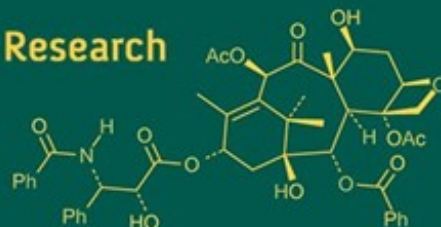


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## Effect of plastic mulch and crop cover on growth and yield of garlic (*Allium sativum* L.)

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**ABSTRACT**

A field experiment entitled “Effect of plastic mulch and crop cover on growth and yield of garlic (*Allium sativum* L.)” was conducted during Rabi 2024–25 at the All India Co-ordinated Research Project on Vegetable Crops, Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra. To evaluate the effect of plastic mulch and crop cover on growth and yield of garlic. The experiment was laid out in a Randomized Block Design with three replications and eight treatment combinations involving T<sub>1</sub> – Silver black polyethylene mulch and crop cover with polypropylene 17 GSM, T<sub>2</sub> – Silver black polyethylene mulch and crop cover with polypropylene 25 GSM, T<sub>3</sub> – Silver black polyethylene mulch with Saree cover, T<sub>4</sub> – Without mulch and crop cover with polypropylene 17 GSM, T<sub>5</sub> – Without mulch and crop cover with polypropylene 25 GSM, T<sub>6</sub> – Without mulch and crop cover with Saree, T<sub>7</sub> – Silver black polyethylene mulch without crop cover and T<sub>8</sub> – Without mulch and without crop cover (Control). Significant differences among treatments were observed for several growth, maturity and yield attributes. Silver black polyethylene mulch with polypropylene 25 GSM crop cover (T<sub>2</sub>) recorded the maximum plant height at harvest (58.67 cm), bulb length (3.35 cm), number of cloves per bulb (33.67), clove length (1.71 cm), clove diameter (0.89 cm), bulb yield per plot (14.54 kg) and bulb yield per hectare (242.34 q ha<sup>-1</sup>). The maximum average bulb weight (37.77 g) and bulb diameter (4.17 cm) were recorded with silver black polyethylene mulch and polypropylene 17 GSM crop cover (T<sub>1</sub>). Silver black polyethylene mulch without crop cover (T<sub>7</sub>) resulted in the earliest maturity, with 50 per cent neck fall at 130.00 days and harvest at 138.00 days. The findings indicated that silver black polyethylene mulch combined with polypropylene 25 GSM crop cover was effective in improving yield and major yield attributes of Rabi garlic under the agro-climatic conditions of Rahuri, Maharashtra.

**Keywords:** Garlic, Silver black polyethylene mulch, Crop cover, Growth, Yield etc.

**Introduction**

Garlic (*Allium sativum* L.) is an important bulbous vegetable crop belonging to the family Alliaceae with a chromosome number of  $2n = 16$ . It is the second most widely cultivated bulb crop after onion and is believed to have originated in Central Asia. Garlic is valued worldwide for its culinary, nutritional and medicinal properties. India ranks second in garlic production globally after China. During 2024–25, garlic was cultivated on about 0.36 million ha with a production of approximately 3.3 million tonnes. Madhya Pradesh is the leading garlic producing state in India, followed by Gujarat, while Maharashtra is also an important producing state (Anon., 2024) [1]. Garlic is predominantly propagated vegetatively through cloves and produces bulbs consisting of several cloves enclosed by papery sheaths (Mukhia *et al.*, 2023) [2]. Garlic contains several nutritionally and biologically important constituents, particularly sulfur-containing compounds such as alliin and allicin, which are responsible for its characteristic pungency and several medicinal properties (Nasir *et al.*, 2020) [3]. Its nutritional richness and diverse culinary and medicinal uses make it an economically important crop.

