



A study on the mechanized farming of vegetable cultivation in Odisha

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Abstract : In this paper, a study was carried out regarding the impact of using improved implements and machinery with regard to cost of cultivation, yield and benefit-cost ratio for the cultivation of vegetables over traditional tools and implements. The experiment was conducted at Bhubaneswar in coastal Odisha in the cropping year 2008-09 for cultivation of okra in *Kharif*, potato in *Rabi* and pumpkin in summer season in an area of 0.4 ha (1 acre) each for traditional farming (TF) using traditional tools and implements and for mechanized farming (MF) adopting improved implements. The cost of cultivation was found to be about 30 per cent less in mechanized farming over traditional farming by using improved implements in case of mechanized farming on custom hiring basis. The study also revealed that okra was most remunerative crop with a benefit –cost ratio of 5.64:1 followed by potato (4.37:1) and pumpkin (4.29:1) in the mechanized farming. Similarly, for traditional farming, the benefit-cost ratio was found to be 3.29:1, 2.72:1 and 2.99:1 for okra, potato and pumpkin, respectively. The percentage savings of human labour in mechanized farming was about 56 compared to traditional farming. The yield per hectare in the mechanized farming was 5 per cent and 3 per cent more for okra and potato, respectively and 2 per cent less for pumpkin over traditional farming. Hence, there is the necessity of creating awareness and popularizing the improved horticultural implements in the state for their mass scale adoption and commercialization.

Key Words : Mechanized farming, Horticultural mechanization, Vegetable cultivation, Benefit-cost ratio

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INTRODUCTION

Mechanization of horticultural crops particularly for vegetable cultivation in Odisha is at a very low level (Anonymous, 2007). Majority of the farmers are using traditional tools and implements for various field operations involving drudgery, high cost of operation, wastage of agricultural inputs and damage of crop produce. Efficient and good quality agricultural implements have been developed and are commercially available. These implements need to be popularized amongst the farmers to increase the productivity and to reduce losses. Since vegetable crops are high value crops, but are highly perishable in nature, improved implements have been developed and are being used in developed countries for achieving timeliness in farm operations, reducing losses and maximizing production. Details of such implements and machines have been discussed

in this paper for their usefulness in vegetable crops.

It is estimated that by 2020, the vegetable production will touch about 11 million tones and fruit production about 2.5 million tones (Alam, 2000). Mechanization is, therefore, an essential input for horticultural crops. It not only achieves timeliness of farm operations but also increases productivity and reduces cost of cultivations as well as post harvest losses to a great extent. Odisha has emerged as the third largest producer of fruits and vegetables after Uttar Pradesh and Bihar. The farmers of Odisha, in general, use traditional tools and methods for cultivation and adopt traditional post harvest practices for handling, storage and processing of the crop produce. As a result of this, the yields are low, cost of cultivation is high and there occurs high losses ranging between 30-40 per cent of the total produce due to damage during harvesting, handling, storage, transport and processing. If improved implements are used in production

and processing of vegetable crops, the yields could be increased substantially and losses could be minimized considerably.

An attempt has therefore been made in this paper to study the importance of mechanization for increasing production of vegetable crops at reduced cost of operation and with less drudgery involved in farm operations and suggests measures to be taken to popularize the improved implements amongst the farmers of Odisha for mass scale adoption and commercialization.

MATERIALS AND METHODS

The experiment was conducted in the central farm of Orissa University of Agriculture and Technology, Bhubaneswar during the cropping year 2008-2009. The place is situated at 20° 15' N latitude and 85° 52' E longitude with an elevation of 25.9 m above mean sea level and nearly 65 km west of Bay of Bengal. The crop rotation of okra (*Kharif*), potato (*Rabi*) and pumpkin (summer) was selected for the field study as these vegetable crops are usually grown by the farmers of coastal Odisha. Two plots of 0.4 ha (1 acre) each were taken adjacent to each other. The vegetables were grown in one plot following traditional tools and implements which

are usually used by the farmers and improved implements and machinery in the other plot. The cost of use of the improved machinery has been taken on their custom hiring basis as owning costly machinery is beyond the capacity of a farmer. The improved machinery as well as traditional tools of the department of Farm Machinery and Power of the University have been used for the present study.

RESULTS AND DISCUSSION

A perusal of the economic evaluation of the cultivation of vegetables is given in Table 1-4.

