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EFFECT OF PLASTIC MULCH AND CROP COVER ON GROWTH AND YIELD OF ONION (*ALLIUM CEPA* L.)

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ABSTRACT

A field experiment entitled "Effect of plastic mulch and crop cover on growth and yield of onion (*Allium cepa* L.)" was conducted during *Rabi* 2024–25 at the Scheme for Research on Onion Storage, MPKV, Rahuri, in a Randomized Block Design with three replications and eight treatments: T_1 – Silver black polythene mulch and cover with polypropylene 17 GSM, T_2 – Silver black polythene mulch and cover with polypropylene 25 GSM, T_3 – Silver black polythene mulch and cover with Saree, T_4 – Without mulch and crop cover with polypropylene 17 GSM, T_5 – Without mulch and crop cover with polypropylene 25 GSM, T_6 – Without mulch and crop cover with Saree, T_7 – Silver black polythene mulch without crop cover and T_8 – Without mulch and without crop cover (Control). Significant variation was observed among treatments for growth and yield parameters. Maximum plant height (47.36 cm) was recorded in T_8, followed by T_7 and T_2, while the lowest (32.75 cm) was in T_3. The number of leaves per plant was highest in T_3 (9.60) and lowest in T_6 (4.47). Minimum neck thickness (0.35 cm) was in T_4 and maximum (0.72 cm) in T_8. T_2 recorded the highest polar (4.60 cm) and equatorial diameters (5.48 cm), followed by T_1, T_7 and T_8. The highest average bulb weight (148.58 g), yield per plot (26.76 kg) and per hectare (357.23 q) were recorded in T_7, while T_6 had the lowest bulb weight (49.53 g) and yield (14.34 kg/plot; 191.15 q/ha). In bulb grading, T_7 produced the highest proportion of 'A' grade bulbs (45.15% by number; 63.65% by weight) and T_6 the lowest (12.93%; 18.69%). The study indicated that silver black polythene mulch without crop cover (T_7) significantly enhanced growth and yield performance of *Rabi* onion under the agro-climatic conditions of western Maharashtra.

Key words : Onion, Plastic mulch, Crop cover, Growth, Yield

Introduction

Onion (*Allium cepa* L.) is a major bulb crop of the family Alliaceae and ranks second in global production after China. India is the second-largest producer, cultivating onions mainly in the *Rabi* season and contributing about 35% of the national output from Maharashtra alone (Anonymous, 2024). Onions are valued for their culinary uses and nutritional content, being rich in vitamin C, folate, vitamin B_6, potassium and essential minerals (Aykroyd, 1963; Anonymous, 2020).

Mulching is a key agronomic practice that conserves soil moisture, regulates temperature, suppresses weeds, and improves soil health, thereby enhancing crop growth and yield. In onion cultivation, plastic mulches—particularly silver-black polyethylene—have proven effective in regulating microclimate, reducing irrigation needs and improving bulb size and yield (Suthar and Rawat, 2020).

Crop covers, made from materials such as polypropylene, act as protective barriers against insect pests, diseases, and adverse weather while modifying the crop microenvironment. They regulate air and soil temperature, conserve moisture and improve plant health and productivity (Dhakal and Nandwani, 2020).

Integration of plastic mulch with crop covers can further enhance microclimatic conditions, promote faster vegetative growth and increase marketable yield (Leua and Zankat, 2024).

Therefore, the present investigation was undertaken to evaluate the effect of plastic mulch and crop cover on growth and yield of onion under *Rabi* conditions.

Materials and Methods

Site of the experiment

The field experiment entitled "Effect of plastic mulch and crop cover on growth and yield of onion (*Allium cepa* L.)" was conducted during *Rabi* 2024–25 at the Scheme for Research on Onion Storage, 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 scarcity zone of Maharashtra. The soil of the experimental plot was medium black, clay loam in texture, well-drained, and neutral in reaction (pH 7.6).

