

## **Economic Feasibility of Okra and Tomato Crop Grown On Black Colored Poly – Mulch in Udaipur District of Rajasthan- A Case Study**

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### **Abstract**

*Plastic mulching is a way of soil moisture conservation and improvement of water use efficiency of the crop. Plastic mulch also helps in better nutrient management and weed management. Different colour of plastic mulch has its individual effects on soil and plant health and also on some micro-climatic factors of the growing plants. Crops will be sown/transplanted/grown in the two rows. After laying of plastic mulch on raised beds. The water has been supplied through gravity fed drip irrigation with one lateral for two rows of the crop. Economics of the crops has been worked out. The field investigation trial was conducted at Plastic- culture Farm of CTAE, Udaipur (Raj.) to fulfil three objectives, namely; (i) To study of the effect of different coloured poly-mulch on the micro-climate of the growing plants. (ii) To study the impacts of micro-climate on the growth and yield characters of tomato and okra and (iii) To study the economic feasibility of yellow coloured poly-mulch with regards to tomato and okra crops. The fixed costs for okra and tomato cultivation on black coloured poly-mulch was found to be Rs. 39,835.00/- for the period of six months for tomato and okra crop. The total variable cost (B) was found to be was Rs. 1,40,171.20/- and Rs. 1,32,371.20 for per ha under black colour poly-mulch for okra and tomato cultivation, respectively in one hectare area. Per hectare cost of cultivation (A+B) for production of okra and tomato was found to be Rs. 1,80,006.20/- and Rs. 1,72,206.20/- respectively under black coloured poly-mulch while, average yield of okra and tomato was found to be 15216.30 kg and 79200 kg. per ha, respectively. Per hectare net returns was found to be Rs. 57,104.50/- and Rs. 611993.80/- for the production of okra and tomato, respectively. With black coloured poly-mulch per hectare returns over fixed costs was found to be Rs. 6,889.50/- and Rs. 6,51,828.80/- for the production of okra and tomato, respectively. The input out-put ratio or per rupee returns from 1.0 ha area for okra and tomato form black poly-mulch was obtained as 1.33 and 4.40 for okra and tomato crops respectively.*

*Key world: plastic mulch, fixed cost, cost of cultivation, nutrient, production*

### **Introduction**

Plastic mulching is a way of soil moisture conservation and improvement of water use efficiency of the crop. Poly-mulch also helps in better nutrient management and weed management. Different colour of plastic mulch has its individual effects on soil and plant health and also on some micro-climatic factors of the growing plants. Drip irrigation is the best available technology for the judicious use of water for growing horticultural crops in the large scale on sustainable basis. Drip irrigation is a low labour intensive and highly efficient system of irrigation, which is also amenable to use in difficult situations and problematic soils, even with poor quality water. Irrigation water saving ranging from 36-79% can be obtained by adopting a suitable drip irrigation system. Drip irrigation is designed to supply filtered water directly to the root

zone of the plant so as to maintain the moisture near to field capacity level for most of the time, which is found ideal for efficient growing of vegetable crops. The okra and tomato crops were grown with black coloured poly-mulch. Crops were sown/transplanted on raised beds in the two rows after lying of poly-mulch on the beds. The water was supplied through gravity fed drip irrigation with one lateral for two rows of the crop. Economics of the crops were worked out.

The study trials were conducted at Plastic-culture Farm of CTAE, Udaipur (Raj.) to fulfil the following objectives.

1. To study the effect of different coloured poly- mulch on the micro-climate near the growing plants.
2. To study the impacts of microclimate on the growth and yield characters of okra and tomato.

3. To study the economic feasibility of black coloured poly-mulch with regards to okra and tomato.

### Methodology

Standardization of the height stand for water tank, length of main supply pipe line and the laterals and diameters of laterals is required before the adoption of the gravity fed drip irrigation system. The vegetable crop such as okra and tomato has been selected because of their easier adaptability to all type of climate & soil, high production capacity, good nutritional value of the fruit, popularity among the farmers and easy marketing. Hence, this study was carried out to evaluate the performance of black colour poly- mulch on the okra and tomato crops under gravity fed drip irrigation system under agro-climatic conditions of Udaipur region. The okra cv. "Mahyco Bhindi-No.64" and tomato cv. "Dev" was taken for cultivation during the year 2013. The total growing area of 0.10 ha were planted with using spacing of 50 x 30 cm for okra and for tomato both.

To study the economic feasibility of okra and tomato crop under black colour colour poly mulch the cost of cultivation, yield, gross income and net income (profit) were calculated. The statistical analysis was made on the data of one season crops of okra and tomato.

