiming generalization of its findings across the length and breadth of the State or across all the agro-climatic zones. This cautionary posture does not nullify the elaborate exploratory findings of the study, nor does it rubbish the contrasting portrayal of organic farming and industrial agriculture. In view of the fact that "the area is not very well explored particularly in this State with back up from the empirical evidence gathered from representative farm families', the zone of ignorance about organic farming is vast, and needs to be explored and analysed in the next opportunity with a larger and more varied sample design using more resources and at least three times longer the time period to gain a comprehensive and intensive understanding of the stated objectives. In retrospect, the present study would serve as a good prelude to that.

The critique regarding the Review of Literature is well taken and is updated in the Final Report.

> Another point raised by the commentator deals with the methodological portion. He rues that "elaborate space is allotted to describe selection of farmers from regions and agro-climatic sub regions; but in no stage, the type of sample design (described in any standard textbook) is clearly stated. It appears that the report is a comparison between GR farming practices and non-GR farming practices. (Chapter 3)". He has also said that "the report begins with the simplistic assumption that GR farming practice is not sustainable".
>
> A few paragraphs later, the issue of sample design has again been raked up by the commentator. It goes as follows: "The report elaborately explained the selection of number of farmers in each district but remains absolutely silent on selection of blocks. And how the sampled farmers are selected at the village level without considering gram panchayat/ mouza/ village as any kind of stratum in any stage is not explained."

Evidently, the textbook material on sample design had not been digested well by the commentator. How could he not understand that the criteria for selection of farmers as well as the regions and agro-climatic sub-regions are at the heart of the sample design! Similarly, the premise of non-sustainability of GR farming practices in the long-run is too

well established in the literature published over the preceding three decades or more including several scholastic scientific papers/ books published by the Indian Council of Agricultural Research (ICAR), Economic and Political Weekly (EPW), the various agricultural universities besides the works of the early critics like Frankel to the recent scholars like Vandana Shiva. Anyone well versed in the literature on Green Revolution would corroborate that the 'assumption' (*sic*) is anything but simplistic. Even the "UN-sponsored wonderful and priceless 2500 page document" (IAAKSTD report)] highly recommended by the commentator bears it out. We shall also consider mentioning the recently concluded UNCTAD study "Wake Up Before It's Too Late". In its highlights portion the study opines, **"The world needs a paradigm shift in agricultural development: from a "green revolution" to an "ecological intensification" approach. This implies a rapid and significant shift from the conventional, monoculture-based and high external-input-dependent industrial production towards mosaics of sustainable, regenerative production systems that also considerably improves productivity of small-scale farmers. We need to see a move from a linear to a holistic approach to agriculture management, which recognizes that a farmer is not only a producer of agricultural goods, but a manager of the agro-ecological system that provides a number of public goods and services (e.g. water, soil, landscape, energy, bio-diversity and recreation".**

On the one hand, block/ Gram Panchayat/mouza/ village was not known to have been any major decisive criterion for determining the costs or managerial practices of pursuing organic agriculture once the agro-climatic zones have been considered for stratification; on the other, the time and resource constraints were overwhelming, as mentioned earlier. Even then the post-facto distribution of sampled farmers has been presented to give the reader an idea about the spread and coverage incidentally captured in the sample. To remind one about one of the elementary lessons of stratified sampling which should not be forgotten is that stratification must not be arbitrary and should have a decisive bearing on the objective(s) of the study, and from that perspective the strata must have considerable internal homogeneity and inter-strata heterogeneity.

> The commentator notes that "it is not understood why detailed logic is given to select three categories of farmers namely, fully organic, fully inorganic and mixed farming. The entire exercise, therefore, becomes a purposive case study instead of much vaunted 'thorough academic empirical study'."