Experimental materials

The experimental material consisted of onion (*Allium cepa* L.) variety N-2-4-1, which is widely grown in Maharashtra for its high yield potential and good storage quality. Healthy, uniform seedlings were raised in nursery beds and transplanted at 9 weeks of age. Silver black polythene mulch of 30 micron thickness and crop covers made of polypropylene fabric (17 GSM and 25 GSM) and saree material were used as per treatment specifications. Mulch sheets were placed over raised beds prior to transplanting, while crop covers were installed two days after transplanting and removed 50 days later. Drip irrigation was provided to maintain optimum soil moisture, and recommended fertilizers were applied as per the package of practices for onion.

Recording of observations

For each parameter, five plants were selected at random in each plot and tagged for uniform observation throughout the experiment**.**

Growth characters

- **Plant height (cm):** Measured from the ground level to the tip of the longest leaf at harvest using a measuring scale; average values were computed.
- **Number of leaves per plant:** Counted from the same tagged plants at harvest and expressed as the mean number of functional leaves per plant.
- **Neck thickness (cm):** Measured at the neck region of the bulb at harvest using a digital vernier caliper; mean values were calculated.

Bulb and yield attributing characters

- **Polar diameter (cm):** Measured from the root plate to the tip of the bulb using a digital vernier caliper; the mean of five bulbs was calculated.
- **Equatorial diameter (cm):** Measured at the widest part of the bulb at right angles to the polar diameter using a digital vernier caliper; mean values were computed.
- **Average bulb weight (g):** Determined by weighing five randomly selected bulbs on an electronic balance and dividing by the number of bulbs.
- **Yield per plot (kg):** Total weight of bulbs harvested from each plot was recorded.
- **Total yield (q/ha):** Calculated from plot yield using the conversion factor to express yield in quintals per hectare.
- **Marketable yield (q/ha):** Obtained by subtracting non-marketable bulbs from the total yield and expressing the remainder in quintals per hectare.
- **Bulb grading:** Bulbs were graded into A (>6.5 cm), B (4.5–6.5 cm), and C (<4.5 cm) grades based on equatorial diameter; the percentage by number and by weight for each grade was calculated.

Results and Discussion

Growth attributing parameters

Plant height (cm) : Data with respect to plant height as influenced by different treatments of plastic mulch and crop cover (Table 1) showed significant differences. The plant height at harvest was maximum (47.36 cm) in T_8 – Without mulch and without crop cover (Control), which was at par with T_7 – Silver black polythene mulch without crop cover (44.38/ cm), T_2 – Silver black polythene mulch and cover with polypropylene 25 GSM (41.71 cm) and T_5 – Without mulch and crop cover with polypropylene 25 GSM (40.83/ cm). The minimum plant height (32.75 cm) was recorded in T_3 – Silver black polythene mulch and cover with Saree.

These results are supported by Naikwadi (2006), who reported that onion grown under black polyethylene mulch exhibited significantly higher plant height than unmulched plots. Similar findings were reported by Abou El-Magd *et al.* (2019), who observed that plastic mulch enhances vegetative growth by creating a favourable root zone microclimate. Lee *et al.* (2019) noted that plant height was not significantly affected due to mulching with transparent or black mulch in onion.

Number of leaves per plant : The number of leaves per plant also showed significant variation among treatments (Table 1). The highest number of leaves per plant (9.60) was recorded in T_3 – Silver black polythene mulch and cover with Saree, which was significantly superior to all other treatments. The minimum number of

Table 1 : Effect of plastic mulch and crop cover on growth attributing characters of onion.

