



IMPACT OF BHOOCHEETANA TECHNOLOGY ON COST AND RETURNS IN MAIZE PRODUCTION: AN EMPIRICAL STUDY IN DAVANGERE DISTRICT OF KARNATAKA

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ABSTRACT Agriculture being the livelihood for majority of rural people, its reforms has become a continuous process. Introduction of Green revolution technology followed by organic farming and recently by Bhoochetana Technology (BCT). In this study an attempt has been made to ascertain the impact of BCT on cost and returns in maize production. Multi-Stage sampling scheme was adopted for sample selection. Total variable cost as well as Total cost in maize production was significantly more among the farmers who have adopted the BCT compared to the non-adopters. Adopters of BCT have obtained higher maize yield and also earned higher gross as well as net returns from maize production compared to the non-adopter of BCT.

KEYWORDS : Bhoochetana technology, Cost and Returns

1. Introduction

Agriculture plays the most crucial role in the overall economic development of the country and it is considered as backbone of Indian economy. Indian agriculture is a diverse and extensive sector involving a large number of factors. Productivity driven production growth in agriculture production through the adoption of green revolution technology is considered as one of the most successful story our nation. The Green Revolution contributed to the Indian economy by providing food self-sufficiency and improved rural welfare (Anwasha, 2012). The main feature of this technology is the use of purchased and costly hybrid seeds, high doses of Chemical fertilizer, Pesticides etc. It aimed at pumping in the inputs so that the production rises. Over the years it burns the soil organic matters and soil micro-organisms rendering soil lifeless and infertile, spoiling the soil health, depleting micro nutrient and natural fertility. This has resulted in stagnant and declining yield, production and income of the crop (Sharma, 1991). The damage caused through agro chemical pollution to environment and human health, directly and through the human food chain is irreparable (Guan soon, 1998). There is a strong belief that organic farming is a solution for the problems and ills of inorganic farming system which creates environmentally and economically sustainable production system by using farm derived resources that protect crops from pests and diseases.

Organic farming creates integrated, humane, environmentally and economically sustainable production systems, which maximize reliance on farm-derived renewable resources and the management of ecological and biological processes and interactions, so as to provide acceptable levels of crop, livestock and human nutrition, protection from pests and disease, and an appropriate return to the human and other resources. Even after using organic farming system, farmers could not achieve the expected yield which was a hard stone to digest for the small and marginal holders. Several research studies have revealed that initially organic farming system produces low yield immediately after shifting from IFS and gradually it increases. But farmers being poor are not able to withstand the shock and hence returned back to IFS. Focusing small and marginal farmers in the dry-land region as the target group Bhoochetana Technology was implemented. Technological change has been the main engine of agricultural growth in India. Strong empirical evidence provides support that high levels of R&D lead to high productivity and therefore improved economic performance. R&D was found to translate into significant rates of return in primary and service sectors, registering as high as 60 per cent (Cororaton, 1998).

Agricultural growth in the state was low due to depleted soils and water deficiency. Hence there was a need of holistic programme for efficient management of the natural resources and to increase food production. Therefore, Bhoochetana programme for Rejuvenation of soil enrichment and to revive agriculture and increase the dry land Crop production with the application of micro nutrients and use of technology. The crop yields in dry land areas were 1 to 1.5 tons per hectare which were lower by two to five folds of achievable potential yield (Wani et.al,2012). Potential of dry-land agriculture could be

unlocked by using best technology for improving rural livelihoods through sustainable agriculture. Hence Government of Karnataka in collaboration with ICRISAT initiated a novel project called Bhoochetana under Rastriya Krishi Vikas Yojana (RKVY) in May 2009 for a period of four years to improve productivity in rain-fed agriculture. Karnataka State Department of Agriculture is the Nodal department for Programme. ICRISAT is the Technical Support provider and will help in implementation along with the State agricultural universities. The most significant features of the programme includes; i) To achieve 20% enhancement in the yield of dry land crops in a period of four years, ii) To Identify and adapt best management practices for the selected crops, iii) Guiding farmers in Propagation of efficient water usage micro nutrients, seed treatment with bio pesticides and fungicides and also Balanced Application of nutrients, iv) Important feature is that Technological Information is made available to farmers at their door steps through Farmer Facilitators (Village level farmer officers) and Agricultural Extension Personnel and other inputs at Cluster level , v) Creating Awareness through wide publicity through wall writing, village meetings, Posters and through mass media.