The three-tier categorization was made in order to capture the farmers in three mutually exclusive and collectively exhaustive categories so that no confusion arises regarding their cost-benefit differentials as well as differences in farm management practices which do exist distinctively as borne out by the study under discussion. More, importantly, it was done to see if fully organic practice is economically viable at all, or is viable as a mixed practice; also, to be able to make comparative study between the three distinctly identifiable practices in respect of costs and incomes. It is awfully surprising why and how the commentator arrived at the drastic conclusion that the entire study has become "a purposive case study". He must have got his definition of purposive sampling or case-study grossly erroneous.

> The next point raised by the commentator is the "derived cost of family labour" which (the derivation) according to him "in the entire report is not clearly stated".

In fact, the derivation norm of the imputed cost assigned to the family labour has been mentioned, though not extensively elaborated, as the cost that had been adjusted by following a norm "derived after a series of consultations with the stakeholders". This explanatory sentence has been quoted by the commentator himself just before raising the doubt. The stakeholders here are obviously the farmers (multiple samples) in the first place, then village-based trainers/ facilitators of organic farming and thereafter some non-farmer knowledgeable people associated with organic farming. Does it merit any further simplification even for the educated readers/ reviewers?

> Earlier at one place the commentator notes that "… one gets perplexed whether this report is a case study of benefits generated by DRCSC or it is an attempt to see ''Economic Viability of Sustainable Agriculture''!

This is ostensibly because the population of organic farmers has been taken from the farmers "under the extension services of the DRCSC" and the sample of inorganic farmers has been drawn taking a cue from them. But an organic farmer is an organic farmer even if he is under the DRCSC umbrella! Possibly the farmers with DRCSC support are better equipped and more efficient than the other organic farmers. In that case, if the outcome of the study goes more in favour of organic farming vis-à-vis inorganic farming than the unsupported organic farmers then the lesson would be that some exogenous support is necessary especially in the first couple of years, as has been expressed by many of the organic farmers during the field visits by the authors of the report. But that does not nullify the study either in respect of the sample design or the analytical method or the outcome. It reinforces the study in its essence and content, i.e., the economic viability of organic farming compared to chemical-based, GR-technology-based inorganic farming.

> Regarding the unit of land measurement, the commentator objects against the use of 'Bigha' – a unit which he finds is "very confusing and not followed in any official report at the state/national/international level".

But as 'bigha' has been used uniformly in preference over 'acre' or 'hectare' throughout the report, it is difficult to understand how it could be 'confusing', particularly for a highly placed officer in the Agriculture department of the State government. There could be some room for 'confusion' had different units of land measurement been used arbitrarily or randomly or deliberately in the report. There is a unique standard conversion rate, well accepted by all, of 'bigha' for any other unit of land measurement. This is the unit still used comfortably by most farmers. The unit was considered suitable for the study because it dealt with organic farmers most of whom were 'marginal farmers' going by the conventional definition. The authors made a conscious departure from the 'official' practice without compromising the logic, content or spirit of the study. The most used (absolute) measure of 'bigha' has been incorporated in the final report and mentioned in the footnote.

> The commentator also makes an issue of the "gender distribution" of the sampled farmers with respect to a few parameters given in the report and indicates, as if, that the study should have then indulged in "feminization of agriculture", "gender-sensitive technology" and "gender-sensitive farm implements" because "gender issue is a serious issue in the face of male labour migration from agriculture". He goes on to observe that the tables in the study report relating to gender "practically generate no linkage or conclusive findings in regard to 'economic viability of sustainable agriculture'". By the end of his list of comments/ observations, he suggests inclusion of "areas like seed quality, soil quality, irrigation infrastructure, and above all, farmers' level of adoption of technology". But the study never aimed to produce an Organic Farming Omnibus.

The commentator seems to have a fascination for keeping too many eggs of too many different birds in the same basket. To reiterate, the objective of the study was simply to look into the viability of organic farming compared to non-organic farming from an economic point of view, and not digress into other perspectives, however pertinent those might be; given the constraints the study seeks to find an optimum outcome. The gender table was inserted simply to give a clear profile of the sampled farmer households. However, in course of the field survey, it was found that women in marginal farmer households play a significant role in the organic farming management practices in terms of intermittent labour dispensation throughout their day-long household chores though that is difficult to capture in quantitative terms in a systematic manner.