The cost of cultivation per hectare for okra, potato and pumpkin in mechanized farming was Rs. 10228, Rs. 22083 and Rs. 8618, respectively where as the respective values for traditional farming were Rs. 15124, Rs. 30900 and Rs. 11638. The monetary gain realized per hectare in mechanized farming was more than traditional farming for all vegetables cultivation under study. However the monetary gain/ha in mechanized farming was highest in case of potato (Rs. 96717) followed by okra (Rs. 57772) and pumpkin (Rs. 36982). The respective monetary gain/ha in traditional farming was also highest in case of potato (Rs. 84200) followed by okra (Rs. 49876) and pumpkin (Rs. 34862). From the expenditure and return analysis,

Table 1 : Cost of cultivation of okra during Kharif 2008 (0.4 hectare/1 acre of land)

Sr. No.	Operations	Traditional practice (using traditional implements)	Time reqd./ acre, h or man-h	Cost (Rs.)	Improved practice (using improved implements)	Time reqd./ acre, h or man-h	Cost (Rs.)
1.	Tillage	MB plough- twice	16	480.00	T/O rotavator once	1.6	304.00
		B/D 4-disc harrow-once	10	300.00			
2.	Planking	Wooden planker twice	2	60.00	Nil	---	
2.	Seed	1 kg @ Rs.200/ kg	---	200.00	1 kg @ Rs.200/ kg	---	200.00
3.	Sowing	Manual, @ Rs.100/day/ labourer	24	37.50	Manual, @Rs.100/day /labourer	24	37.50
4.	FYM and fertilizer	FYM- 1 tractor load	---	400.00	FYM- 1 tractor load	---	400.00
		Urea- 12 kg		72.00	Urea- 12 kg		72.00
		MOP- 30 kg		150.00	MOP- 30 kg		150.00
5.	Fertilizer application	Manual	12	150.00	Manual fertilizer spreader	1	12.5
6.	Weeding	Hand hoe- 2 times with 8 labourers/day	128	1600.00	E/O power weeder, twice	6	390.00
7.	Plant protection	12 litres capacity knapsack sprayer, twice + pesticide cost	8	100+500	E/O power sprayer, twice	2	25.00 + 500.00
8.	Harvesting	Manual- 20 labour	160	2000.00	Manual- 20 labour	160	2000.00
	Total cost of cultivation			6049.50	Total		4091.00
	Yield			26 quintal	Yield		27.20 quintal
	Return @ Rs. 1000 per quintal			26000.00	Return		27200.00
	Benefit cost ratio			3.29:1	Benefit cost ratio		5.64:1
	Man-hour savings over traditional practice per hectare					413 hours (52 man labourers)	
	Monetary savings in cost of cultivation over traditional practice per hectare						Rs. 4896.00
	Overall monetary gain over traditional practice per hectare						Rs. 7896.00

Table 2 : Cost of cultivation of potato during Rabi 2008-09 (0.4 hectare/1 acre of land)

Sr. No.	Operations	Traditional practice (using traditional implements)	Time reqd./acre, h or man-h	Cost (Rs.)	Improved practice (using improved implements)	Time reqd./acre, h or man-h	Cost (Rs.)
1.	Tillage	MB plough- twice	16	480.00	T/O rotavator once	1.6	304.00
		B/D 4-disc harrow-once	10	300.00			
2.	Planking	Wooden planker twice	2	60.00	Nil	---	
2.	Seed	5 q @ Rs.800/ q	---	4000.00	5q @ Rs.800/ q	---	4000.00
3.	Sowing	Manual, @Rs.100/day /labourer	50	625.00	Manual, @Rs.100/day /labourer	50	625.00
5.	FYM and fertilizer	FYM- 5 tractor load	---	2000.00	FYM- 5 tractor load	---	2000.00
		Urea- 20 kg		120.00	Urea- 20 kg		120.00
		MOP- 30 kg		150.00	MOP- 30 kg		150.00
6.	Fertilizer application	Manual	40	500.00	Manual fertilizer spreader	6	75.00
6.	Weeding	Hand hoe-2 times with 8 labourers/day	128	1600.00	E/O power weeder, twice	6	390.00
7.	Plant protection	12 litres capacity knapsack sprayer, twice + pesticide cost	8	100.00	E/O power sprayer, twice	2	25.00
				+500.00			+500.00
8.	Irrigation	Manual watering 3 times	90	1125.00	5 hp diesel pumpset (3times)	6	468.00
9.	Harvesting	Manual- 8 labourers	64	800.00	T/O potato digger	1	176.00
Total cost of cultivation				12360.00	Total		8833.00
Yield				58 quintal	Yield		59.40 quintal
Return @ Rs. 800 per quintal				46040.00	Return		47520.00
Benefit cost ratio				2.72:1	Benefit cost ratio		4.37:1
Man-hour savings over traditional practice per hectare						802 hours (100 man labourers)	
Monetary savings in cost of cultivation over traditional practice per hectare							Rs. 8817.00
Overall monetary gain over traditional practice per hectare							Rs. 12517.00

Table 3 : Cost of cultivation of pumpkin during summer 2009 (0.4 hectare/1 acre of land)