BCT was implemented to all 30 districts from 2009-2012 and target was set for 50 Lakh Hectares during 2013. Since implementation of technology, Productivity and incomes have increased and Agricultural Growth increased by 6%. Davangere district suffers with acute water scarcity, mainly due to the poor and erratic distribution of rainfall, the increasing population pressure and unsustainable water use. Annual rainfall in Davangere is below 700 mm. Crop productivity under the rain-fed system was below one ton per hectare. The government reports revealed that the improved package of practices has increased productivity in the dry land region and farmers have benefited by new technology. The yield as well as the quality of the product had increased in the production of maize, groundnut, jowar and ragi for the adopters. Empirical analysis of impact of BCT on the cost and returns structure in crop production has greater policy implications. So far no studies have compared cost and returns among Adopters and Non Adopters of BCT. Hence this study of cost and returns in maize production through BCT is undertaken in Davangere district of Karnataka.

2. Methodology

Primary data was collected from Davangere district of Karnataka. Davangere district contains six taluks out of which three taluks Harapanahally, Jagalur and Honnali were selected for the study on the basis of highest percentage of maize crop grown area. Samples required for the study was obtained by applying Multi stage sampling method. Three villages were chosen from every taluk and 20 respondents were selected from each selected village using random sampling. Hence totally 180 samples were selected for the study using a well-designed and pre tested schedule. Respondents were classified as Adopters of BCT if they use micro nutrients namely Borax, zinc and Gypsum salts in their farms and possessing soil health cards and others as Non-Adopters of BCT. Among 180 respondents, 83 were Adopters of BCT and remaining 97 were Non-Adopters of BCT. Data on

variable input expenditure per acre of farm for producing maize was collected from all the respondents and their mean values were compiled for adopters and non-adopters of BCT. Total variable cost of inputs was obtained by adding all the mean values. The data on fixed input components per acre was collected and their mean values were also calculated for the target groups. Total input cost of production per acre of maize was calculated by summing total variable cost and total fixed cost for Adopters and Non- Adopters of BCT. Adopters and non-adopters were compared by taking percentages. Students t-test was used to examine the significant difference between the two groups.

Information about crop yield, gross income, net returns over total variable cost and net returns over total cost per acre of maize was collected for all adopters and non-adopters of BCT. Mean values were calculated for both the groups. Percentages were computed for assessing the returns through BCT. To analyze the difference in returns of adopters and non-adopters of BCT, t-test was applied.

3. Results and Discussions

Inputs used in maize production include; Seeds, Farmyard manure, Fertilizers, BC components, Plant Protection measures, Human labour, Bullock labour, Tractor and Thresher. Expenditure incurred on such inputs has been collected, consolidated and presented in table-1. The other components like marketing expenditure and interest on working capital were also included in the expenditure. The total variable cost for maize production per acre of land was calculated separately for Adopters and Non-Adopters of BCT. The arithmetic Mean value of total variable cost and total cost for Adopters was found to be significantly more compared to the Non-Adopters. The calculated t values relating to these variables were significant at one percent probability level. Some payment regularly met by the farmers were Land revenue and taxes, Premium paid to crop insurance, Rental value of land and depreciation charges together constitute fixed cost components. Expenditure on these heads per acre of land was computed and their mean values and Total fixed costs were computed. Among all variable cost components, the mean value of inputs used by Adopters of BCT exceed to that of non- Adopters except for seeds, interest on working capital and expenditure on tractor.

Expenditure on human labour, bullock labour, and fertilizer are the major cost components. Their respective share in the total cost among the adopters of BCT was 20.5 %, 18.2% and 8.9 % respectively. The corresponding figure for the adopters group was almost similar (21.5%, 17.2% and 9.0%). The most significant difference between adopter and non-adopters of BCT with respect to the cost structure is the difference in the expenditure on FYM and fertilizers. Adopters have applied significantly more FYM compared to the non-adopters. The calculated t value for this variable was significant at one percent level. Fertilizer application was also found to be relatively more among the adopters compared the non-adopters. Expenditure on thresher and marketing expenditure were associated with quantity of the harvest and product marketed. Therefore, expenditure on thresher and marketing was more significantly more among the adopters compared to the non-adopters due to higher maize crop yield among the adopters.