#### Calculation of cost of cultivation

- A separate cost of cultivation, yield, gross income and net income of okra and tomato was calculated considering the one sqm area and it was multiplied for 1.0 ha area for black colour poly mulch. On the basis of calculated data input-output ratio or income on per rupee investment has been calculated.
- Two components of cost of cultivation namely fixed and variable cost has been considered for this analysis.

#### Items for fixed costs are-

- (i) Rental value of land- Assumed as it is prevailing in the locality.
- (ii) Depreciation of drip irrigation system was considered @ 10% of the value of drip irrigation system i.e. on Rs. 1,35,000/ha (half amount of total depreciation value for one crop has been taken into consideration).
- (iii) Depreciation on farm buildings @ 2% of the value of the farm buildings i.e. on Rs. 8,00,000 (Half amount of total depreciation value for one crop was considered)
- (iv) Depreciation on pacca well @ 2% of the value of well, i.e. on Rs.2,00,000/-(half amt. of total depreciation value for one crop was used for calculation)
- (v) Depreciation on pump house & electric pump set @ 2% of the value of pump house & electric pump i.e. on Rs.1,50,000/-(half amount of total depreciation value

for one crop was considered)

- (vi) Fixed electricity meter charges @ Rs.320/-for every 2 months (three times)
- (vii) Interest on fixed capital was taken as 12 % of the total fixed capital.
- (viii) Rent paid for land(for one crop of 6 months @ Rs.250/- per ha.)
- (ix) Interest on fixed capital (i.e. @ 12% on Rs.19,335 per ha) Half amount for one crop of 6 months was taken into consideration.
- (x) Salary for permanent labour– These are the data of AICRP (All India Coordinated Research Project) on Application of Plastics in Agriculture in which no permanent labour was employed in the scheme.

Items/ operations for variable cost are

- (i) Field preparation @ Rs.800/- per hr. for 10 hrs.
- (ii) Seeds-Okra @ 3 kg per ha @Rs.1800/-per kg; Tomato @125gm per ha, @Rs.49000/-per kg
- (iii) Fertilizers, FYM, insecticides and pesticides were used as per recommended doses as suggested in the package of practices for the zone by Department of Agriculture, Udaipur
- (iv) Electricity Charges are considered as the bimonthly bills generated by the AVSNL, Ajmer.
- (v) Casual labour charges - Labour for cultural operations, watch and wards, harvesting and marketing charges are included in casual labour charges, i.e. @ 2 Labour per day per hectare @Rs.147/-per day as per govt. norms (half amount of total charge per crop was taken into consideration).
- (vi) Poly Mulch material charges were used as per market price.
- (vii) Half amount per crop of interest on working capital @12% per annum.
- (viii) Working capital- total working capital for 6 months is added. It included the charges for field preparation, high yielding variety seeds, farm yard manure, fertilizers, insecticides and pesticides, land revenue, electricity charges and casual labour charges for both the crops under black coloured poly-mulch.
- (ix) Interest on working capital is calculated only for 6 months for each crop (as per its life span).
- (x) Labour for watch and ward, harvesting and marketing charges are included in casual labour charges

### Results and Discussion

Fixed cost for cultivation of okra and tomato crops under black coloured poly-mulch during the year 2013 has been shown in the Table 1. The fixed costs for black coloured poly- mulch was found to be Rs. 39,835/- per ha for the period of six months for both the crops. The components of fixed cost covers depreciation on drip irrigation system @ 10% of the value of drip

Table 1: Per hectare fixed cost for okra and tomato crops under black coloured poly mulch during the year 2013. (in Rs.)

S.No.	Particulars	Crops	
		Okra	Tomato
A. Fixed Cost (FC)			
1.	Depreciation on drip irrigation system @ 10% of the value of drip irrigation system, i.e. on Rs.1,35,000/-per ha (half amount of total depreciation value for one crop)	6750.00	6750.00
2.	Depreciation on farm buildings @ 2% of the value of farm buildings, i.e. on Rs. 8,00,000/- per ha (half amount of total depreciation value for one crop)	8000.00	8000.00
3.	Depreciation on pacca well @ 2% of the value of well, i.e. on Rs.2,00,000/- (half amount of total depreciation value for one crop)	2000.00	2000.00
4.	Depreciation on pump house & electric pump set @ 2% of the value of pump house & electric pump i.e. on Rs.1,50,000/- (half amount of total depreciation value for one crop)	1500.00	1500.00
5.	Fixed electricity meter charges @ Rs. 320/- for every 2 months (three times)	960.00	960.00
6.	Rent paid for land (for one crop of 6 months @ Rs.250/- per ha.)	125.00	125.00
7.	Rental value of land for 1.0 ha area (half amount of rental value of land for one crop)	17,500.00	17,500.00
8.	Interest on fixed capital (i.e. on Rs.19,335/- per ha @ 12%) Half amount for one crop of 6 months	2320.20	2320.20
9.	Total Fixed Costs (A)	39,835.00	39,835.00