S. no.	Treatment details	Plant height at harvest (cm)	Number of leaves per plant at harvest	Neck thickness at harvest (cm)
T_1	Silver black polythene mulch and cover with polypropylene 17 GSM	39.09	9.47(3.16)	0.50
T_2	Silver black polythene mulch and cover with polypropylene 25 GSM	41.71	9.27(2.60)	0.66
T_3	Silver black polythene mulch and cover with Saree	32.75	9.60(2.25)	0.57
T_4	Without mulch and crop cover with polypropylene 17 GSM	36.13	9.20(3.11)	0.35
T_5	Without mulch and crop cover with polypropylene 25 GSM	40.83	5.87(2.52)	0.56
T_6	Without mulch and crop cover with Saree	36.90	4.47(2.23)	0.46
T_7	Silver black polythene mulch without crop cover	44.38	9.20(3.11)	0.56
T_8	Without mulch and without crop cover (Control)	47.36	8.00(2.91)	0.72
	S.Em. ±	2.25	0.03	0.11
	CD at 5%	6.82	0.09	NS

***** Figures in the parentheses are square root transformed.

Table 2 : Effect of plastic mulch and crop cover on polar and equatorial diameter (cm) of onion bulb.

S. no.	Treatment details	Polar diameter (cm)	Equatorial diameter (cm)
T_1	Silver black polythene mulch and cover with polypropylene 17 GSM	4.29	5.21
T_2	Silver black polythene mulch and cover with polypropylene 25 GSM	4.60	5.48
T_3	Silver black polythene mulch and cover with Saree	3.74	4.34
T_4	Without mulch and crop cover with polypropylene 17 GSM	3.68	4.48
T_5	Without mulch and crop cover with polypropylene 25 GSM	3.49	4.30
T_6	Without mulch and crop cover with Saree	3.26	3.89
T_7	Silver black polythene mulch without crop cover	4.43	5.09
T_8	Without mulch and without crop cover (Control)	4.10	5.01
	S.Em. ±	0.17	0.20
	CD at 5%	0.52	0.62

leaves per plant (4.47) was observed in T_6 – Without mulch and crop cover with Saree.

Plastic mulch or covering has been reported to increase initial vegetative growth by raising soil temperature and conserving soil moisture (Lee, 2010; Suh and Kim, 1991). Sharma *et al.* (2010) observed that increased light interception and a favourable microclimate under non-shaded or well-ventilated conditions enhanced leaf development in onion. Similarly, Ghosh *et al.* (2013) reported that higher numbers of leaves per plant under mulched conditions may be due to improved moisture availability and enhanced plant metabolism.

Neck thickness (cm) : The effect of different treatments on neck thickness of onion was non-significant (Table 1). A thin, compact neck is desirable as it reduces the entry of pathogens and improves storage life. In the present study, the minimum neck thickness (0.35 cm) was recorded in T_4 – Without mulch and crop cover with polypropylene 17 GSM, whereas the maximum (0.72 cm) was recorded in T_8 – Without mulch and without crop cover (Control).

These results are in line with Dixit *et al.* (2005) and Sankar *et al.* (2011). Kumar *et al.* (2014) also reported that lower neck thickness is generally observed under plastic mulch due to better maturity and faster drying of neck tissues during curing.

Bulb and Yield Attributing Characters

Polar diameter and equatorial diameter (cm) : Data on polar and equatorial diameters of bulbs (Table 2) indicated significant differences among treatments. The maximum polar diameter (4.60 cm) was recorded in T_2 – Silver black polythene mulch and cover with polypropylene 25 GSM, which was at par with T_1 – Silver black polythene mulch and cover with polypropylene 17 GSM (4.29 cm), T_7 – Silver black polythene mulch without crop cover (4.43 cm) and T_8 – Without mulch and without crop cover (Control) (4.10 cm). The minimum polar diameter (3.26 cm) was observed in T_6 – Without mulch and crop cover with Saree.

The maximum equatorial diameter (5.48 cm) was also recorded in T_2 – Silver black polythene mulch and cover with polypropylene 25 GSM, which was at par with T_1 – Silver black polythene mulch and cover with polypropylene 17 GSM (5.21 cm), T_7 – Silver black polythene mulch without crop cover (5.09 cm) and T_8 – Without mulch and without crop cover (Control) (5.01 cm). The minimum equatorial diameter (3.89 cm) was recorded in T_6 – Without mulch and crop cover with Saree.