Mulching is an important crop management practice that helps conserve soil moisture, suppress weeds, modify soil temperature and improve nutrient availability, thereby promoting crop growth and yield (Singh *et al.*, 2022) [4]. Similarly, crop covers made from materials such as polypropylene create a favorable microclimate by increasing air and soil temperature, reducing wind effects and conserving moisture. They also provide protection against insect pests and adverse weather conditions, promoting early establishment and uniform crop growth.

The combined use of plastic mulch and crop covers can improve soil and air microclimate, moisture availability, crop establishment and productivity in vegetable crops. Such integrated management has been reported to enhance growth and marketable yield in bulb crops (Leua *et al.*, 2024) [5]. However, information on the combined effect of different plastic mulch and crop-cover materials on garlic under local conditions is

limited. Therefore, the present investigation was undertaken with an objective to study the effect of plastic mulch and crop cover on growth and yield of garlic.

## Material and Methods

The field experiment entitled “Effect of plastic mulch and crop cover on growth and yield of garlic (*Allium sativum* L.)” was conducted during Rabi 2024–25 at the All India Co-ordinated Research Project on Vegetable Crops, Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra. The site is situated at 19°47' N latitude, 74°19' E longitude, and an elevation of 495–569 m above mean sea level in the semi-arid region of Maharashtra. The soil of the experimental plot was medium black, clay loam in texture, well-drained and neutral to slightly alkaline in reaction (pH 7.6). The experimental material consisted of garlic (*Allium sativum* L.) variety Phule Nilima. Healthy cloves were planted on 25 October, 2024 at a spacing of 15 × 10 cm in plots of 5 × 1.2 m. Silver black polyethylene mulch of 25 micron thickness and crop covers made of polypropylene fabric (17 GSM and 25 GSM) and saree material were used as per treatment specifications. The crop covers were installed two days af-

ter planting and removed 45 days after planting. Drip irrigation was provided as required and recommended FYM (20 t ha<sup>-1</sup>) and fertilizers (100:50:50 kg N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O ha<sup>-1</sup>) were applied. Five plants were randomly selected and tagged in each plot for recording growth observations. Data were recorded on growth for plant height, number of leaves per plant and neck thickness were recorded at crop-cover removal and at harvest. Days to 50% neck fall and days to harvest were recorded from planting to the respective stages. Similarly, yield characters such as bulb weight, bulb length and diameter, number of cloves per bulb, clove length and diameter, yield per plot and yield per hectare were recorded. Bulbs were graded into A (>35 mm), B (25–35 mm) and C (15–25 mm) grades based on bulb diameter, and grade percentage was calculated on weight basis.

## Results and Discussion

### Growth contributing characters

The data pertaining to different growth contributing characters affected by different crop cover and plastic mulch treatments has given in Table 1.

**Table 1.** Effect of plastic mulch and crop cover on morphological characters of garlic

| Sr. No.        | Plant height (cm)                   |            | Number of leaves per plant          |                 | Neck thickness (cm)                 |            | Days to 50 % neck fall | Days to harvest |
|----------------|-------------------------------------|------------|-------------------------------------|-----------------|-------------------------------------|------------|------------------------|-----------------|
|                | After re-<br>moval of crop<br>cover | At harvest | After re-<br>moval of crop<br>cover | At harvest      | After re-<br>moval of crop<br>cover | At harvest |                        |                 |
| T <sub>1</sub> | 37.33                               | 58.00      | 5.90<br>(2.53)                      | 11.90<br>(3.52) | 0.62                                | 0.93       | 135.33                 | 143.33          |
| T <sub>2</sub> | 34.94                               | 58.67      | 5.62<br>(2.47)                      | 11.50<br>(3.46) | 0.53                                | 0.93       | 137.33                 | 145.33          |
| T <sub>3</sub> | 40.07                               | 55.87      | 4.99<br>(2.34)                      | 11.00<br>(3.39) | 0.57                                | 0.86       | 134.67                 | 142.67          |
| T <sub>4</sub> | 32.49                               | 58.00      | 5.04<br>(2.35)                      | 10.90<br>(3.38) | 0.59                                | 0.82       | 130.67                 | 138.67          |
| T <sub>5</sub> | 33.35                               | 58.00      | 5.59<br>(2.47)                      | 10.50<br>(3.32) | 0.50                                | 0.86       | 132.00                 | 140.00          |
| T <sub>6</sub> | 41.38                               | 56.10      | 4.80<br>(2.30)                      | 9.83<br>(3.21)  | 0.39                                | 0.83       | 134.00                 | 142.00          |
| T <sub>7</sub> | 35.23                               | 55.60      | 5.61<br>(2.47)                      | 12.30<br>(3.58) | 0.42                                | 0.81       | 130.00                 | 138.00          |
| T <sub>8</sub> | 30.55                               | 53.27      | 4.44<br>(2.22)                      | 9.50<br>(3.16)  | 0.45                                | 0.75       | 130.67                 | 138.67          |
| S.Em. ±        | 0.93                                | 0.50       | 0.05                                | 0.02            | 0.03                                | 0.01       | 0.79                   | 0.79            |
| CD at 5 %      | 2.84                                | 1.54       | 0.17                                | 0.08            | 0.10                                | 0.04       | 2.39                   | 2.39            |