The reference to 'conventional wisdom' and intensive cropping in fact has been given in the context of organic farming. This is true of small and marginal farmer households, in particular, engaged in organic farming vis-à-vis their industrial farming counterparts. This wisdom is quite prevalent in the villages under widely practiced organic farming.

It calls for a greater knowledge and exposure to organic farming practices to understand the traditional knowledge and ingenuity of the organic farmers coupled with the external knowledge and training provided by the DRCSC or similar organizations that help even the small and marginal farmers to cultivate lands without adequate irrigation facilities. This is achieved by a scientific crop rotation and simultaneous cropping of a judiciously selected basket of crops that develops a synergy and positive externalities which reduces the overall need for water. This is distinctly different from the usual practice of inorganic farming that someone not adequately exposed to organic farming would hardly be able to appreciate, let alone be convinced about. Here 'intensive cropping' connotes the essential sense of growing more crops on the same land-space, even if small, over a year.

It is the same mechanical approach that makes one ask 'Can they be defined as farmer at all?' referring to the 7 farmers [in the sample] 'practicing fully organic farming, but owning only homestead land and pond!'. Shouldn't a pro-poor policy approach include these cultivators rather get rid of them driving them out from the 'farmer' category altogether ? This is despite the fact that they have been practicing fully organic farming in their homestead land and on the edge of the pond that very largely help them survive like human beings providing them essential vegetables (vitamin sources) particularly in

times of soaring market prices. In the absence of any alternative livelihood opportunity created by the State, their farming practice means a lot to them. There are many other tiny organic farmers like them who would otherwise degenerate into the category of farm labourers. One has to see them to believe. In fact, this reminds one of the organic farming revolution in Cuba that brought in its wake the practice of 'urban farming' (on balconies, cornices, sun sheds, and very other vacant space) on a very wide (not large) scale which helped them significantly to address their food insecurity crisis following the collapse of the erstwhile Soviet block countries. Similarly, one has to see to believe how marginal organic farmers in Purba Medinipur have been cultivating 'boro' paddy sans the typical GR technology package.

A series of discussions is underway and continuing in various UN fora about the definition of farmers and their rights. India is also a part of that process. The latest development is that the UNHCR has made a final study on this, which has proposed to invoke one instrument as Declaration on the Rights of the People living in Rural Areas. This declaration, in the offing, defines farmer as follows:

Article 1 Definition of peasants

1. A peasant is a man or woman of the land, who has a direct and special relationship with the land and nature through the production of food or other agricultural products. Peasants work the land themselves and rely above all on family labour and other small-scale forms of organizing labour. Peasants are traditionally embedded in their local communities and they take care of local landscapes and of agro-ecological systems.
2. The term peasant can apply to any person engaged in agriculture, cattle-raising, pastoralism, handicrafts-related to agriculture or a related occupation in a rural area. This includes indigenous people working on the land.
3. The term peasant also applies to landless. According to the UN Food and Agriculture Organization definition, the following categories of people are considered to be landless and are likely to face difficulties in ensuring their livelihood: 1. Agricultural labour households with little or no land; 2. Non-agricultural households in rural areas, with little or no land, whose members are engaged in various activities such as fishing, making crafts for the local market, or providing services; 3. Other rural households of pastoralists, nomads, peasants practising shifting cultivation, hunters and gatherers, and people with similar livelihoods".

(A/HRC/19/75 – Nineteenth Session, Agenda Item no. 5 dt. 24.02.2012).

The recently concluded NSSO 70th Round also changed its concept of farmers. Chapter 1, 1.3.6 a. goes on to say," Possession of land was an essential condition for defining a person as farmer (farmer household) in 59th round, but an agricultural household as defined in NSS 70th round may or may not possess land".

Hence, it is clear that an evolving definition of farmer is taking shape and the erstwhile definitions have become redundant. The new definition of farmers has a right perspective bearing and encompasses the broad category of farmers. We suggest the commentator to take note of such changes and also put into practice when determining the cost of cultivation of various crops for the state.