Improved bulb size under mulch and crop cover may be due to better soil moisture conservation, optimum soil temperature, and a favourable root-zone environment that enhances nutrient uptake and supports bulb development (Lamont, 1993; Ibarra-Jiménez *et al.*, 2006). Similar results were reported by Prasad *et al.* (2017), Rachel *et al.* (2018) and Karangiya *et al.* (2023).

Average bulb weight (g) : Average bulb weight differed significantly among treatments (Table 3). The highest bulb weight (148.58 g) was recorded in T_7 – Silver black polythene mulch without crop cover, while the lowest (49.53 g) was in T_6 – Without mulch and crop cover with Saree.

Higher bulb weight in mulched plots may be attributed to improved soil microclimate, reduced evaporation, weed suppression, and better moisture availability in the root zone (Kumar and Sharma, 2018). Similar findings have been reported by Job *et al.* (2016), Rachel *et al.* (2018), Firissa *et al.* (2019), Bappy *et al.* (2021) and Karangiya *et al.* (2023).

Yield (kg/plot) : Onion yield per plot was significantly influenced by treatments (Table 4). The highest yield (26.79/ kg/plot) was obtained in T_7 – Silver black polythene mulch without crop cover, which was at par with T_2 – Silver black polythene mulch and cover

Table 3 : Effect of plastic mulch and crop cover on average weight (g) of the onion bulb.

S. no.	Treatment details	Average weight of the bulb (g)
T_1	Silver black polythene mulch and cover with polypropylene 17 GSM	112.31
T_2	Silver black polythene mulch and cover with polypropylene 25 GSM	113.67
T_3	Silver black polythene mulch and cover with Saree	63.35
T_4	Without mulch and crop cover with polypropylene 17 GSM	84.66
T_5	Without mulch and crop cover with polypropylene 25 GSM	74.69
T_6	Without mulch and crop cover with Saree	49.53
T_7	Silver black polythene mulch without crop cover	148.58
T_8	Without mulch and without crop cover (Control)	112.88
	S.Em. ±	11.41
	CD at 5%	34.62

Table 4 : Effect of plastic mulch and crop cover on yield (kg/ plot) of onion.

S. no.	Treatment details	Yield (kg/ plot)
T_1	Silver black polythene mulch and cover with polypropylene 17 GSM	20.02
T_2	Silver black polythene mulch and cover with polypropylene 25 GSM	22.20
T_3	Silver black polythene mulch and cover with Saree	22.07
T_4	Without mulch and crop cover with polypropylene 17 GSM	15.63
T_5	Without mulch and crop cover with polypropylene 25 GSM	15.91
T_6	Without mulch and crop cover with Saree	14.34
T_7	Silver black polythene mulch without crop cover	26.79
T_8	Without mulch and without crop cover (Control)	21.76
	S.Em. ±	2.59
	CD at 5%	7.86

Table 5 : Effect of plastic mulch and crop cover on percentage of the number of 'A', 'B' and 'C' grades of onion bulbs.

S. no.	Treatment details	% of bulbs by number		
		A	B	C
T_1	Silver black polythene mulch and cover with polypropylene 17 GSM	25.77(30.47)	29.94(33.13)	44.30(41.69)
T_2	Silver black polythene mulch and cover with polypropylene 25 GSM	35.63(36.63)	27.81(31.81)	36.55(37.19)
T_3	Silver black polythene mulch and cover with Saree	31.11(33.41)	28.65(32.20)	40.25(39.20)
T_4	Without mulch and crop cover with polypropylene 17 GSM	15.64(23.15)	28.76(32.16)	55.60(48.25)
T_5	Without mulch and crop cover with polypropylene 25 GSM	13.83(21.75)	22.08(27.13)	64.10(53.55)
T_6	Without mulch and crop cover with Saree	12.93(21.05)	28.03(31.34)	59.03(50.38)
T_7	Silver black polythene mulch without crop cover	45.15(42.19)	28.38(32.18)	26.47(30.81)
T_8	Without mulch and without crop cover (Control)	31.97(34.40)	32.01(34.38)	36.01(36.74)
	S.Em. ±	2.37	3.26	3.77
	CD at 5 %	7.20	NS	11.44