\*Figures in the parentheses are square root transformed.

T<sub>1</sub>- Silver black polyethylene mulch and crop cover with polypropylene 17 GSM, T<sub>2</sub>- Silver black polyethylene mulch and crop cover with polypropylene 25 GSM, T<sub>3</sub>- Silver black polyethylene mulch with Saree, T<sub>4</sub>- Without mulch and crop cover with polypropylene 17 GSM, T<sub>5</sub>- Without mulch and crop cover with polypropylene 25 GSM, T<sub>6</sub>- Without mulch and crop cover with Saree, T<sub>7</sub>- Silver black polyethylene mulch and without crop cover, T<sub>8</sub>- Without mulch and without crop cover (control).

### Plant height (cm)

Plant height was significantly influenced by plastic mulch and crop-cover treatments. After removal of crop cover, the maximum plant height was recorded in T<sub>6</sub> (Without mulch and crop cover with Saree) (41.38 cm), which was at par with T<sub>3</sub> (Silver black polyethylene mulch and crop cover with Saree) (40.07 cm), while the minimum was observed in T<sub>8</sub> (Without mulch and without crop cover, Control) (30.55 cm). At harvest, the maximum plant height was recorded in T<sub>2</sub> (Silver black polyethylene mulch and crop cover with polypropylene

25 GSM) (58.67 cm), which was at par with T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM), T<sub>4</sub> (Without mulch and crop cover with polypropylene 17 GSM), and T<sub>5</sub> (Without mulch and crop cover with polypropylene 25 GSM) (58.00 cm). The minimum plant height was recorded in T<sub>8</sub> (Without mulch and without crop cover, Control) (53.27 cm). Similar results were reported by Gessew *et al.* (2016) [6], Jamil *et al.* (2005) [7], Najafabadi *et al.* (2012) [8], Yimer (2020) [9], Kwon *et al.* (2011) [10] and Tharu *et al.* (2026) [11], who attributed improved plant growth under mulching to better soil moisture and temperature conditions and reduced weed competition.

### Number of leaves per plant

The number of leaves per plant was significantly influenced by plastic mulch and crop-cover treatments. After removal of crop cover, the maximum number of leaves was recorded in T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM) (5.90), which was at par with T<sub>2</sub> (Silver black polyethylene mulch and crop

cover with polypropylene 25 GSM) (5.62), T<sub>5</sub> (Without mulch and crop cover with polypropylene 25 GSM) (5.59), and T<sub>7</sub> (Silver black polyethylene mulch and without crop cover) (5.61). The minimum was recorded in T<sub>8</sub> (Without mulch and without crop cover, Control) (4.44). At harvest, T<sub>7</sub> (Silver black polyethylene mulch and without crop cover) recorded the maximum number of leaves (12.30), which was at par with T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM) (11.90), while the minimum was observed in T<sub>8</sub> (Without mulch and without crop cover, Control) (9.50). Similar findings were reported by Bohara *et al.* (2025) [12], Gessesew *et al.* (2016) [6], Kwon *et al.* (2011) [10] and Tharu *et al.* (2026) [11], who attributed improved leaf production under mulching to better soil moisture, temperature and microclimatic conditions.

