Effect of planting density and mulch type on bulb yield and contributing traits in Garlic

1Ankush and *2Savita
School of Agriculture, Lovely Professional University, Phagwara, Punjab (144411)

Abstract
The research was done to analyze the yield and attributing traits of garlic influenced by spacing and mulch. It consisted 9 treatments with different types of mulch and spacing viz; T0 (Control), T1 (Straw with 15x15cm), T2 (Straw with 10x5cm), T3 (FYM with 15x15cm), T4 (FYM with 10x5cm), T5 (White mulch with 15x15cm), T6 (white mulch with 10x5cm), T7 (Black mulch with 15x15cm), T8 (black mulch with 10x5cm) in Shankar variety. The experiment was carried out at Lovely Professional University, Punjab in a randomized complete block design with three replications. Highly significant difference was found for neck diameter (cm), fresh bulb weight (kg), dry bulb weight (kg), cloves bulb\(^{-1}\) and bulb yield (q/ha). White mulch with 10x5cm influenced fresh bulb weight (3.82kg), dry bulb weight and bulb yield (q/ha). Maximum neck diameter and cloves bulb\(^{-1}\) were obtained with FYM and 15x15cm. Therefore, it is suggested that planting of garlic with white mulch and with 15cm intra row spacing and FYM as mulch with 15×15cm produces the highest bulb yield and attributing traits of garlic.

Keywords: bulb, clove, neck, weight, yield etc.

Introduction:
Garlic is an important bulb crop belongs to alliaceae family grown widely in India. India ranks 2\(^{nd}\) in garlic production after China with an annual production is1.251 Tonne and estimated area is 230.6 thousand ha with 4.94 tonnes/ha productivity (Anonymous, 2016). It is mainly grown in different parts of India viz; Gujarat, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, and Uttar Pradesh. It is widely used as a food ingredient in gastric problems. It has antifungal property due to the presence of allicin and from ancient times, adding flavor in the food is the main use of garlic. It has some medicinal uses especially for curing of migraine, nibbles, intestinal tumours and worms. It is being used as a medicine in the whole world for the curing of several diseases (Nez et al., 2007).

Basically garlic, a winter season and long duration crop propagated asexually (from bulb) grown under irrigated condition. Several inputs are being utilized for the successful cultivation of garlic but planting density is one of the major input which influence clove size and yield of garlic bulbs. Garlic cannot tolerate to high temperature and light intensity which affects its vegetative growth and clove development. Therefore, by adopting good agronomic practices, yield and quality of garlic bulb can be improved. Among the agronomic practices, mulching is one of the best practice and its application on plant is well known. It maintains soil temperature and moisture and alters growing environment. Another advantage of mulch is reduction in weed growth and improvement in soil fertility (Gajri et al., 1994) results in reduction of less uses of fertilizers like N fertilizer and also reduce the labour cost (Baten et al., 1995). Thus, mulch can be used to improve the yield of garlic and
fertility of soil by altering the growing environment (Haque et al., 2003). Keeping of all above said facts, present study was done to estimate the effect of spacing and mulch on yield and contributing traits of garlic.

Materials and methods
The investigation was done during 2017-2018 at Lovely Professional University, Phagwara, and Punjab which consisted nine treatments with different mulch and spacing in combinations viz; T₀ (no mulch+15x8cm), T₁ (Straw+15x15cm), T₂ (Straw + 10x5cm), T₃ (FYM+15x15cm), T₄ (FYM+10x5cm), T₅ (White mulch+15x15cm), T₆ (White mulch+10x5cm), T₇ (Black mulch+15x15cm), T₈ (Black mulch+10x5cm). The experiment was conducted in randomized block design with three replications where mulch materials were assisted in main plots and while different spacing was allocated in sub plots. Observations were recorded for neck diameter (cm), fresh bulb weight (kg), dry bulb weight (kg), cloves bulb⁻¹ and bulb yield (q/ha) from randomly selected five plants and subjected to analysis of variance (ANOVA).