*Figures in the parentheses are arc sine transformed.

with polypropylene 25 GSM (22.20 kg), T_3 – Silver black polythene mulch and cover with Saree (22.07 kg), T_8 – Without mulch and without crop cover (Control) (21.76 kg) and T_1 – Silver black polythene mulch and cover with polypropylene 17 GSM (20.02 kg). The lowest yield (14.34 kg/plot) was in T_6 – Without mulch and crop cover with Saree.

Better yields under mulched treatments may be due to effective weed control, improved moisture retention, and a favourable microenvironment for growth (Sarkar *et al.*, 2019; Firissa *et al.*, 2019; Bappy *et al.*, 2021; Karangiya *et al.*, 2023).

Bulb grading by number : Data regarding grades of bulbs as influenced by different treatments of plastic mulch and crop cover at harvest are presented in Table 5.

'A' grade bulbs (%) : The highest proportion of 'A' grade bulbs by number (45.15%) was in T_7 – Silver black polythene mulch without crop cover, followed by T_2 – Silver black polythene mulch and cover with polypropylene 25 GSM (35.63%). The lowest percentage (12.93%) was in T_6 – Without mulch and crop cover with Saree.

'B' grade bulbs (%) : Differences were non-significant. The maximum was in T_8 – Without mulch and without crop cover (Control) (32.01%) and the minimum in T_5 – Without mulch and crop cover with polypropylene 25 GSM (22.08%).

'C' grade bulbs (%) : The lowest percentage was in T_7 – Silver black polythene mulch without crop cover (26.47%), while the highest (64.10%) was in T_5 – Without mulch and crop cover with polypropylene 25 GSM.

Bulb grading by weight : Data regarding bulb grading by weight as influenced by different treatments of plastic mulch and crop cover at harvest are presented in Table 6.

'A' grade bulbs (%) : The maximum (63.65%) was recorded in T_7 – Silver black polythene mulch without crop cover, followed by T_8 – Without mulch and without crop cover (Control) (54.70%). The lowest (18.69%) was in T_6 – Without mulch and crop cover with Saree.

'B' grade bulbs (%) : The highest proportion by weight was in T_6 – Without mulch and crop cover with Saree (51.40%) and the lowest was in T_7 – Silver black polythene mulch without crop cover (23.67%).

'C' grade bulbs (%) : The lowest was in T_7 – Silver black polythene mulch without crop cover (12.68%), while the highest was in T_5 – Without mulch and crop cover with polypropylene 25 GSM (41.15%).

Total and marketable yield (q/ha)

The influence of different plastic mulch and crop cover treatments on total and marketable yields of onion is presented in Table 7. A significant variation was observed among treatments for both parameters.

The maximum total yield (357.23 q/ha) was obtained in T_7 – Silver black polythene mulch without crop cover, which was statistically at par with T_2 – Silver black polythene mulch and cover with polypropylene 25 GSM (296.06 q/ha), T_3 – Silver black polythene mulch and cover with Saree (294.22 q/ha), T_8 – Without mulch and without crop cover (Control) (290.09 q/ha), and T_1 – Silver black polythene mulch and cover with polypropylene 17 GSM (266.91 q/ha). The lowest total yield (191.15 q/ha) was recorded in T_6 – Without mulch and crop cover with Saree.

Marketable yield followed a similar trend. T_7 – Silver black polythene mulch without crop cover produced the highest marketable yield (313.65 q/ha), statistically comparable to T_8 – Without mulch and without crop cover (Control) (247.64 q/ha), T_2 – Silver black polythene mulch

Table 6 : Effect of plastic mulch and crop cover on percentage of the weight of 'A', 'B' and 'C' grade onion bulbs.