### Neck thickness (cm)

Neck thickness was significantly influenced by plastic mulch and crop-cover treatments. After removal of crop cover, the minimum neck thickness was recorded in T<sub>6</sub> (Without mulch and crop cover with Saree) (0.39 cm), which was at par with T<sub>7</sub> (Silver black polyethylene mulch and without crop cover) (0.42 cm) and T<sub>8</sub> (Without mulch and without crop cover, Control) (0.45 cm), whereas the maximum was observed in T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM) (0.62 cm). At harvest, the minimum neck thickness was recorded in T<sub>8</sub> (Without mulch and without crop cover, Control) (0.75 cm), while the maximum was recorded in T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM) and T<sub>2</sub> (Silver black polyethylene mulch and crop cover with polypropylene 25 GSM) (0.93 cm). Similar findings were reported by Dixit *et al.* (2005) [13], Sankar *et al.* (2011) [14] and Kumar *et al.* (2014) [15], indicating that mulch treatments influenced neck thickness and bulb maturity.

### Days to 50% neck fall

Days to 50 per cent neck fall were significantly influenced by plastic mulch and crop-cover treatments. The minimum days to 50 % neck-fall was recorded in T<sub>7</sub> (Silver black polyethylene mulch and without crop cover) (130.00 days), which was at par with T<sub>4</sub> (Without mulch and crop cover with polypropylene 17 GSM) and T<sub>8</sub> (Without mulch and without crop cover, Control) (130.67 days), and T<sub>5</sub> (Without mulch and crop cover with polypropylene 25 GSM) (132.00 days). The maximum was recorded in T<sub>2</sub> (Silver black polyethylene mulch and crop cover with polypropylene 25 GSM) (137.33 days). Similar findings were reported by Karangiya *et al.* (2023) [16] and Lee *et al.* (2019) [17], indicating that mulch and crop covers modify soil and crop microclimate, thereby influencing bulb maturity and neck fall.

### Days to harvest

Days to harvest varied significantly among the treatments. The earliest harvest was recorded in T<sub>7</sub> (Silver black polyethylene mulch and without crop cover) (138.00 days), which was at par with T<sub>4</sub> (Without mulch and crop cover with polypropylene 17 GSM) and T<sub>8</sub> (Without mulch and without crop cover, Control) (138.67 days), and T<sub>5</sub> (Without mulch and crop cover with polypropylene 25 GSM) (140.00 days). The maximum days to harvest were recorded in T<sub>2</sub> (Silver black polyethylene mulch and crop cover with polypropylene 25 GSM) (145.33 days). Similar findings were reported by Najafabadi *et al.* (2012) [8] and Karangiya *et al.* (2023) [16], indicating that mulching modifies soil moisture and temperature conditions, thereby influencing crop growth and maturity.

### Yield contributing characters

**Table 2.** Represents the data on yield attributing characters affected by different crop cover and plastic mulch treatments.

### Bulb weight (g)

Bulb weight varied significantly among the treatments. The maximum bulb weight was recorded in T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM) (37.77 g), which was at par with T<sub>2</sub> (Silver black polyethylene mulch and crop cover with

polypropylene 25 GSM) (37.30 g), whereas the minimum was observed in T<sub>8</sub> (Without mulch and without crop cover, Control) (26.00 g). Similar results were reported by Abdullah (2013) [18], Bohara *et al.* (2025) [12] and Tharu *et al.* (2026) [11], indicating that mulching improved bulb weight through better soil moisture and temperature conditions.