Sr. No.	Operations	Traditional practice (using traditional implements)	Time reqd./acre, h or man-h	Cost (Rs.)	Improved practice (using improved implements)	Time reqd./acre, h or man-h	Cost (Rs.)
1.	Tillage	MB plough- twice	16	480.00	T/O rotavator once	1.6	304.00
		B/D 4-disc harrow-once	10	300.00			
2.	Seed		---	100.00	5q @ Rs.800/ q	---	100.00
3.	Sowing	Manual, @Rs.100/day /labourer	20	250.00	Manual, @Rs.100/day /labourer	20	250.00
5.	FYM	FYM- 1 tractor load	---	400.00	FYM- 1	---	400.00
6.	Weeding	Hand hoe- 2 times with 8 labourers/day	128	1600.00	Hand hoe- 2 times with 8 labourers/day	128	1600.00
7.	Plant protection	12 litres capacity knapsack sprayer, twice+pesticide cost	8	100.00	E/O power sprayer, twice	2	25.00
				+300.00			+300.00
8.	Irrigation	Manual watering 3 times	90	1125.00	5 hp diesel pumpset (3times)	6	468.00
Total cost of cultivation				4655.00	Total		3447.00
Yield				31 quintal	Yield		30.40 quintal
Return @ Rs. 600 per quintal				18600.00	Return		18240.00
Benefit cost ratio				2.99:1	Benefit cost ratio		4.29:1
Man-hour savings over traditional practice per hectare						286 hours (36 man labourers)	
Monetary savings in cost of cultivation over traditional practice per hectare							Rs. 3020.00
Overall monetary gain over traditional practice per hectare							Rs. 2120.00

Table 4 : Cost of cultivation, yield, return and benefit-cost ratio of vegetable crops in a vegetable cropping system (Okra-potato-pumpkin)

Crops	Area covered, ha	Yield per area covered	Yield per ha	Cost of cultivation/ area covered, Rs.	Return/ area covered, Rs.	Cost of cultivation /ha	Return/ ha, Rs.	Benefit-Cost ratio
Okra (TF)	0.4	26 q	65 q	6049.50	26000.00	15124.00	65000.00	3.29:1
Okra (MF)	0.4	27.20 q	68 q	4091.00	27200.00	10228.00	68000.00	5.64:1
Potato (TF)	0.4	58 q	145 q	12360.00	46040.00	30900.00	115100.00	2.72:1
Potato (MF)	0.4	59.40 q	148.5 q	8833.00	47520.00	22083.00	118800.00	4.37:1
Pumpkin (TF)	0.4	31 q	77.5 q	4655.00	18600.00	11638.00	46500.00	2.99:1
Pumpkin (MF)	0.4	30.40 q	76 q	3447.00	18240.00	8618.00	45600.00	4.29:1
Total (TF) per hectare (Okra-potato-pumpkin)						57662.00	226600.00	Average 3.00:1
Total (MF) per hectare (Okra-potato-pumpkin)						40929.00	232400.00	Average 4.76:1

Net monetary gain in TF/ha (Okra-potato-pumpkin) ; Rs. 168938.00 and in MF/ha, Rs. 191471.00
TF (Traditional farming with traditional implements); MF (Mechanized farming with improved implements)

it was found that okra was most economic crop with a benefit–cost ratio of 5.64:1 followed by potato (4.37:1) and pumpkin (4.29:1) in the mechanized farming. Similarly, for traditional farming, the benefit-cost ratio was found to be 3.29:1, 2.72:1 and 2.99:1 for okra, potato and pumpkin, respectively. The per cent of human labour savings in mechanized farming over traditional farming was found to be 45.94, 82.20 and 42 for okra, potato and pumpkin, respectively. The over all benefit-cost ratio was found to 4.76:1 in mechanized farming compared to 3.00:1 in traditional farming. The yield per hectare in the mechanized farming was 68 q, 148.5 q and 76 q for okra, potato and pumpkin, respectively and the respective yield/ha for traditional farming were 65 q, 145 q and 77.5 q. The yield per hectare in the mechanized farming was 5 per cent and 3 per cent more for okra and potato, respectively and 2 per cent less for pumpkin over traditional farming.

Conclusion:

The study revealed that mechanized farming for vegetable cultivation was quite remunerative, economical and labour savings compared to traditional farming. Small vegetable growers may not purchase the machine due to limited use, cost component and the problem of repair and maintenance in rural area, but they may be encouraged to use improved implements through custom hiring. Thus a mechanism needs to be established to provide the machine through custom service providers. Since mechanization of horticultural crops in Odisha is at a very low level, necessary

steps need to be taken to increase the growth of mechanization of these crops. Improved and good quality hand tools and equipments commercially available in the country need to be popularized amongst the farmers. For this, awareness should be created among the farmers through mass media and implements should be demonstrated in farmers' field under front line demonstration programmes. The adoption of improved implements will definitely help in production of high quality horticultural crops at reduced cost and with minimum losses to increase domestic consumption and export of agricultural produce at competitive price.

REFERENCES

- Alam, A. (2000).** Farm mechanization: rising energy intensity. The Hindu Survey of Indian Agriculture, 2000. pp. 181-191.
- Anonymous (2007).** Annual Report. Department of Horticulture, Government of Odisha.
- Anonymous (2005).** Hand Book of Agriculture. ICAR Publication, New Delhi, India.

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