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Effect of varieties and planting dates on yield-attributing characters in onion (*Allium cepa*)

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ABSTRACT

The experiment was conducted at farmers' fields during 2020-21 season to evaluate the effects of varieties and planting dates on onion (*Allium cepa* L.) yield parameters. The highest bulb yield was recorded in T_3, followed by T_4, T_2, and T_1. Similarly, D_2 exhibited the highest yield, followed by D_3 and D_1. T4 also resulted in the maximum plant height, average bulb weight, and bulb diameter. The planting date significantly influenced bulb weight and plant height. Consequently, T_3 (PRO-6) demonstrated the highest benefit-to-cost ratio and yield, followed by T_4 (PRO-7), T_2 (Punjab Naroya), and T_1 (farmers' practices). Among planting dates, D_2 yielded the highest, with a benefit: cost ratio of 4.58, followed by D_1 (4.42) and D_3 (4.35). The combined effects indicate that PRO-6, along with a planting date of January 1st, resulted in maximum yield and profit.

Key Words: Planting date, Bulb yield, Economics, Farmers' fields, Plant height, Profit

Onion (*Allium cepa* L.) is a cross-pollinated crop with a diploid chromosome number of 2n = 16. It is widely cultivated in the S.A.S. Nagar (Mohali) district of Punjab during the *rabi* season. The successful production of onions relies on selecting varieties that are well-suited to different climatic conditions (Choudhary *et al*., 2022). Inappropriate selection of varieties and planting dates can result in lower onion production. The planting date affects the impact of soil and environmental factors on growth, yield, and bulb quality, which vary significantly from region to region (Kandil *et al*., 2013). Due to its high sensitivity to photoperiod and temperature, onion has limited adaptability to different parts of the world. Therefore, performance and stability of onion varieties in specific environmental conditions need to be analyzed (Sharma, 2009). Hence, an experiment was conducted to determine the best variety and planting date in S.A.S. Nagar (Mohali) district of Punjab.

MATERIALS AND METHODS

The experiment was conducted at five different locations at farmers' fields during *rabi* 2020-21 season. Each experiment covered an area of one acre. The soil at the experimental sites was loose, deep, and sandy loam. A factorial randomized block design (RBD) was employed, with four varieties: T_1 (farmers' practice/local variety), T_2 (Punjab Naroya), T_3 (PRO-6), and T_4 (PRO-7) as factor one, and three planting dates: D_1 (December 15th), D_2 (January 1st), and D_3 (January 15th) as factor two. Observations were made on growth, yield, and economic parameters. The crop was cultivated following recommended practices, with a seeding rate of 5 kg/acre and a spacing of 15 cm between ridges and 7.5 cm between plants.

Data collection involved randomly selecting five plants from each replication within each experimental plot to record observations such as days to harvesting, bulb diameter, number of leaves/plant, bulb weight, plant height, and bulb yield. The days to harvesting were calculated as the number of days from planting to first harvesting.

The cost of cultivation and gross returns were calculated using prevailing market prices. The benefit: cost ratio (BCR) was calculated using the formula: BCR = gross return (Rs/ha) / total cost of cultivation (Rs/ha). Statistical analysis was performed as per Panse and Sukhatme (1985).

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RESULTS AND DISCUSSION

The varieties had a significant effect on number of days taken to harvesting, with variety T_4 being the earliest (118 days), followed by T_3 (121 days), T_2 (128 days), and T_1 (144 days). The planting dates did not have a significant effect on days taken to harvesting. Specifically, variety PRO-7 exhibited the shortest time to harvesting compared to other varieties. These findings align closely with the studies conducted by Tesfaye *et al*. (2018) and Fufa *et al*. (2021), suggesting that genetic factors and inherited traits contribute to early acclimatization and improved growth and development.

Regarding bulb diameter, the varieties had a significant effect, while the planting date did not. Variety T_4 had the largest bulb diameter (5.05 cm), followed by T_3 (5.03 cm), T_2 (4.31 cm), and T_1 (4.19 cm). These variations among varieties can be attributed to their genetic backgrounds, which strongly influence growth potential of plants. The morphological and biochemical characteristics specific to each onion variety may also play a role in determining bulb size (Fufa *et al*., 2021). Similar findings have been reported by Bosekeng and Coetzer (2015) and Misu *et al*. (2018).