### Length of bulb (cm)

Bulb length ranged from 2.77 to 3.35 cm. The maximum bulb length was recorded in T<sub>2</sub> (Silver black polyethylene mulch and crop cover with polypropylene 25 GSM) (3.35 cm), which was at par with T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM) (3.32 cm), T<sub>3</sub> (Silver black polyethylene mulch with Saree cover) (3.28 cm) and T<sub>4</sub> (Without mulch and crop cover with polypropylene 17 GSM) (3.21 cm). The minimum was recorded in T<sub>8</sub> (Without mulch and without crop cover, Control) (2.77 cm). Similar findings were reported by Bohara *et al.* (2025) [12] and Tharu *et al.* (2026) [11], who attributed improved bulb development under mulching to better moisture conservation, soil temperature regulation and reduced weed infestation.

### Diameter of bulb (cm)

Bulb diameter ranged from 3.55 to 4.17 cm and differed significantly among treatments. The maximum diameter was recorded in T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM) (4.17 cm), which was at par with T<sub>2</sub> (Silver black polyethylene mulch and crop cover with polypropylene 25 GSM) (4.09 cm) and T<sub>3</sub> (Silver black polyethylene mulch with Saree cover) (4.03 cm), while the minimum was recorded in T<sub>8</sub> (Without mulch and without crop cover, Control) (3.55 cm). Similar results were reported by Haque *et al.* (2003) [19], Jamil *et al.* (2005) [7], Abdullah (2013) [18], Kwon *et al.* (2011) [10], Bohara *et al.* (2025) [12], Tharu *et al.* (2026) [11] and Carr *et al.* (2021) [20], indicating that mulching enhanced bulb size through improved moisture availability and soil microclimate.

### Number of cloves per bulb

The number of cloves per bulb varied significantly among treatments. The maximum number was recorded in T<sub>2</sub> (Silver black polyethylene mulch and crop cover with polypropylene 25 GSM) (33.67), which was at par with T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM) (32.77), while the minimum was recorded in T<sub>8</sub> (Without mulch and without crop cover, Control) (26.00). Similar findings were reported by Abdullah (2013) [18], Kwon *et al.* (2011) [10], Tharu *et al.* (2026) [11] and Carr *et al.* (2021) [20], indicating improved bulb development under mulching.

### Length of clove (cm)

Clove length was highest in T<sub>2</sub> (Silver black polyethylene mulch and crop cover with polypropylene 25 GSM) (1.71 cm), whereas the minimum was recorded in T<sub>8</sub> (Without mulch and without crop cover, Control) (1.40 cm). The improved clove size under mulching may be attributed to favourable soil moisture and temperature conditions, as reported by Abdullah (2013) [18].

### Diameter of clove (cm)

Clove diameter ranged from 0.61 to 0.89 cm. The maximum diameter was recorded in T<sub>2</sub> (Silver black polyethylene mulch and crop cover with polypropylene 25 GSM) (0.89 cm), which was at par with T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM) (0.87 cm), while the minimum was observed in T<sub>8</sub> (Without mulch and without crop cover, Control) (0.61 cm). Similar findings were reported by Tharu *et al.* (2026) [11], who attributed improved clove development under mulching to better moisture conservation, soil temperature regulation and reduced weed infestation.

### Yield per plot (kg)

Garlic yield per plot was significantly influenced by the treatments. The maximum yield was recorded in T<sub>2</sub> (Silver black polyethylene mulch and crop cover with polypropylene 25 GSM) (14.54 kg), which was at par with T<sub>1</sub> (Silver black polyethylene mulch and crop cover

with polypropylene 17 GSM) (14.36 kg), while the minimum was recorded in T<sub>8</sub> (Without mulch and without crop cover, Control) (10.01 kg). Similar findings were reported by [Chen et al. \(2024\)](#) [21]

and [Tharu et al. \(2026\)](#) [11], who observed higher garlic yield under mulching due to improved soil moisture, temperature and bulb development.

