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Research Note

Economics of Krishik Bandhu Drip Irrigation: An Empirical Analysis

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Abstract

The impact of Krishik Bandhu (KB) drip irrigation has been reported on productivities, incomes and benefit-cost ratios of sugarcane, banana, chilli and cotton in 51 villages of Tamil Nadu, Maharashtra and Madhya Pradesh states. The crop productivities, incomes and benefit-cost ratios under drip irrigation method have been found far higher in all the crops and in all the selected regions of these three states compared to those under the conventional flood irrigation method. The KB drip irrigation technology has been found to be far superior than the flood irrigation method.

Introduction

Agriculture is the primary occupation of a major proportion of the Indian population. There have been considerable variations in both the total quantity and distribution of rainfall in the recent past. This has resulted in the inadequate supply of irrigation water and a decline in the groundwater table as well. But, assured supply of irrigation water in adequate quantities is essential for improving crop productivities. The demand for irrigation water is witnessing a rapid growth in India.

Maharashtra has the highest area under micro irrigation with about 219696 ha, followed by Tamil Nadu and Madhya Pradesh (TERI, 2005). Drip irrigation is a proven method of efficient use of water in agriculture. Besides saving a considerable quantity of water, it increases crop productivity and reduces the total cost of cultivation (INCID, 1994).

The International Development Enterprises, India (IDEI), which has been working on water saving technologies, has developed an Affordable Drip Irrigation Technology Intervention (ADITI). It is quite beneficial for the small and marginal farmers.

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This drip irrigation technology is simple and flexible. It can work in the ways that are more dynamic and fruitful than any other sophisticated irrigation technology. The IDEI has developed a variety of low cost drip irrigation technologies of which Krishik Bandhu (KB) drip irrigation technology is one. The KB drip irrigation technology is being adopted in different parts of India. It can be effectively adopted in undulating lands, rolling topographies, barren lands and shallow soils (Shivanappan, 1994). Therefore, it was proposed to evaluate its impact on productivities, incomes and benefit-cost ratios of a variety of crops in different regions of Tamil Nadu, Maharashtra and Madhya Pradesh.

Methodology

For the purpose of this study, in all 165 farmers, spread over 51 villages in the Erode region of Tamil Nadu, Indore region of Madhya Pradesh and Jalgaon region of Maharashtra states, were interviewed. The necessary data were collected from the sample farmers who had adopted the KB drip irrigation technology. The major crops raised under the KB drip irrigation technology were sugarcane and banana in the Erode region, chilli in the Indore

region, and cotton and banana in the Jalgaon region. The economics of these crops were worked out in terms of productivity, income and benefit-cost ratio, both under the KB drip irrigation method and the conventional flood irrigation method and the results so computed have been compared. The sample size selected for the study has been presented in Table 1.

Table 1. Sample size for the survey carried out in three regions of Tamil Nadu, Madhya Pradesh and Maharashtra states

District	Crop	Drip irrigation	Flood irrigation	Sample size
Erode	Sugarcane	20	20	40
	Banana	10	10	20
Indore	Chilly	23	20	43
Jalgaon	Cotton	21	21	42
	Banana	10	10	20
Total		84	81	165

Results and Discussion

This section focuses on the various advantages of the KB drip irrigation technology adopted by the sample farmers in comparison with those under the conventional flood irrigation method. The estimates made in respect of productivity, income and benefit-cost ratio for sugarcane and banana in the Erode region of Tamil Nadu, chilli in the Indore region of Madhya Pradesh and cotton and banana for the Jalgaon region of Maharashtra (Tables 2 and 3) have been evaluated region-wise.

Erode Region

Sugarcane Crop

There was a saving of Rs 6450.00 (14 per cent) in the total cost of cultivation of sugarcane under the KB drip irrigation technology compared to that under the flood irrigation method. Though the costs of ploughing, land preparation, application, seeding and plant protection measures were identical in both the KB drip irrigation technology and flood irrigation method, a net saving in costs occurred due to lower irrigation costs in the former. In fact, the costs incurred in respect of harvesting and transportation were more in the KB drip irrigation technology due

Table 2. Cost of cultivation of crops in different regions under drip and flood methods of irrigation

Place	Particulars	Method of irrigation	Ploughing	Land preparation	Seed and sowing	Fertilizers	Farm yard manure	Plant protection	Weed control	Irrigation	Harvesting	Transport	Total cost of cultivation
Erode	Sugarcane (Rs/acre)	Drip	2650	2000	5200	2500	11250	1700	1500	0	12650	3465	39450
	Difference (%)	Flood	2650	2000	5200	4000	11250	1700	1600	6000	11500	3150	45900
Banana (Rs/acre)	Drip	2400	0	0	37	0	8800	2300	875	100	-10	0	14
	Flood	2400	0	0	4900	8000	8000	2800	2500	1000	1237	0	25012
Indore	Difference (%)	Drip	0	0	0	15	-10	18	65	78	34	0	20
	Chilli (Rs/acre)	Flood	600	600	940	1911	1600	2400	1120	500	2760	500	12923
Jalgaon	Difference (%)	Flood	600	600	950	1913	1500	2500	1600	1040	2700	500	13903
	Cotton (Rs/acre)	Drip	588	250	863	2425	1167	2175	763	52	-2	0	7
Difference (%)	Flood	550	250	760	1810	2083	2530	950	1485	100	2100	0	10579
	Banana (Rs/acre)	Drip	-7	0	-14	-34	44	14	20	100	-12	0	15
Difference (%)	Flood	450	250	4300	4050	2250	500	875	1000	1450	1400	0	15125
	Drip	450	275	4300	5875	2000	500	1790	3640	72.5	1400	0	20230
Difference (%)	Flood	0	9	0	31	-12.5	0	51	0	0	-4	0	25