Table-1: Cost Structure in Maize Production

Sl. No	Particulars	Mean value of Inputs used by		t value
		Adopters of BCT	Non-Adopters of BCT	
1	Expenditure on Seeds (Rs/ac)	1415 (5.7)	1417 (5.9)	0.057
2	Expenditure on FYM (Rs/ac)	1944 (7.8)	1329 (5.6)	5.136*
3	Expenditure on BC components(Rs/ac)	257 (1.0)	-	-
4	Expenditure on Fertilizers (Rs/ac)	2239 (8.9)	2128 (9.0)	2.337*
5	Expenditure on PP measures (Rs/ac)	30 (0.1)	25 (0.1)	0.340
6	Expenditure on Human Labour (Rs/ac)	5125 (20.5)	5084 (21.5)	0.335
7	Expenditure on Bullock Labour (Rs/ac)	4534 (18.2)	4068 (17.2)	1.672**
8	Expenditure on Tractor (Rs/ac)	1305 (5.2)	1549(6.5)	1.566

9	Expenditure on Thresher (Rs/ac)	556 (2.2)	454 (1.9)	7.084*
10	Marketing Expenses (Rs/ac)	670 (2.7)	547 (2.3)	7.151*
11	Interest on Working Capital (Rs/ac)	1387 (5.6)	1579 (6.7)	2.736*
A	Total Variable Cost (Rs/ac)	19464 (78.1)	18183 (76.9)	3.726*
12	Risk Premium (Rs/ac)	279 (1.1)	268 (1.1)	0.605
13	Land Revenue & taxes	10 (0.0)	11 (0.0)	1.15
14	Depreciation Charges (Rs/ac)	160 (0.6)	137 (0.6)	1.418
15	Rental Value of Land (Rs/ac)	5024 (20.2)	5046 (21.3)	0.780
B	Total Fixed Cost (Rs/ac)	5474 (21.9)	5462 (23.1)	0.329
C	Total Cost (Rs/ac)	24938 (100.0)	23645 (100.0)	3.622*

Note: Figures in parenthesis are percentage to total cost * and ** indicate the significance at one and five percent probability level respectively.

Pattern of Returns was to be analyzed for adopters and non-adopters of BCT. Hence data on crop yield, gross income, Net Income over TVC and TC per acre for the target groups were collected and their mean values were computed and displayed in table-2. It was found that crop yield was 22.8 Quintals/acre for adopters and only 18.7 quintals/acre for non-adopters having the yield difference of 4.1 quintals/acre. The yield difference was statistically significant at one percent probability level. The gross income per acre of maize earned by the adopters was more than the gross income of non-adopters by Rs. 5629. Similarly, Net income over TVC and TC for adopters exceeds by Rs 4347 and Rs 4336.

Table-2: Returns Structure in Maize Production

Sl. No	Particulars	Mean Value of inputs used by		t value
		Adopters of BCT	Non Adopters of BCT	
1	Crop Yield(Qtl/ac)	22.8	18.7	8.014*
2	Gross income (Rs/ac)	29993.9	24364.9	7.944*
3	Net Income over TVC	10529.8	6182.1	8.152*
4	Net Income over TC (Rs/ac)	5056	720	8.242*

* indicates the significance at one percent probability level.

The results of the t test reveals that the gross income, net income over TVC as well as Net income over TC were significantly more among the adopters of the BCT compared to the non-adopters of BCT. The adoption of BCT brought about significant change in the cost and returns structure in the maize production. BC technology increased the crop yield and returns more than that of the increase in the cost of production of maize.

4. Conclusion

In this study an attempt has been made to empirically verify the impact of Bhoochetana technology on the cost and returns structure in the maize production. The study reveals the significant difference between adopters and non-adopters with respect to the mean value of expenditure per acre on FYM and fertilizer. Adopters of BCT spend more on the threshing and marketing due to higher crop yield. Expenditure on Human labour, bullock labour, and fertilizer are found to be the major cost components in the maize production. The total cost as well as TVC was significantly more among the adopters of BCT compared to the non-adopters. Adopters of BCT earned significantly higher Gross returns compared to the non-adopters. This difference is more than the difference in the cost of production. Therefore, adopters of BCT earned significantly higher net income compared to the non-adopter of this technology.

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