**Table 2.** Effect of plastic mulch and crop cover on bulb yield and yield contributing characters of garlic.

| Sr. No.        | Bulb weight (g) | Length of bulb (cm) | Diameter of bulb (cm) | Number of cloves per bulb | Length of clove (cm) | Diameter of clove (cm) | Yield per plot (kg) | Yield per hectare (q) |
|----------------|-----------------|---------------------|-----------------------|---------------------------|----------------------|------------------------|---------------------|-----------------------|
| T <sub>1</sub> | 37.77           | 3.32                | 4.17                  | 32.77                     | 1.65                 | 0.87                   | 14.36               | 239.34                |
| T <sub>2</sub> | 37.30           | 3.35                | 4.09                  | 33.67                     | 1.71                 | 0.89                   | 14.54               | 242.34                |
| T <sub>3</sub> | 34.00           | 3.28                | 4.03                  | 31.77                     | 1.61                 | 0.76                   | 13.09               | 218.17                |
| T <sub>4</sub> | 33.00           | 3.21                | 3.80                  | 31.33                     | 1.52                 | 0.74                   | 12.71               | 211.75                |
| T <sub>5</sub> | 32.00           | 3.15                | 3.82                  | 30.43                     | 1.53                 | 0.69                   | 12.32               | 205.33                |
| T <sub>6</sub> | 30.60           | 3.01                | 3.88                  | 30.33                     | 1.50                 | 0.66                   | 11.78               | 196.35                |
| T <sub>7</sub> | 30.00           | 2.90                | 3.91                  | 29.00                     | 1.59                 | 0.71                   | 12.46               | 207.60                |
| T <sub>8</sub> | 26.00           | 2.77                | 3.55                  | 26.00                     | 1.40                 | 0.61                   | 10.01               | 166.83                |
| S.Em. ±        | 0.86            | 0.04                | 0.04                  | 0.59                      | 0.02                 | 0.02                   | 0.33                | 5.53                  |
| CD at 5%       | 2.61            | 0.14                | 0.14                  | 1.79                      | 0.06                 | 0.06                   | 1.00                | 16.78                 |

T<sub>1</sub>- Silver black polyethylene mulch and crop cover with polypropylene 17 GSM, T<sub>2</sub>- Sliver black polyethylene mulch and crop cover with polypropylene 25 GSM, T<sub>3</sub>- Sliver black polyethylene mulch with Saree, T<sub>4</sub>- Without mulch and crop cover with polypropylene 17 GSM, T<sub>5</sub>- Without mulch and crop cover with polypropylene 25 GSM, T<sub>6</sub>- Without mulch and crop cover with Saree, T<sub>7</sub>- Sliver black polyethylene mulch and without crop cover, T<sub>8</sub>- Without mulch and without crop cover (control).

#### Yield per hectare (q ha<sup>-1</sup>)

Bulb yield per hectare varied significantly among treatments. The maximum yield was recorded in T<sub>2</sub> (Silver black polyethylene mulch and crop cover with polypropylene 25 GSM) (242.34 q ha<sup>-1</sup>), which was at par with T<sub>1</sub> (Silver black polyethylene mulch and crop cover

with polypropylene 17 GSM) (239.34 q ha<sup>-1</sup>), whereas the minimum was recorded in T<sub>8</sub> (Without mulch and without crop cover, Control) (166.83 q ha<sup>-1</sup>). Higher yield under mulch and crop-cover treatments may be attributed to improved soil moisture conservation, favourable soil temperature, reduced weed competition and better bulb development. Similar findings were reported by [Jamil et al. \(2005\)](#) [7], [Najafabadi et al. \(2012\)](#) [8], [Abdullah \(2013\)](#) [18], [Yimer \(2020\)](#) [9], [Chen et al. \(2024\)](#) [21], [Bohara et al. \(2025\)](#) [12] and [Tharu et al. \(2026\)](#) [11].

#### Grade bulb percentage

The data regarding bulb percentage grades influenced by various treatments of plastic mulch and crop cover at harvest are presented in [Table 3](#).

