Visit us - www.researchjournal.co.in ■ DOI : 10.15740/HAS/IRJAES/8.2/418-421
International Research Journal of Agricultural Economics and Statistics
Volume 8 | Issue 2 | September, 2017 | 418-421 ■ e ISSN-2231-6434

Research Paper

Economics of different mulching materials on aonla (*Emblica officinalis* Gaertn.) under rainfed conditions of Jammu

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ABSTRACT : The present study was conducted during 2013-14 to study the economics of different mulching materials *viz.*, black polythene, white polythene, paddy straw, saw dust, sarkanda, dry grass and control (unmulched) on aonla under rainfed conditions of Jammu. The present investigation was carried out at Rainfed Research Sub-Station for Sub-tropical fruits Raya, of Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu during 2013-14. The mean annual rainfall is about 1000-1200 mm. Soil of the experimental field was sandy clay in texture, having pH: 6.50, organic carbon: 0.50 per cent, available N: 174.50 kg/ha, available P: 15.80 kg/ha and available K: 140.00 kg/ha. Twenty eight trees were selected for the study and laid out in Randomized Block Experimental Design with one tree per treatment replicated four times. Application of treatments was done during the spring season *viz.*, 19th February, 2013.The study revealed that the total cost of cultivation was found to be higher (Rs. 2566.60) in black polythene mulch and white polythene mulches whereas it was minimum (Rs.2478.30) in control. Net returns were also recorded maximum (Rs. 2672.84/treatment) under black polythene mulch and minimum in control (Rs. 1559.30/treatment). However, benefit cost (B: C ratio) was also found to be maximum in black polythene mulch (1:2.04) and minimum in both white polythene mulch and control (1:1.69).

KEY WORDS : Aonla, Economics, Mulching, B: C ratio, Net returns

***Paper History* :**
Received : *17.06.2017;*
Revised : *18.08.2017;*
Accepted : *25.08.2017*

HOW TO CITE THIS PAPER : Iqbal, Mudasir, Bakshi, Parshant, Wali, Vinod Kumar and Hamid, Naveed (2017). Economics of different mulching materials on aonla (*Emblica officinalis* Gaertn.) under rainfed conditions of Jammu. *Internat. Res. J. Agric. Eco. & Stat.*, **8** (2) : 418-421, **DOI : 10.15740/HAS/IRJAES/8.2/418-421.**

INTRODUCTION :

Aonla or Indian gooseberry (*Emblica officinalis* Gaertn.) has been cultivated in India since time immemorial (Singh *et al*., 2009). The major aonla growing states in India are Uttar Pradesh, Maharashtra, Gujarat, Rajasthan, Andhra Pradesh, Tamil Nadu, Karnataka, Haryana, Punjab and Himachal Pradesh. The fruit is highly nutritive for human consumption. It is the richest sources of vitamin C among fruits next to Barbados cherry and also useful for general improvement of health and medicinal purpose. Growing of organic aonla would help in export promotion of its value added products which have good demand in recent years (Pathak, 2003). It has played an important therapeutic role from time

immemorial and is frequently recommended for its synergistic effects in both the ayurvedic and unani systems of medicine (Jain *et al*., 1983). Being a very rich source of vitamin C and other nutrients like polyphenols, pectin, iron calcium and phosphorus (Nath *et al*., 1992; Singh *et al*., 1993 and Khokhar *et al*., 2001), the fruit is a potent antioxidant, hypolipidemic, antibacterial, antiviral and antacid. Moreover, the fresh aonla fruit is highly acidic and astringent; it is not as popular as table fruit.

The practice of mulching in fruit trees impart manifold beneficial effect, like stabilization of soil temperature, reduced water loss through evaporation, resulting more stored soil moisture (Shirgure *et al.,* 2003), maintenance of soil fertility (Thakur *et al.*, 1997), suppression of weed growth (Bhutani *et al*., 1994), improvement in growth and yield (Pande *et al.*, 2005), reduces erosion by wind or water, checks surface run-off and suppress the weed growth (Merwin *et al*., 1994). Mulching is a beneficial practice to obtain higher income from orchards (Prakash *et al.,* 2007) and results in higher yield (Patra *et al*., 2004). Mulching with organic wastes has been found very effective for establishment of aonla orchard (Rao and Pathak, 1998). Mulching encourages the proliferation of feeder roots resulting in efficient uptake of plant nutrient. The economics of best mulching material is to be worked out so as to get maximum yield and income as it will help to raise the socio-economic conditions of the orchardists by giving more income per unit area. Thus, by keeping the beneficial aspects of mulching into consideration, the present investigation was undertaken to assess the economic feasibility of different mulching materials.

MATERIALS AND METHODS :

The present investigation was carried out at Rainfed Research Sub-Station for Sub-tropical fruits Raya, of Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu during 2013-14. The mean annual rainfall is about 1000-1200 mm. Soil of the experimental field was sandy clay in texture, having pH: 6.50, organic carbon: 0.50 %, available N: 174.50 kg/ha, available P: 15.80 kg/ha and available K: 140.00 kg/ha. Twenty eight trees were selected for the study and laid out in Randomized Block Experimental Design with one tree per treatment replicated four times. Application of treatments was done during the spring season *viz*., 19th February, 2013. During the course of study, all the trees were given uniform cultural operations as per the package of practices for fruit crops of SKUAST-Jammu.

The economics of using different mulching materials in aonla orchard of cv. NA-7 have been worked out by calculating net returns for each treatment. The net returns obtained from different treatments have also been compared with control, *i.e.* unmulched. In this analysis, only the cost of treatments for different mulching materials and cultural management practices has been considered for estimating the cost. This cost includes material as well as labour cost of the treatment. Thus, the net returns are based on the following components.