S. no.	Treatment details	% of bulbs by weight		
		A	B	C
T_1	Silver black polythene mulch and cover with polypropylene 17 GSM	40.64(39.60)	33.18(35.08)	26.17(30.70)
T_2	Silver black polythene mulch and cover with polypropylene 25 GSM	51.88(46.08)	31.01(33.74)	17.10(24.39)
T_3	Silver black polythene mulch and cover with Saree	42.67(40.71)	38.55(38.35)	18.78(25.24)
T_4	Without mulch and crop cover with polypropylene 17 GSM	27.36(31.42)	41.98(40.35)	30.66(33.59)
T_5	Without mulch and crop cover with polypropylene 25 GSM	24.04(29.36)	34.81(36.04)	41.15(39.84)
T_6	Without mulch and crop cover with Saree	18.69(24.93)	51.40(45.86)	29.91(32.82)
T_7	Silver black polythene mulch without crop cover	63.65(52.94)	23.67(29.08)	12.68(20.69)
T_8	Without mulch and without crop cover (Control)	54.70(47.70)	26.73(31.07)	13.68(25.86)
	S.Em. ±	2.97	2.43	2.64
	CD at 5 %	9.01	7.37	8.02

*Figures in the parentheses are arc sine transformed.

Table 7 : Effect of plastic mulch and crop cover on total yield (q/ha) and marketable yield (q/ha) of onion.

S. no.	Treatment details	Total yield (q/ha)	Marketable yield (q/ha)
T_1	Silver black polythene mulch and cover with polypropylene 17 GSM	266.91	197.16
T_2	Silver black polythene mulch and cover with polypropylene 25 GSM	296.06	245.44
T_3	Silver black polythene mulch and cover with Saree	294.22	244.02
T_4	Without mulch and crop cover with polypropylene 17 GSM	208.35	144.31
T_5	Without mulch and crop cover with polypropylene 25 GSM	212.15	127.47
T_6	Without mulch and crop cover with Saree	191.15	130.63
T_7	Silver black polythene mulch without crop cover	357.23	313.65
T_8	Without mulch and without crop cover (Control)	290.09	247.64
	S.Em. ±	34.54	32.00
	CD at 5%	104.75	97.06

and cover with polypropylene 25 GSM (245.44 q/ha), and T_3 – Silver black polythene mulch and cover with Saree (244.02 q/ha). The lowest marketable yields were obtained in T_5 – Without mulch and crop cover with polypropylene 25 GSM (127.47 q/ha) and T_6 – Without mulch and crop cover with Saree (130.63 q/ha).

The increase in total and marketable yields under mulched treatments can be attributed to improved soil moisture retention, better nutrient availability and reduced weed competition, creating a favourable microclimate for uniform bulb development. Similar results were reported by Pramanick *et al.* (2006), Rathva *et al.* (2015a), Kumari *et al.* (2016), Quamruzzaman *et al.* (2021), Sarmah *et al.* (2022) and Kumar and Sharma (2018) for total yield and by Sarker *et al.* (2003), Abraham *et al.* (2017), Firissa *et al.* (2019), Bappy *et al.* (2021) and Karangiya *et al.* (2023) for marketable yield.

Conclusion

The study demonstrated that the use of silver black polythene mulch, particularly without crop cover, significantly enhanced the growth and yield performance of *Rabi* onion (*Allium cepa* L., cv. N-2-4-1) under the agro climatic conditions of western Maharashtra. T_7 – Silver black polythene mulch without crop cover recorded the highest average bulb weight (148.58 g), yield (26.79 kg/plot; 357.23 q/ha), marketable yield (313.65 q/ha) and the largest proportion of 'A' grade bulbs both by number and weight. T_2 – Silver black polythene mulch and cover with polypropylene 25 GSM produced the largest polar and equatorial diameters, while T_6 – Without mulch and crop cover with Saree consistently recorded the lowest values for most growth and yield parameters.