Variety significantly influenced the number of leaves/plant, while planting date did not. Variety T_4 recorded the highest number of leaves/plant (11.53), followed by T_3 (11.30), T_2 (9.77), and T_1 (8.86). The variety with highest number of leaves/plant also exhibited greater plant height, larger bulb diameter, and earlier harvesting. Similar results were reported by Ashagrie *et al*. (2021).

Both varieties and planting dates had a significant effect on weight of bulbs. Among varieties, T_3 exhibited highest weight of bulbs (72.40 g), followed by T_4 (71.56 g), T_1 (70.12 g), and T_2 (64.39 g). Regarding planting dates, highest weight of bulbs was recorded in D_1 (70.37 g), followed by D_3 (69.64 g), and D_2 (68.84 g). The performance potential of different onion varieties depends on interaction between their genetic make-up and the environment. These findings align with those of Misu *et al*. (2018).

Varieties and planting dates also had a significant effect on plant height. Variety T_4 exhibited the tallest plant height (45.11 cm), followed by T_3 (41.73 cm), T_2 (39.27 cm), and T_1 (34.11 cm). Among the planting dates, D_1 recorded the maximum plant height (40.73 cm), followed by D_3 (40.52 cm), and D_2 (38.93 cm). Similar results were reported by Kandil *et al*. (2013), Ashagrie *et al*. (2021), and Fufa *et al*. (2021). The decrease in plant height can be attributed to rigorous cell division and expansion, which are influenced by protein synthesis. Therefore, variations in cell metabolism can affect plant height (Sharma *et al*., 2016).

There was a significant effect on yield as well. T_3 exhibited the highest yield (388.32 q/ha), followed by T_4 (365.82 q/ha), T_2 (353.90 q/ha), and T_1 (303.05 q/ha). Among the planting dates, maximum yield was recorded in D_2 (362.92 q/ha), followed by D_3 (351.25 q/ha), and D_1 (346.67 q/ha). Similar results were reported by Kandil *et al*. (2013), Rugi *et al*. (2018), Choudhary *et al*. (2022), and Singh *et al*. (2022). The higher yield of PRO-6 was primarily attributed to the increased weight of bulbs and plant height.

Table 1: Effect of varieties and planting dates on yield-contributing characters

Treatment	Days taken to harvesting	Bulb diameter (cm)	No. of leaves/ plant	Weight of bulb (g)	Plant height (cm)	Yield (q/ha)
T_1	144.56	4.19	8.86	70.12	34.11	303.05
T_2	128.44	4.31	9.77	64.39	39.27	353.9
T_3	121.00	5.03	11.30	72.40	41.73	388.32
T_4	118.44	5.05	11.53	71.56	45.11	365.82
S E(m)	1.09	0.09	0.17	0.44	0.57	0.85
CD@0.05	3.25	0.28	0.50	1.28	1.69	2.50
D_1	128.50	4.6	10.48	70.37	40.73	346.67
D_2	127.00	4.56	10.22	68.84	38.93	362.92
D_3	128.83	4.77	10.39	69.64	40.52	351.25
S E(m)	0.95	0.08	0.15	0.38	0.50	0.73
CD@0.05	NA	NA	NA	1.11	1.47	2.06

Bulb yield is the result of the interaction between the variety and specific agroclimatic conditions and crop management factors. Additionally, planting date played a role in determining the yield as it influenced the suitable environmental conditions required for the proper growth and development of plants.

Among varieties, treatment T_3 yielded a net return of ₹6,14,150/ha with a B:C ratio of 4.78:1. Treatment T_4 yielded a net return of ₹5,70,400/ha with a B:C ratio of 4.54:1, T_2 yielded ₹5,50,300/ha with a B:C ratio of 4.49:1, and T_1 yielded ₹4,49,850/ha with a B:C ratio of 3.88:1. The total cost of production was highest for treatment T_3 (₹1,62,500/-), followed by T_4 (₹1,61,250/-), T_2 (₹1,57,500/-), and the farmers' practice (₹1,56,250/-). Gross returns were highest for T_3 (₹7,76,650/-), followed by T_4 (₹7,31,650/-), T_2 (₹7,07,800), and the farmers' practice (₹6,06,100/-).