Results and discussion
Neck Diameter (cm)
Neck diameter is an important yield parameter considered by breeder as well as agronomist. Mean values of neck diameter were ranged from 1.90cm to 2.60cm (Fig 1). FYM with 15x15cm spacing showed highest neck diameter T₃ (2.60cm) and minimum T₈ (1.90cm) in black polyethylene with 10x5cm spacing. Ranges of T₃ (2.60cm), T₁ (2.40cm), T₆ (2.28cm) were significantly superior for neck diameter than control, whereas ranges T₇ (2.27cm), T₅ (2.19cm), T₄ (2.10cm), T₂ (2.03cm) was statically similar to control. Results were similar with (Pitchai et al. (2001). Neck diameter was high with FYM 15x15cm spacing probably due to the effect of FYM provided nutrients to the crop which helps for the development due to less competition between the plants for nutrient, light & water.

Cloves Bulb⁻¹
Cloves bulb⁻¹ is an important yield and growth parameter considered by breeder as well as agronomist. Cloves bulb⁻¹ was ranged from 27.27 to 44.57 (Fig 2). FYM with 15x15cm spacing showed highest cloves bulb⁻¹ T₃ (44.57) and minimum T₀ (27.27) in control with 15x8cm spacing .It was found that T₃ (44.57), T₁ (38.87), T₇...
(37.87), T₆ (36.13), T₄ (35.67), T₅ (35.63), T₂ (35.27), T₈ (32.33) significantly superior as compare to control. Results were similar with Darabi et al. (2004), Adekpe et al (2007). Cloves bulb⁻¹ is increased when planting of crop in wider spacing due to increase in bulb size. Bulb size was large with FYM 15x15cm spacing probably due to the effect of FYM provided nutrients to the crop which helps for the development of bulb with more no. of cloves due to less competition between the plants for nutrient, light & water.

Fig 2: Effect of spacing and mulch on cloves bulb⁻¹

Fresh Bulb weight (kg)

Fresh bulb weight per plot⁻¹ is an important yield parameter considered by breeder as well as agronomist. Fresh bulb was ranged from 1.99kg to 3.82kg (Fig 3). White polyethylene with 10x5cm spacing showed highest fresh bulb weight T₆ (3.82kg) and minimum T₃ (1.99kg) in FYM with 15x15cm spacing. It was observed that T₆ (3.82kg), T₂ (3.66kg), T₄ (3.60kg), T₈ (3.56kg) significantly compare to control. Results were similar with Om et al. (1977), Rahman and Talukder (1986), Anwar et al. (1996). Fresh bulb weight was maximum due to White mulch which makes soil temperature upto optimum level for the proper growth of plants.

Fig 3: Effect of spacing and mulch on fresh bulb weight (kg)

Dry bulb weight (kg)
Dry bulb weight is an important yield parameter considered by breeder as well as agronomist.

**Fig4: Effect of spacing and mulch on dry bulb weight (kg)**

Dry bulb weight was ranged from 1.14 to 2.73 (Fig 4). White mulch with 10x5cm spacing showed highest Dry bulb weight $T_6$ (2.73kg) and minimum $T_3$ (1.14kg) in FYM with 15x15cm spacing. It was observed that $T_6$ (2.73 kg), $T_4$ (2.63 kg), $T_8$ (2.60 kg) & (2.50 kg) significantly superior as compare to control. Dry bulb weight was maximum due to White mulch which makes soil temperature up to optimum level for the proper growth of plants.

**Bulb yield (q/ha)**

Bulb yield (q/ha) is an important yield and growth parameter considered by breeder as well as agronomist. Bulb yield was ranged from 70.33q/ha to 170.83q/ha (Fig 5). White mulch with 10x5cm spacing ($T_6$) showed highest bulb yield and minimum in FYM with 15x15cm spacing ($T_3$). It was noticed that $T_6$, $T_4$, $T_8$, $T_2$ were significantly superior values as compare to control. Results were similar with Darabi et al. (2004), Karaya et al. (2005). Bulb yield was highest at closure spacing while it was lowest at wider spacing because no of plant are high at close spacing yield is also influenced by white mulch which makes optimum temperature & moisture in soil.

**Fig5: Effect of spacing and mulch on bulb yield (q/ha)**
Conclusion

From the research work, it has been observed that wide range of variation occurs among the treatments for different yield and contributing parameters indicating the great scope for improvement in garlic yield. Out of nine treatments two treatments includes FYM with 15cm intra row spacing and white mulch with 5cm intra row spacing were found best for yield and yield related parameters so they may be recommended for commercial cultivation.

References