Among the different crop cover and mulching treatments, T_7 – Silver black polythene mulch without crop cover was found to be better, as it recorded superior and comparable onion bulb yield. However, since this study represents data from only one season, a final conclusion cannot be drawn, and further multi season trials are needed to confirm its consistent performance.

References

Abou El Magd, M.M., El Bassiony A.M. and Fawzy Z.F. (2019). Effect of plastic mulch on growth and yield of onion (*Allium cepa* L.). *Chem. Biolog. Technol. Agricult.*, **6(1)**, 1–9.

Anonymous (2020). *Indian Food Composition Tables*. Indian Council of Medical Research – National Institute of Nutrition, Hyderabad.

Anonymous (2024). *Agricultural and Processed Food Products Export Development Authority (APEDA)*. Ministry of Commerce and Industry, Government of India.

Aykroyd, W.R. (1963). *ICMR Special Report Series No. 42*. Indian Council of Medical Research, New Delhi.

Bappy, M.N.H., Uddin M.J., Rahman M.A., Hossain M.A., Ali M.S. and Sarker A. (2021). Effect of mulch materials on growth and yield of onion (*Allium cepa* L.). *Int. J. Agron.*, **2021**, 1–7.

Dhakal, K. and Nandwani D. (2020). Evaluation of row covers for yield performance of leafy green vegetables in organic management system. *Org. Agricult.*, **10(Suppl 1)**, 27–33.

Dixit, A., Pandey U.C. and Singh S.K. (2005). Effect of mulch on growth and yield of onion (*Allium cepa* L.). *Progressive Horticulture*, **37(2)**, 356–359.

Firissa, T., Kebede W. and Woldetsadik K. (2019). Effect of organic and inorganic mulching on bulb yield and quality of onion (*Allium cepa* L.). *Int. J. Veg. Sci.*, **25(5)**, 441–451.

Ghosh, P., Chattopadhyay N., Chakraborty A., Mandal P., Chatterjee S. and Das S. (2013). Influence of mulch and irrigation on growth and yield of onion (*Allium cepa* L.). *Veg. Sci.*, **40(1)**, 71–75.

Ibarra Jiménez, L., Zermeno Gonzalez A., Munguía López J., De la Rosa Ibarra M. and Lozano del Río J. (2006). Plastic mulch effect on onion (*Allium cepa* L.) growth and yield. *HortScience*, **41(7)**, 1338–1341.

Job, R., Sharma R.P., Singh A.K., Kumar M. and Singh R. (2016). Effect of different mulches on growth, yield and quality of onion (*Allium cepa* L.) under mid hill conditions of Himachal Pradesh. *Int. J. Farm Sci.*, **6(2)**, 44–49.

Kalisz, A., Jezdinský A. and Sêkara A. (2014b). Influence of row covers on yield and quality of Chinese cabbage. *Folia Horticulturae*, **26(1)**, 3–10.

Karangiya, V.K., Patel J.R., Parmar R.S., Chaudhari D.B. and Rathod K.J. (2023). Effect of mulching and crop cover on growth, yield and quality of onion (*Allium cepa* L.). *Int. J. Chem. Stud.*, **11(2)**, 235–241.

Kumar, M., Meena R.S., Lal R. and Singh S.P. (2014). Response of onion (*Allium cepa* L.) to mulching under different irrigation regimes. *J. AgriSearch*, **1(3)**, 173–177.

Kumar, S. and Sharma S.K. (2018). Effect of plastic mulching on growth and yield of onion (*Allium cepa* L.). *J. Pharmacog. Phytochem.*, **7(5)**, 325–329.

Kumari, N., Kumar R., Kumari P. and Singh R. (2016). Effect of mulching on growth and yield of onion (*Allium cepa* L.) under dryland conditions. *Environ. Ecol.*, **34(3B)**, 1420–1424.

Lamont, W.J. (1993). Plastic mulches for the production of vegetable crops. *HortTechnology*, **3(1)**, 35–39.

Lee, J. (2010). Effect of organic mulch on growth, yield and quality of onions. *Scientia Horticulturae*, **124(3)**, 408–410.

