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# EFFECT OF MULCHING ON BRINJAL CULTIVATION

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**Abstract:** Brinjal (*Solanum melongena* L.) can be grown best under tropical and subtropical conditions of our country. It is of great importance because its fruits have medicinal value. As it is a warm season crop, factors like high temperature, excessive soil humidity, excessive salinity, water stress adversely affect the crop growth and yield. Mulching improved these factors essential for proper growth and increases the production. Some of the major advantages of using mulch in brinjal is weed control, earliness in yield, and also reduce disease and insect problems which affect the yield to larger extent. An experiment was conducted in Bhagalpur district of Bihar during 2013-2015, to find out the effect of mulching method (without mulching T-0, straw mulching T-1 and Mulching with 30 micron Bi-coloured silver and black plastic T-2) on the yield and yield attributes of *Mukta Keshi* veriety of Brinjal. The highest yield (480.24 q/ha) was obtained when Mulching with 30 micron Bi-coloured silver and black plastic, while straw mulching and no mulching produced 414.51 q/ha and 356.33 q/ha of brinjal production. Similar situation was found of B:C ratio, and it was maximum in the case of mulching with Mulching with 30 micron Bi-coloured silver and black plastic, while straw mulching and no mulching has B:C ratio of 4.22 and 4.20 respectively.
**Keywords:** Mulching, brinjal yield, water saving, cost of cultivation.

## INTRODUCTION

Brinjal, Solanum melongenaL. is a popular vegetable crop grown in the subtropics and tropics. It is called brinjal in India and aubergine in Europe. The name "brinjal" derives from the shape of the fruit of some varieties, which are white and shaped similarly to chicken eggs. Brinjal, also known as brinjal or aubergine belonging to the family “Solanaceae”, is a vegetable commonly grown by the farmers throughout the world. The family contains more than 2000 species distributed in 75 genera. In the genus “Solanum” there are three main species viz; escullantum (large round), serpentium (long slender) and depressum (dwarf brinjal). Currently, it is extensively grown in Bangladesh, India, Pakistan, Nepal, U.A.E, Sri Lanka, Egypt and other warm countries of the world. Among all summer grown vegetables with semi-perennial nature, brinjal is almost available throughout the year and consumed in

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various forms by all classes of people. World's statistics reveal that brinjal is second to potato and sweet potato in terms of production.

India grows brinjal in an area 711.3 hectare with production of 13557.8 MT and productivity 19.1 MT per hectare (NHB, 2014-15). Crop yield will be reduced day by day due to biotic and abiotic factors. The crop is reported to be attacked by several insectpest like aphid, brinjal fruit and shoot borer (Gallo *et al.,* 2002). Other factors that reduce yield to larger extent are: high temperature, excessive soil humidity, excessive salinity, water stress, weed competition. Due to weed hindrances 10 to 70% annual crop loss reported (Mani *et al.,* 1968) and 45% annual loss reported in sole brinjal crops (Leela 1982). So all these factors can be managed by the use of mulch (Patil *et al.,* 2013).

Desirable effects of plastic mulching are Weed control, temperature moderation, salinity reduction, which increases the utilization of plastic mulching in vegetable cultivation. The notable advantage of the use of plastic mulch is its impermeability which prevents direct evaporation of moisture from the soil and thus reduces the water losses. Plastic like HDPE, LDPE and LLDPE materials has been used as plastic mulch. Water is a major input for agricultural production. In the current situation, it is a scarce resource and there exists a large gap in terms of water available and its requirement for irrigation of crops. Adoption of innovative irrigation techniques can increase the efficiency of water usage. This water saving is increased because of maximum amount of water is stored in the root zone and deep percolation losses are minimized.

There are two types of mulches that we used in agriculture. Organic mulch like straw, newspaper, dry leaves, saw dust, grass clipping, compost etc. and it can be found beneficial because these are the natural materials which requires restoration because organic mulches decay very easily. Inorganic mulching is generally used in perennial crops like Plastic mulch, synthetic mulch, polyethylene film etc. (Memon *et al.,* 2017).

As compared to conventional cultivation, there is significant increase in yield of brinjal when mulch with transparent foil (28.3%), polyethylene film and polypropylene textile mulchesby 15.9% and 11.6% in case of black polypropylene textile (Sowinska *et al.,* 2016).

Plastic mulch like HDPE, LDPE AND LLDPE is considered useful for better growing condition like weed control, temperature control, reduced salinity which reduces water loss from soil due to increased water resistance. In agricultural for more plant height, crop growth, yield farmers use different type of mulch like plastic sheet, biodegradable films etc. It is to be reported that mulching showed good influence on crop growth, crop yield and cropping

species (Ashworth and Harrison, 1983). In grafted brinjal mulching with plastic mulch of thickness 25µ gives higher yield (Rajasekar *et al.,* 2017). Earliness, yield and quality of the vegetables crop can be improved by the use of plastic mulch (Raina *et al.,* 1999; Bharadwaj, 2013).

## MATERIALS AND METHODS

The mulching method, which has been evaluated in this paper are No mulching (T-0), mulching with straw (T-1), and Mulching with 30 micron Bi-coloured silver and black plastic (T-2). The experiments were conducted for two consecutive years of 2013-14 and 2014-15 in the same fields, and *Mukta Keshi* Variety of Brinjal was used for these experiments. A total of 10 trials were conducted each year for the evaluation of various yield components like No. of fruits/plant, water saving over farmers practices (%), average weight of brinjal (g), disease/insect pest incidence (%), yield (q/ha) and Cost components like cost of cultivation (Rs./ha), gross return (Rs./ha), net return (Rs./ha) and BC ratio.