irrigation system, i.e. on Rs.1,35,000/-per ha and the half amount of total depreciation value for one crop has been calculated as Rs. 6750/- for each crop. Depreciation on farm buildings @ 2% of the value of farm buildings, i.e. on Rs. 8,00,000/- and the half amount of total depreciation value for one crop was calculated as Rs. 8000/-. Depreciation on pacca well @ 2% of the value of well, i.e. on Rs. 2,00,000/- (half amount of total depreciation value of well for one crop was considered and it was found as Rs. 2,000.00/-). Depreciation on pump house & electric pump set @ 2% of the value of pump house & electric pump i.e. on Rs.1,50,000/- (half amount of total depreciation value for one crop was used) and it was Rs.1500.00/-. Fixed electricity meter charges @ Rs.320/-for every 2 months (three times)and it was found to be Rs. 960.00/-. Interest on fixed capital was taken as 12 % of the total fixed capital and it was calculated as Rs. 2320/-. Rent paid for land (for one crop of 6 months @ Rs. 250/- per ha.) and it was found to be Rs. 125/- for one crop of six months. Rental value of land was used @ Rs. 35000/ha per annum and the half amount for one crop for 6 months was found to be Rs.17,500.

The variable and total cost for cultivation of okra and tomato crops under black coloured poly mulch for the year 2013 has been given in the Table 2. The same cost was observed for preparation of field for both the crops while cost on okra seed was incurred to be Rs. 5400/- @ Rs.1800/- per kg with total needs 3 kg seeds per ha. The cost on tomato hybrid seed was found to be very high i.e. @ Rs. 49000/- per kg and it was

needed 125 gm per ha with costing of Rs.6125/-. Farm Yard Manure (FYM) applied per ha for okra and tomato crop was @ 200 q and 250 q/ha, respectively and it was purchased @ Rs.100/quintal.

Per hectare variable cost on fertilizer was observed to be Rs.3700/- for okra and Rs.7500/- for tomato including Urea, DAP and Murate of Potash. Costs for insecticides and pesticide was observed as Rs. 5000/- and 4000/- for okra and tomato, respectively and it included Chloropyrophos, Imedachlopid Cypermethrin, Thiram and Mencozeb. Casual labour charges @ 2 labour per day per hectare @ Rs.147/- per day as per govt. norms (half amount of total charge per crop) and it was observed to be Rs. 35,280/-. The same labour were also performed the work of watchman, harvesting and marketing, of crops. Electricity charges was paid as Rs. 2000/- per ha for each crop season. Expenditure on black coloured poly-mulch charges was observed to be as Rs 46,875/- per ha. The interest on working capital was taken @ 12% per annum and half amount of interest per crop was added in variable cost and was found to be Rs. 5,050.00/- for the okra crops and Rs. 5,391.20/- for tomato crop. Total working capital was calculated as Rs. 126,255.00/- and Rs. 1, 34,780.00/- for okra and tomato crops, respectively.

The total value of the total variable cost (B) was found to be different for okra and tomato crop under black coloured poly- mulch and it was calculated as Rs. 1,71,140/- and Rs. 1,40,171.20/- for okra and

Table 2: Per hectare variable cost for okra and tomato crop under black plastic-mulch during the year 2013 (in Rs.)