Cost of treatment :

The cost incurred on each treatment per hectare was worked out by taking into consideration the cost of variable inputs only *viz*., fertilizer, basin preparation, mulching, irrigation, plant protection measures, harvesting, labour cost etc.

Variable cost (Vc) = $C_1+C_2+.....C_n$

Gross income:

Gross income was calculated by multiplying the fruit yield per hectare for a given treatment by the sale price of the fruit.

Gross income (GI) = Fruit yield x sale price

In order to evaluate the most profitable treatment, economic analysis of treatments was worked out in terms of net returns and benefit cost (B:C) ratio. The net returns and B:C ratio was calculated as follows:

Net returns were calculated by deducting the cost of cultivation from the gross income.

Net income = Gross income – Cost of treatment

$$\text{B : C ratio} = \frac{\text{Gross present value of income (B)}}{\text{Gross present value of cost (C)}}$$

RESULTS AND DATA ANALYSIS :

The data on the cost of cultivation of aonla cv. NA-7 with different mulching materials is presented in Table 1 revealed that the total cost of cultivation was found to be higher (Rs. 2566.60) in treatments T_1 and T_2 *i.e.* black polythene mulch and white polythene mulches whereas it was (Rs. 2478.30) in the treatment (T_7) *i.e.* control. The costs incurred on preparation of basin (Rs. 142.86), labour charges (Rs. 428.57), FYM (Rs. 600.00), fertilizers

i.e. urea, DAP and MOP (Rs. 241.06), irrigation, plant protection and harvesting charges (Rs. 853.57) were found to be same. The only difference was the cost of different mulching materials.

The data pertaining to the net returns is presented in Table 2. It is evident from the data that different mulching treatments influenced the net returns over unmulched control. The treatment black polythene gave maximum net returns (Rs. 2672.84) and was followed by paddy straw mulch (Rs. 2297.50). The minimum net returns (Rs. 1559.3) were found in control.

The Table further revealed that benefit: cost (B:C ratio) was found maximum in the black polythene mulch (1: 2.04) treatment and minimum 1: 1.69 each in white polythene mulch and control. This may be attributed to higher yields and superior quality of fruits with different mulching treatments. Similar estimates for gross income were reported by Kotze and Joubert (1992) where the increase was 24 and 79 per cent under mulch treatments in apricot trees. Higher gross and net returns per hectare were calculated by Raina (1991) in apple, Sharma (2003) in plum and Sharma (2004) in strawberry. These findings are in agreement with the work of Khokhar *et al*. (2001) who found maximum cost: benefit ratio in grass mulch as compared under hand weeding as control in olive. These results are also in agreement with the results obtained by Prakash *et al.* (2007) in litchi.

Conclusion:

The result concluded that Net returns were recorded maximum (Rs. 2672.84/treatment) under black polythene mulch and minimum (Rs. 1559.30/treatment) in control. The result depicted and concluded that Benefit: cost ratio (B:C ratio) was found maximum in the treatment black polythene mulch (1: 2.04) and minimum both in white polythene mulch and control (1: 1.69). From the present study it can be concluded that among the different mulching treatments the application of black polythene is most suitable and economically feasible as it resulted in highest net returns under the rainfed conditions of Jammu.

Table 1: Average cost of aonla cv. NA-7 cultivation under different mulching materials

Sr. No.	Items	Black polythene (T_1)	White polythene (T_2)	Paddy straw (T_3)	Saw dust (T_4)	Sarkanda (T_5)	Dry grass (T_6)	Control (T_7)
1.	Cost of basin preparation (Rs.)	142.86	142.86	142.86	142.86	142.86	142.86	142.86
2.	Cost of FYM (Rs.)	600	600	600	600	600	600	600
3.	Cost of urea (Rs.)	79.20	79.20	79.20	79.20	79.20	79.20	79.20
4.	Cost of DAP (Rs.)	101.20	101.20	101.20	101.20	101.20	101.20	101.20
5.	Cost of MOP (Rs.)	61.20	61.20	61.20	61.20	61.20	61.20	61.20
6.	Cost of mulching material (Rs.)	300.00	300.00	220.00	208.00	180.00	212.00	-
7.	Cost of labour (Rs.)	428.57	428.57	428.57	428.57	428.57	428.57	428.57
8.	Miscellaneous (Rs.) (irrigation, plant protection measures, harvesting of fruits etc.)	853.57	853.57	853.57	853.57	853.57	853.57	853.57
	Total cost (Rs.)	2566.6	2566.6	2486.3	2474.3	2446.3	2478.3	2266.3

Table 2 : Benefit: cost ratio analysis of aonla cv. NA-7 under different mulching materials

Mulching	Average yield of aonla kg/tree	Rate/kg fruit (Rs.)	Gross return (Rs.)	Cost of cultivation (Rs.)	Net return (Rs.)	Benefit : cost ratio
T_1 : Black polythene	72.77	18	5239.44	2566.60	2672.84	1 : 2.04
T_2 : White polythene	67.85	16	4342.40	2566.60	1775.80	1 : 1.69
T_3 : Paddy straw	70.35	17	4783.80	2486.30	2297.50	1 : 1.93
T_4 : Saw dust	70.04	16	4482.56	2474.30	2008.26	1 : 1.81
T_5 : Sarkanda	67.34	16	4309.76	2446.30	1863.46	1 : 1.76
T_6 : Dry grass	68.84	16	4405.76	2478.30	1927.46	1 : 1.78
T_7 : Control	63.76	15	3825.60	2266.30	1559.3	1 : 1.69

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