Table 3. Yields, returns net profits and benefit-cost ratios of crops in different regions under drip and flood methods of irrigation

Region	Crops	Irrigation method	Yield (t/acre)	Returns (Rs /acre)	Net profits (Rs /acre)	Benefit-cost ratio
Erode (Tamil Nadu)	Sugarcane	Drip	57.2	61032	21582	1.55
		Flood	48.6	51419	5519	1.12
	Banana	Drip	13.2	113520	88508	4.54
		Flood	9.5	77900	46575	1.85
Indore (Madhya Pradesh)	Chilli	Drip	1.9	72200	59277	5.68
		Flood	1.1	41040	27137	2.95
Jalgaon (Maharashtra)	Cotton	Drip	1.4	29120	18541	2.75
		Flood	0.9	18000	5544	1.44
	Banana	Drip	25.8	82560	67435	5.46
		Flood	24.5	74725	54495	3.69

to increased production of sugarcane per acre, but these additional costs were more than compensated by the fertigation facility imbedded in the KB drip irrigation technology. The fertigation facility provided a saving in the cost of fertilizer application to the extent of 37 per cent.

The use of KB drip irrigation technology provided an additional yield of about 9 tonnes of sugarcane per acre and fetched an additional net profit of Rs 16063.00. The benefit-cost ratio was 1.55 in the KB drip irrigation technology and 1.12 in the conventional flood irrigation method. The production of sugarcane under the KB drip irrigation technology outweighed that under the flood irrigation method in the Erode region of Tamil Nadu.

Banana Crop

The net saving in the total cost of cultivation per acre of banana under the KB drip irrigation technology was to the tune of Rs 6313.00 (20 per cent) as compared to that under the flood irrigation method. There was a substantial saving of Rs 3500.00 (78 per cent) in the KB drip irrigation technology. The total costs incurred for banana in the Erode region were Rs 25012.00 per acre, while those under the flood irrigation method were Rs 31325.00. The total income per acre obtained from banana under the KB drip irrigation technology was of the order of Rs 1,13,520.00 and that under the flood irrigation method was Rs 77,990.00. The additional net profit by the

KB drip irrigation technology was almost equal to the total net profit obtained under the flood irrigation method.

The benefit-cost ratio of the banana crop under the KB drip irrigation technology was of the order of 4.54, while that under the flood irrigation was only 1.85. Thus, growing banana under the KB drip irrigation technology was far more profitable than that under the flood irrigation method. The KB drip irrigation technology was found to be superior to the conventional method of flood irrigation in banana cultivation.

Indore Region

Chilli Crop

The total cost of cultivation per acre of chilli crop under the KB drip irrigation technology was marginally lower than that under the flood irrigation method, but the yield of chilli crop under the KB drip irrigation technology was almost double of that under the flood irrigation method. Consequently, the net profits under the KB drip irrigation technology were more than double of those under the flood irrigation method. The benefit-cost ratio was 5.68 in the case of KB drip irrigation technology, while that under the flood irrigation method was only 2.95.

Production of the chilli crop was a far more productive venture under the KB drip irrigation technology than under the flood irrigation method.

Jalgaon Region

Cotton Crop

The total cost of cultivation per acre of cotton under the KB drip irrigation technology was Rs 10579.00, while that under flood irrigation method was Rs 12456.00. Thus, there was a saving of Rs 1875.00, constituting 15 per cent, although a higher cost was incurred on picking in the case of KB drip irrigation technology on account of higher yield to the tune of half a tonne. The net profit earned per acre of cotton in the case of KB drip irrigation technology was of the order of Rs 18541.00, whereas that under the conventional flood irrigation method was only of Rs 5544.00. The benefit-cost ratio in the former case was 2.75 while that in the latter case was only 1.44.

Banana Crop

There was a saving of Rs 5105.00 in the total cost of cultivation of banana under the KB drip irrigation technology compared to that under the flood irrigation method. The saving in the cost was considerable, 25 per cent of the cost incurred on the cotton produced under the flood irrigation method. The KB drip irrigation technology fetched an additional yield of 1.3 tonnes of banana and registered a benefit-cost ratio of 5.46, while that under the conventional flood irrigation was only 3.69.

Conclusions

The KB drip irrigation technology has been found quite beneficial in several respects. It has

provided higher yields per acre to the tune of 18 per cent in sugarcane and 39 per cent in banana in the Erode region of Tamil Nadu, 73 per cent in chilli in the Indore region of Madhya Pradesh and 55 per cent in cotton and 5.3 per cent in banana in the Jalgaon region of Maharashtra, besides savings in the total cost of cultivation per acre to the extent of 14 per cent in sugarcane and 20 per cent in banana in the Erode region, 7 per cent in chilli in the Indore region, and 15 per cent in cotton and 25 per cent in banana in the Jalgaon region. It also produced much higher benefit-cost ratios, ranging from 1.5 in sugarcane production in the Erode region to 5.68 in chilli production in the Indore region. There has been a considerable saving in labour cost in the application of irrigation water in the case of KB drip irrigation technology besides facilitating fertigation.

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