From a policy perspective also this is very important. The hitherto policies in agriculture have defined development in agriculture in terms of yield and productivity without any concern for living standards of the families involved in agriculture. Production in agriculture should be viewed from the angle of food and livelihood security of the farmers. I just want to cite two examples. In a saline soil of the Sunderbans, the preference for farming of the farmer is not the productivity, as production is very low there, but his requirement of food and for that reason only the farmers indulges in agriculture and never pursue a commercial angle. Similarly, a farmer in Purulia having Baid(medium high) and Kanali (low land) will sow paddy in both places disregarding the fact that there may be no paddy produced in the Baid land. Why the farmer does so? Because, the farmer also needs fodder for the livestock, an essential part of the semi-arid area livelihood, It is not the commercial concern that the farmers in the rainfed areas are driven by, it is their food and livelihood driving them to take decisions. Do the policy makers consider these angles when arriving at cost of cultivation of crops in the state? It should be an imperative to consider those for policy makers in agriculture.

Again, all organic farmers, almost irrespective of farm size, do grow almost a similar package of vegetables, to a smaller or greater extent. The reason is that the essence of organic farming lies not only in the use of organic manure and pest repellants but also more importantly in the farm management practices – choice of crops, crop sequencing, relay cropping and parallel cropping, the timing of manure and pest repellant selection and application, water application, and so forth.

The answer to the commentator's question, "why are they growing organic crops" if they are not getting any incentive from the product market lies in the fact that for most of the small and marginal farmers, organic farming is the answer for ensuring safe and nutrient food for their survival. The report is not at all silent in this regard. A full paragraph has been devoted to explain this point in the last section of the report titled "Observations'.

Truly, the formal definition of organic farming has not been given in the report. But going through the entire study report, it is hardly difficult to understand that not only abhorrence of chemicals in cultivation but also, more importantly, the farm management practice in all its details of application, makes up what is known as organic farming.

That in West Bengal, there is not a single authorized certification agency for organic agricultural products speaks volumes for the neglect of organic farming in general in the State. This is well known. But the discovery of the commentator that a couple of tables relating to marketing infrastructure of different crops "have practically no relationship with the declared mission of the report" is confounding. Because, how many of the crops that are bought and sold daily in the local markets have a certification tag? People in the villages in particular know pretty well and can identify which products are

organically produced, and which are not. They have a clear preference for the former, and it may be noted that in the villages organic agricultural products generally do not carry a higher price tag. Even in the city of Kolkata, organically produced crops are sold regularly once or twice a week in specific areas (Salt Lake City and Earthcare Books premises in Middleton Street) to many buyers who even pay a higher price. The tables do speak, and speak important things that are given before the tables. If one dismisses the organically produced crops on the pretext of the absence of authorized certifying agencies then the whole study can be dismissed at the very outset. Why go through the full report and dash a 9-page long list of comments and observations?

To quote the commentator's observations regarding derivation of 'farm business income' in the report " It is universally known that farm business income is calculated taking into account income from all crops throughout the year and farm business income of farmers/ of a group is calculated on annual basis. Crop specific farm business income is a new presentation of this report! Practically, it is simply the gross/net income from raising one crop."

In actuality, the report says, "Adding Income from major crops aman, boro and potato, other crops and also income from vegetables we get a farmer's yearly agricultural income", and then it places two equations to demonstrate concretely and clearly the derivation of Farm Business Income. Thereafter, the report says further that, "Following this procedure, we calculated farm specific yearly agricultural income. The exercise was carried out with respect to all three major crops and other crops as well as with respect to the vegetables that the farmers produce. Crop specific farm business incomes had been calculated first with respect to each farmer. Farmer type and farm size specific aggregations were then done."

In other words, farm business income has been calculated taking into account the annual incomes from the each of the crops and vegetables grown by the farmer separately as they fetch the returns from the market (or imputing the monetary value as per the current market prices) and also the incomes from the non-farm agricultural activities (like horticulture), and thereafter summing up the whole income to arrive at what has been called the 'total farm business income'. This approach was taken to preempt the possible errors of Type-I. This is not an unknown or unused practice, whether in academics (including farm management studies) or in policy analysis.