Lee, J., Lee S., Lee H. and Lee S. (2019). Effect of different mulching materials on growth and yield of onion (*Allium cepa* L.). *Korean J. Horticult. Sci. Technol.*, **37(1)**, 34–42.

Leua, H.N. and Zankat S.B. (2024). Effect of plastic mulch and row cover in vegetable crops. *Int. J. Sci. Res.*, **13(1)**, 183–185.

Magar, P.B., Shrestha S., Acharya U. and Shrestha S. (2022). Influence of mulching materials on growth, yield and quality of onion (*Allium cepa* L.) in mid-hill condition. *Asian J. Agricult. Horticult. Res.*, **10(1)**, 1–10.

Naikwadi, B.V. (2006). Effect of mulching and irrigation levels on growth and yield of onion (*Allium cepa* L.). *M.Sc. (Agri.) Thesis*, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra.

Patel, J.R., Patel D.M., Patel A.M. and Patel H.M. (2014). Influence of mulching on growth and yield of onion (*Allium cepa* L.). *Int. J. Agricult. Sci.*, **10(1)**, 108–111.

Pramanick, B., Bandyopadhyay S. and Choudhury M. (2006). Effect of mulching on yield and economics of onion (*Allium cepa* L.). *Environ. Ecol.*, **24(4)**, 1000–1003.

Prasad, K.V.S., Singh J.P., Yadav S.K. and Singh S. (2017). Influence of mulching on growth and yield of onion (*Allium cepa* L.). *Int. J. Curr. Microbiol. Appl. Sci.*, **6(7)**, 1955–1963.

Quamruzzaman, M., Ahmed M., Miah M.N.H., Islam M.A. and Sarker A. (2021). Effect of mulch on growth and yield of onion (*Allium cepa* L.). *J. Exp. Agricult. Int.*, **43(3)**, 1–9.

Rachel, S., Sharma R.P., Singh A.K., Kumar M. and Singh R. (2018). Effect of different mulches on growth, yield and quality of onion (*Allium cepa* L.). *Int. J. Farm Sci.*, **8(2)**, 25–32.

Rathva, R.B., Patel J.R., Parmar R.S., Patel H.M. and Patel J.A. (2015a). Effect of mulching and irrigation levels on growth and yield of onion (*Allium cepa* L.). *Int. J. Plant Prot.*, **8(1)**, 140–144.

Sankar, C.R., Lawande K.E., Tripathy P. and Sankar V. (2011). Effect of mulching on growth and yield of onion (*Allium cepa* L.) under different irrigation regimes. *Indian J. Horticult.*, **68(3)**, 401–405.

Sarkar, A., Saha R., Sarkar S., Das S. and Banerjee H. (2019). Effect of plastic mulching on growth and yield of onion (*Allium cepa* L.). *J. Crop and Weed*, **15(3)**, 77–82.

Sarmah, R., Kalita D., Rajkhowa D.J. and Baruah R. (2022). Influence of mulching and planting geometry on growth and yield of onion (*Allium cepa* L.) in Assam. *Crop Res.*, **57(1–2)**, 60–64.

Sharma, R.P., Singh A.K., Kumar M. and Singh R. (2010). Influence of mulching on growth and yield of onion (*Allium cepa* L.). *Veg. Sci.*, **37(2)**, 178–180.

Sopha, G.A. and Efendi M. (2021). The effect of mulching on growth and yield of shallot (*Allium cepa* var. *aggregatum*). *IOP Conf. Ser.: Earth Environ. Sci.*, **648**, 012172.

Suh, H.C. and Kim H.J. (1991). Influence of mulching on soil temperature and growth of onion (*Allium cepa* L.). *Korean J. Horticult. Sci.*, **32(2)**, 123–129.

Terán Chaves, F., López R., Martínez M. and Castillo M. (2023). Effect of black plastic mulch on yield and quality of onion (*Allium cepa* L.). *Horticultura Brasileira*, **41(1)**, e1023.