Regarding planting dates, D_2 recorded the maximum net returns (₹5,67,350/-) with a B:C ratio of 4.58, followed by D_3 (₹5,41,100/-) with a B:C ratio of 4.35, and D_1 (₹5,36,475/-) with a B:C ratio of 4.42. These results are consistent with the findings of Rugi *et al*. (2018) and Poovamma *et al*. (2021).

CONCLUSION

PRO-6 variety demonstrated highest B:C ratio and yield, followed by PRO-7, Punjab Naroya, and farmers' practice. Among planting dates, D_2 resulted in highest yield and B:C ratio (4.58), followed by D_1 (4.42) and D_3 (4.35). The combined effects indicate that PRO-6 variety, along with planting on 1st of January, resulted in maximum yield and profitability.

REFERENCES

AshagrieTeshome, BelewDerbew and Nebiyu Amsalu. 2021. Influence of planting date and bulb size on yield and quality of onion (*Allium cepa* L.) seed production. *Cogent Food and Agriculture* **7**(1): 1-14.

Bosekeng G and Coetzer G.M. 2015.Response of onion (*Allium cepa*. L.) to sowing date and plant population in the central free state, South Africa. *African Journal of Agricultural Research* **10**(4).179-87.

Choudhary M L, Soni R L and Kaushik R A. 2022.Evaluation of onion (*Allium cepa*) varieties for their suitability in tribal area of Dungarpur, Rajsthan. *Current Horticulture* **10**(2): 48–51.

Das BC, Tripathy P, Sahu GS, Das AK, Swain SK, Mandal P, Mohanty S &Sahoo D. 2021. Effect of planting dates and varieties on seed yielding attributes of onion (*Allium cepa* Linn.) under west central table land zone of Odisha. *The Pharma Innovation Journal***10**(7): 151-54.

FufaNimona, GebretensayFekadu, TsagayeDasta, FikreDemis, WegayehuGizaw& Ali Awoke. 2021. Evaluation of seed production and quality performance of Onion (*Allium cepa*. L.) varieties at Kulumsa in Arsi Zone South East Ethiopia. *Journal of Agriculture & Crops***7**(1): 33-38.

Kandil Ahmad A, Sharief Ali E &Fathalla FH. 2013. Effect of transplanting dates of some onion cultivars on vegetative growth, bulb yield and its quality. *ESci Journal of Crop Production* **2**(3):72-82.

Misu Pal Minackhi, Rahim AbdurMd, HossenKawsar, KarimRezaulMd and Islam Morshedul Md. 2018. Effects of planting dates on growth and yield of winter onion. *International Journal of Agronomy and Agricultural Research* **12**(1): 11-19.

PanseVG andSukhatme PU 1985. *Statistical Methods for Agriculture Workers*. Indian Council of Agriculture Research . New Delhi.

Poovamma BC, Devi Bijaya AK & Singh James K. 2021. Effect of different levels of planting time and spacing on quality and economics of multiplier onion (*Allium cepa* L. var. aggregatum Don.) cv. Meitei Tilhou. *International Journal of Current Microbiology and Applied Sciences* **10**(1): 2470-77.

Rugi M, Kushwah SS and Sharma RK. 2018. Effect of transplanting dates on growth, marketabvle bulb yield and economics of khrif onion (*Allium cepa* L.) varieties. *Annals of plant and soil research* **20**(3): 243-49.

Sharma AK. 2009. Evaluation of Onion varieties in kharif season under sub mountain low hill condition of Himachal Pradesh. *Annals of Horticulture* **2**(2): 191-93.

Sharma Samir, DhamiVandanaTyagi Manu and Singh CP 2016. Morphological evaluation of Radish (*Raphanus sativus* L.) varieties in foothill conditions of Uttrakhand. *International Journal of Agricultural Sciences* **8**(63):3591-93.

Singh A, Megha V and Kumar S. 2022. Evaluation of garlic (*Allium sativum*) varieties for better growth and yield for Madhya Pradesh .*Current Horticulture* **10** (1) 64-65.

Tesfaye Maria, Belew Derbew, DessalegnYigzaw & Shumye Getachew. 2018. Effect of planting time on growth, yield components, seed yield & quality of onion (*Allium cepa* L.) at Tehuledere district northeastern Ethiopia. *Agriculture & Food Security* **7**(28): 2-8.

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