## RESULT

Yield components of the results for the trial Year of 2013-14 and 2014-15 are shown in tabular form in Table 1. Cost component and B:C ratio are shown in Table 2 for the two consecutive years of experiments i.e., 2013-14 and 2014-15. While numbers of trials were kept constant as 10 in each case.

**Table 1:** Yield components of the results for the trial Year of 2013-14 and 2014-15

| **Technology option** | **Year of trail** | **Yield component** | | | Disease/ insect pest incidence (%) | Yield (q/ha) |
|---|---|---|---|---|---|---|
| | | **No. of fruits/plant** | **Water saving over farmers practices (%)** | **Avg. wt. of fruit (g)** | | |
| Farmer Practice (Manual transplanting) | 2013-14 | 10.96 | | 248.85 | 34 | 356.33 |
| | 2014-15 | 10.20 | | 244.71 | 33 | 357.65 |
| | Ave. | 10.58 | | 246.78 | 33.5 | 355.01 |
| Tech. option-1 (Sowing of rice by direct seeded rice machine (Planter) | 2013-14 | 12.48 | 14 | 251.27 | 30 | 357.65 |
| | 2014-15 | 13.48 | 18 | 263.29 | 28 | 355.01 |
| | Ave. | 12.98 | 16 | 257.28 | 29 | 414.51 |
| Tech. option-2 (Sowing of sprouted seed by drum seeder | 2013-14 | 14.00 | 32 | 256.02 | 22 | 469.50 |
| | 2014-15 | 14.29 | 33 | 262.09 | 19 | 490.98 |
| | Ave. | 14.15 | 32.5 | 262.09 | 20.5 | 480.24 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SEm | 2013-14 | | | | | |
| | 2014-15 | | | | | |
| | Ave. | 1.54 | | 6.76 | | 34.46 |
| CD | 2013-14 | | | | | |
| | 2014-15 | | | | | |
| | Ave. | 3.25 | NS | 14.20 | | 72.40 |

**Table 2:** Cost component and BC ratio results for the trial Year of 2013-14 and 2014-15.

| **Technology option** | **Year of trail** | **Cost of cultivation (Rs./ha)** | **Gross return (Rs/ha)** | **Net return (Rs./ha)** | **BC ratio** |
|---|---|---|---|---|---|
| Farmer Practice (No mulching) | 2013-14 | 42500 | 178800 | 136300 | 4.21 |
| | 2014-15 | 42570 | 179000 | 136250 | 4.19 |
| | Ave. | 42625 | 178900 | 136275 | 4.20 |
| T-1 (Straw mulching) | 2013-14 | 51000 | 217560 | 166560 | 4.26 |
| | 2014-15 | 52050 | 217680 | 165630 | 4.18 |
| | Ave. | 51525 | 217620 | 166095 | 4.22 |
| T-2 ( Mulching with 30 micron Bi-coloured silver and black plastic ) | 2013-14 | 57500 | 253920 | 196420 | 4.42 |
| | 2014-15 | 58300 | 254130 | 195830 | 4.36 |
| | Ave. | 57900 | 254025 | 196125 | 4.39 |

The maximum average No. of brinjal/plant was observed with 'T-2' (14.29) followed by ‘T-1’ (12.98), and by ‘T-0’ (10.20). Maximum water saving over farmers practices (%) was observed in the case of T-2 as 32.5 followed by straw mulching (T-1) as 16. Avg. wt. of brinjal (g) was recorded with 'T-2' (262.09) followed by ‘T-1’ (257.28), and by ‘T-0’ (246.78). Lowest disease/ insect pest incidence (%) was observed with 'T-2' (20.5) followed by ‘T-1’ (29), and by ‘T-0’ (33.5). above all, the maximum yield (q/ha) was recorded in the case of ‘T-2’ as 480.24, followed by ‘T-1’ and ‘T-0’ as 414.51 and 355.01 respectively.

The result (Table 2) shows that the T-2 i.e. Mulching with 30 micron Bi-coloured silver and black plastic gave maximum BC ratio i.e. 4.39. The second best option recorded for brinjal is T-1 i.e. use of straw mulching because they gave BC ratio of 4.22. The lowest B:C ratio was found for no mulching (T-0) case and it was recorded as 4.20. Though B:C ratio of no mulching and straw mulching are comparable, but yield is much more in case of straw mulching in comparison to no mulching, and increase of yield has been recorded in the case of straw mulching over no mulching as 16.76 %.

**CONCLUSION**

During 2013-15, efforts have been made for uses of mulching in brinjal crop at the farmers’ fields in Bhagalpur district of Bihar. It was found that maximum yield (q/ha), average weight

of brinjal (g), number of brinjal/plant was found in the case of mulching with 30 micron Bi-coloured silver and black plastic as 480.24, 262.09 and 14.29 respectively. While minimum yield (q/ha), average weight of brinjal (g), number of brinjal/plant was found in the case of no mulching as 356.33, 246.78 and 10.58 respectively. Lowest disease/insect pest incidence (%) was recorded in the case of mulching with 30 micron Bi-coloured silver and black plastic as 20.5, while highest such incident (%) was observed in the case of no mulching as 33.5.

Water saving over farmers practices (%) was also recorded for both cases of mulching, i.e. straw and plastic. Use of straw mulch and plastic mulch enhances the soil moisture availability, and are achieved by the prevention of water loss through evaporation, resulting in higher water use efficiency in mulch condition than no mulching.

The maximum number of fruits / plant, fruit weight and yield /ha with less disease incidence were recorded under Tech. option - II (Mulching with plastic) along with highest net return with better benefit cost ratio. This option also found effective in water saving up to 32.5 percent and found most outstanding option being significantly superior to rest of the options.

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