**Table 3.** Effect of plastic mulch and crop cover on percentage of A, B and C grades of garlic bulb.

| Sr. No.        | Treatment details                                                        | % of bulbs    |               |               |
|----------------|--------------------------------------------------------------------------|---------------|---------------|---------------|
|                |                                                                          | A             | B             | C             |
| T <sub>1</sub> | Silver black polyethylene mulch and crop cover with polypropylene 17 GSM | 41.85 (40.31) | 37.28 (37.63) | 20.87 (27.18) |
| T <sub>2</sub> | Sliver black polyethylene mulch and crop cover with polypropylene 25 GSM | 43.18 (41.08) | 34.89 (36.20) | 21.93 (27.92) |
| T <sub>3</sub> | Sliver black polyethylene mulch with Saree                               | 44.60 (41.90) | 32.64 (34.84) | 22.76 (28.49) |
| T <sub>4</sub> | Without mulch and crop cover with polypropylene 17 GSM                   | 38.64 (38.43) | 31.48 (34.13) | 29.88 (33.13) |
| T <sub>5</sub> | Without mulch and crop cover with polypropylene 25 GSM                   | 39.07 (38.68) | 35.81 (36.75) | 25.13 (30.08) |
| T <sub>6</sub> | Without mulch and crop cover with Saree                                  | 42.57 (40.73) | 36.59 (37.22) | 20.83 (27.15) |
| T <sub>7</sub> | Sliver black polyethylene mulch and without crop cover                   | 37.34 (37.67) | 34.51 (35.97) | 28.15 (32.04) |
| T <sub>8</sub> | Without mulch and without crop cover (control)                           | 41.38 (40.03) | 34.61 (36.04) | 24.01 (29.34) |
|                | S.Em. ±                                                                  | 0.37          | 0.35          | 0.18          |
|                | CD at 5 %                                                                | 1.13          | 1.07          | 0.57          |

\*Figures in the parentheses are arc sine transformed.

#### A-grade bulb (%)

A-grade bulb percentage varied significantly among treatments. The maximum A-grade bulbs were recorded in T<sub>3</sub> (Silver black polyethylene mulch with Saree) (44.60%), which was at par with T<sub>2</sub> (Silver

black polyethylene mulch and crop cover with polypropylene 25 GSM) (43.18%), while the minimum was observed in T<sub>7</sub> (Silver black polyethylene mulch and without crop cover) (37.34%). Similar find

ings were reported by Bohara *et al.* (2025) [12], who attributed improved bulb quality under mulching to better moisture conservation, soil temperature regulation and nutrient uptake.

### B-grade bulb (%)

The maximum B-grade bulb percentage was recorded in T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM) (37.28%), which was at par with T<sub>6</sub> (Without mulch and crop cover with Saree) (36.59%) and T<sub>5</sub> (Without mulch and crop cover with polypropylene 25 GSM) (35.81%). The minimum was recorded in T<sub>4</sub> (Without mulch and crop cover with polypropylene 17 GSM) (31.48%).

### C-grade bulb (%)

The minimum C-grade bulb percentage was recorded in T<sub>6</sub> (Without mulch and crop cover with Saree) (20.83%), which was at par with T<sub>1</sub> (Silver black polyethylene mulch and crop cover with polypropylene 17 GSM) (20.87%), whereas the maximum was observed in T<sub>4</sub> (Without mulch and crop cover with polypropylene 17 GSM) (29.88%). Similar findings were reported by Carr *et al.* (2021) [20], who observed that synthetic mulches increased marketable bulb production and reduced the proportion of small bulbs.

## Conclusion

The present investigation revealed that plastic mulch and crop cover combinations significantly influenced the growth and yield of garlic. T<sub>2</sub> – Silver black polyethylene mulch and crop cover with polypropylene 25 GSM performed superiorly for plant growth, bulb length, number of cloves, clove size and yield recording the highest bulb yield of 242.34 q ha<sup>-1</sup>. T<sub>1</sub> – Silver black polyethylene mulch and crop cover with polypropylene 17 GSM recorded the highest bulb weight and diameter and T<sub>3</sub> – Silver black polyethylene mulch with Saree recorded the highest A-grade bulbs.

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