S.No.	Particulars	Crops	
		Okra	Tomato
<b>B. Variable Costs</b>			
1.	Field preparation @ Rs.800/- per hr for 10 hrs.	8000.00	8000.00
2.	Seeds-Okra @ 3 kg per ha (@ Rs.1800/-per kg) Tomato @125 gm per ha (@ Rs.49000/-per kg)	5400.00	6125.00
3.	Seeds-Okra @ 3 kg per ha (@ Rs.1800/kg) Tomato @125 gm/ha (@ Rs.49000/kg)	20,000.00	25,000.00
4.	Fertilizers-	3700.00	7500.00
	(i)Nitrogen- Urea @ Rs.5.5/- per kg	1000.00	2000.00
	(ii)Phosphorus- DAP@ Rs.12/- per kg	1100.00	2200.00
	(iii)Potash-MoP @ Rs.6/- per kg	800.00	1700.00
	(iv)Micronutrients- Agromin and Calcium Nitrate	800.00	1600.00
5.	Insecticide and pesticides	5,000.00	4,000.00
	Chloropyrophos	1000.00	800.00
	Imedachloprid	1000.00	800.00
	Cypermethrin	1000.00	800.00
	Thiram	1000.00	800.00
	Mencozeb	1000.00	800.00
6.	Electricity Charges	2,000.00	2,000.00
7.	Casual labour Charges @2 Labour/day/hectare @Rs.147/per day as per govt. norms (half amount of total charge/crop)	35,280.00	35,280.00
8.	Poly-mulch charges (Rs. per ha)	46,875.00	46,875.00
9.	Half amount per crop of interest on working capital @12% per annum.	5,050.00	5,391.20
10.	Labour for watch and wards (included in casual labour charges)	-	-
11.	Harvesting charges (included in casual labour charges)	-	-
12.	Marketing charges (included in casual labour charges)	-	-
13.	Total working capital	1,26,255.00	1,34,780.00
14.	Total Variable cost (B)	1,31,305.00	1,40,171.20
15.	Cost of cultivation (Rs.)	1,71,140.00	1,80,006.20
16.	Cost of cultivation per sqm. area	17.11	18.00

tomato, respectively for one hectare.

Further, per hectare cost of cultivation (A+B) was found to be Rs. 1, 71,140/- and Rs. 1, 80,006.20/- for okra and tomato respectively under black poly-mulch. Cost of cultivation per sqm area was found to be Rs. 17.11/- for okra and Rs. 18.00/- for tomato under same mulch. Thus, it can be said that more variable cost was observed for tomato as compared for growing of okra, which is due to variation in cost of seeds, working capital, use of fertilizers and insecticides and pesticides in both the crops.

The per hectare yield and income of okra and tomato crops on black coloured poly-mulch has been presented in the table 3. Average yield per hectare of okra from black coloured poly-mulch was found to be 15216.30 kg per hectare while, it was recorded 79,200 kg/ha of tomato crop under the black colored poly-mulch. Average yield per square meter of okra was found to be 1.52 kg while, it was recorded 7.92 kg of

Table 3: Per hectare yield and income of okra and tomato crops grown on black coloured poly-mulch during the year 2013 (in Rupees)

S.No.	Particulars	Crops	
		Okra	Tomato
1.	Yield (kg/sqm)	1.522	7.920
2.	Yield (kg/ha)	15216.30	79,200.00
3.	Gross income/ha (Selling price of okra @ Rs. 15.00/kg and for tomato @ Rs.10.00/kg)	228244.50	7,92,000.00
4.	Gross income/sqm area (Rs.)	22.82	79.20
5.	Cost of cultivation(Rs./ha)	1,71,140.00	1,80,006.20
6.	Net income/ha (Rs)	57,104.50	611993.80
7.	Net income/sqm area (Rs)	5.71	61.20
8.	Income over fixed cost (Rs/ha)	96,889.50	6,51,828.80
9.	Input-output ratio	1.33	4.40

tomato crop.

The yield per square meter area was also calculated by per plant yield and number of plants per sqm area. The average gross income of okra crop from 1.0 ha area during the year 2013 for black coloured poly-mulched field was found to be Rs. 228244.50/- while, for tomato crop the gross income was obtained Rs. 7,92,000/- per hectare. The net income from one ha area for okra during 2013 was found to be Rs. 57,104.50/- while, it was found to be Rs. 611993.80/- for tomato crop. The income over fixed cost was calculated as Rs. 96,889.50/- and Rs. 6,51,828.80/- for okra and tomato crops, respectively from one hectare area. The variation in gross income and net income from both the crops was mainly due to high market price of okra as compared to tomato. Thus, it can be said that market demand of okra is greater than tomato though, okra having low productivity as compared to tomato crop. The per sqm net income from okra and tomato was found to be Rs. 5.71 and Rs. 61.20, respectively from black coloured poly-mulch during the year 2013.

The input out-put ratio or per rupee returns from 1.0 ha area for okra crop from black colour poly-mulch was obtained Rs. 1.33 while, it was found Rs. 4.40 from tomato crop under the same coloured poly-mulch. Thus, it can be concluded that tomato growing is more profitable as compared to okra crop under black colour poly-mulch in Udaipur district of Rajasthan.

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