The commentator seems not to have read this portion of the report thoroughly (just as he overlooked Table 6.10 which would show him the repeat mention of E1 & E2 which he thought had been used only one and had been forgotten), nor does he seem to be ready or willing to budge an inch from his inertia of the conventional ('universal') method of calculation of farm business income for all crops taken together on an annual basis. And he does not spell out what is wrong with the crop-wise calculation of income over a year and totting up the components to arrive at the total farm business income.

Any student of Economics learns in his early first year graduation classes a simple thing that is not easy to forget, namely, the Circular Flow Model which is also an aggregate income assessment model. It holds up that there are more than one approach to arrive at

the total income. The Factor Remuneration Approach, i.e., the Cost Approach, is as much valid and justified as another approach, i.e., the Production Approach (Value-added Approach. Production/productivity data have not been given in the report because cost and income estimates can be obtained straight away for most farmers from the farmers themselves. The break-up of the 'total' figures were obtained but have not been given in the report. But that is customary in all reports of national as well as international organisations, let alone in all government reports whether of the State or the Centre. Then why the lament about the present study report?

The Contingent Valuation Method is so well known in the recent literature of Economics and Environment that this and all related information can be found in many books on the subjects and of course on the internet.

Going by conventional measures, all farmers considered in the report may be grouped as 'marginal' farmers, but to understand the differential motives and dynamics of organic farm management practices, the three-tier sub-categorization within the 'marginal' category is useful. That is where and how the tiny farmers having only a pond and homestead and still practicing organic farming come in for special analysis.

It is evident that throughout the report 'price', unless otherwise specified, has been used to mean market price. Wherever 'imputed price' has been used, the same has been specified. No other concept of price has been used.

In fine, let it be put on record that the language of the comments and observations made on the research study report smacks of a megalomaniac arrogance. The tone and tenor of the entire document, full of sarcasm and trivialisation, betrays an air of cheapness and snobbery that is unbecoming of any self-respecting person occupying a big chair, especially when

putting up observations and comments on a work done by very senior academics.

It needs to be mentioned that prior to final submission, the report was presented in a formal interactive session before veteran and renowned teachers of the ISI Calcutta, IIM Calcutta and of the department of Economics, University of Calcutta, among others, that included the representatives of the DRCSC. It was hailed and appreciated by all of them unequivocally, one or two minor suggestions notwithstanding.

Postscript:

One would never understand the economics of organic farming with blind application of the orthodox conceptual categories of agricultural economics, particularly of industrial farming. The labour process employed in organic farming is far too complex and complicated to be captured by the conventional concepts and processes. Particularly in case of extremely small and marginal farmers this is all the more important.

Extensive as well as intensive field exposure and careful observation of the farm management process in its entirety is absolutely necessary. New concepts and new analytics would have to be used to. It calls for a far longer time period and more resources to undertake a multi-disciplinary research study to undertake a comprehensive and

complete study of organic farming taking into consideration both the demand side and supply side of the subject as well as the forward and backward linkages. This is overdue.

- *Nabinananda Sen.*

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About the Organisation

Development Research Communication and Services Centre (DRCSC), non-government development organization was formed in 1982 as a resource centre for collection, collation and dissemination of information on various socio-economic issues and to highlight the struggles of various NGOs, CBOs and individuals to ensure social justice; especially for informal sector workers, indigenous communities and small & marginal farmers/landless labourers as well as self employed artisans. Along with that, since 1992, the centre focused on Sustainable Agriculture & Natural Resource Management for improving food & livelihood security of the rural poor through sustainable management of natural resources on the basis of principles and actions, that are environment friendly, economically appropriate, socially just and developed by mutual cooperation. The resource centre started to expand its services through a Network of local NGOs and Development Cooperation Groups but now implementing various programes and projects directly also.