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Effect of spacing and varieties on yield attributes of rabi onion (*Allium cepa* L.)

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Abstract
A field experiment was conducted during 2018-19 at Horticulture Research Farm-2, Department of Horticulture, School of Agricultural Sciences and Technology, Babasaheb Bhimrao Ambedkar University, Lucknow (Uttar Pradesh), studies on the "Effect of spacing and varieties on yield attributes of rabi onion (*Allium cepa* L.). In trial different spacing (20×7.5 cm, 20×10 cm and 20×15cm) and three varieties Agri found Light Red, NHRDF-2 and NHRDF-3 was taken for study the layout of experimental field was laid down in Factorial Randomized Block Design with three replications. It is clearly revealed that the bulb diameter (cm), bulb weight (g), number of scales, bulb height (cm), yield per plot (kg) and yield per hectare (q) was found maximum in Agri found Light Red variety with the spacing of 20×10 cm.

Keywords: Onion, yield parameters, spacing and varieties

Introduction
Onion (*Allium cepa* L.) is most important bulbous vegetable crop. It belongs to family Alliaceae order Asparagales composed of 795 species in genera. Its chromosome number is 2n=16. It is an important vegetable crop grown in India. India exports 12 per cent of total world export of onion. It is more than 75% of foreign exchange that comes from export of fresh vegetables. The onion plant has a fan of hollow, bluish-green leaves and its bulb at the base of the plant begins to swell, when a certain day-length is reached. The bulbs are composed of shortened, compressed, underground stems surrounded by fleshy modified scales (leaves) that envelope a central bud at the tip of the stem. It is originated from Central Asia. It is a biennial plant, but is usually grown as an annual and shallow rooted crop. It is basically long day plant for bulb production and grown during Rabi season. The leaves are yellowish to bluish green and grow alternately in a flattened, fan-shaped swathe. The important contents like allicin, allin and sulphites etc. are present in onion. These compounds are helps to fighting cancer, high blood cholesterol and sugar, liver problems and intestinal problems. It has diuretic and stimulant property. The antifungal property of onion is due to presence of catechol a phenolic compound. Onion is used for treating problems including loss of appetite, upset stomach, and gall bladder disorder, for treating heart and blood vessel problems including chest pain (angina) and high blood pressure and for "preventing hardening of the arteries" atherosclerosis. It is used in processed from i.e. flakes powder is used for making pickles. (Bhagchandani *et al.*, 1980) [2]. Onion is a cool season crop and it grows well in climate with extremes of high or low temperatures. For good vegetative growth lower temperatures, (daily mean 13-21ºC) and short photoperiod are required while for bulb development high temperatures (daily mean 15-25ºC) and long photoperiod are required. Rabi onion varieties require day length of 10-11 hours while, Rabi onion varieties require day length of 12-13 hours. Cole *et al.* (1996) [4]. reported that highest commercial bulb yield was reported at higher planting density, while the highest proportion of large bulb and average bulb weight were examined at lower planting density.

Materials and Methods
The present investigation entitled "Effect of spacing and varieties on yield attributes of rabi onion (*Allium cepa* L.)'' was carried out in the Department of Horticulture, School of Agricultural Sciences and Technology during the year 2018-19. The analytical work was done in Department of Horticulture, School of Agricultural Sciences and Technology, Babasaheb Bhimrao Ambedkar University, Lucknow (Uttar Pradesh). The experiment was laid out in Randomized Block Design with factorial with three replications. Observations recorded to be yield attributes were recorded periodically like bulb diameter (cm), bulb weight (g), number of scales, bulb height (cm), yield per plot (kg) and yield per hectare (q). Statistical analysis of

data obtained in different set of experiments was calculated following the standard procedure as stated by Panse and Sukhatme

Results and Discussion

The various factors which are directly responsible for ultimate bulb production like weight of bulb, number of scales, diameter of bulb, bulb height, yield/plot (kg) and yield (q/ha). The maximum bulb weight recorded maximum in varieties V_3 (NHRDF-2) and spacing at S_3 (20x15 cm) the interaction data revealed that the maximum weight in V_1S_3.This result corroborated the findings of Bijaya Devi *et al.* (2008) [3]. The bulb characters like maximum bulb diameter was found in variety V_2 (NHRDF-3) with spacing at S_2 (20x10 cm) and recorded maximum in the interaction as V_1S_3. This due to wider spacing of plant, which help to utilize more water, nutrition, air and light for better growth. These results are in conformity with findings of Mc-Geary (1985) [6]. The data revealed on number of scales which indicated maximum in variety V_3 (NHRDF-2) with spacing in S_3 (20x15 cm). The combined effect maximum number of leaves was recorded at V_1S_3. This due to wider spacing of plant, which help to utilize more water, nutrition, air and light for better growth. The data revealed on bulb height which indicate maximum in variety V_2 (NHRDF-3) with spacing S_2 (20x10 cm). The combined effect maximum bulb height was recorded at V_1S_3. This due to wider spacing of plant, which help to utilize more water, nutrition, air and light for better growth. This due to wider spacing of plant, which help to utilize more water, nutrition, air and light for better growth. These results are in conformity with earlier reports of Khan *et al.* (2003) [7, 11]. The highest yield per plot (4.49 kg) and total yield/ha (364.80 q/ha), were recorded in the treatment S_1V_3 (20x7.5 cm with Agri found Light Red) and S_3V_3 (20x15cm with NHRDF Red-2). The lowest yield/plot (2.69 kg) and lowest yield/ha (218.83q/ha) were recorded in the treatment with widest spacing (S_3V_3).

This might be because closer spacing provides a greater number of bulbs per unit area. This finding is in agreement with the findings of Ahlawat and Singh (1973) and Bijaya Devi *et al.* (2008) [1, 3].

Table 1: Effect of spacing and varieties on yield attributes of rabi onion (*Allium cepa* L.)

Treatment		Bulb diameter (cm)	Bulb weight (g)	No of scales	Bulb height (cm)	Yield per plot (kg)	Yield per hectare (q)
		Effect of varieties					
Agri found Light Red	V_1	5.69	61.47	10.66	4.86	4.07	331.41
NHRDF-3	V_2	6.97	58.46	10.00	5.29	3.20	260.71
NHRDF-2	V_3	6.86	61.69	11.66	5.10	3.46	281.48
SE m±		0.312	0.689	0.261	0.275	0.118	9.617
CD (P=0.05)		0.993	2.084	0.788	0.831	0.358	29.080
		Effect of spacing					
20×7.5	S_1	6.20	59.93	10.22	4.69	3.73	303.69
20×10	S_2	7.14	60.24	10.33	5.72	3.67	298.82
20×15	S_3	6.18	61.69	11.77	4.84	3.33	271.09
SE m±		0.312	0.689	0.261	0.275	0.118	9.617
CD (P=0.05)		0.993	2.084	0.788	0.831	0.358	29.080
		Interaction effect (V×S)					
V_1S_1		4.80	57.46	11.00	4.42	4.25	304.53
V_1S_2		6.57	62.23	9.00	4.83	3.49	284.13
V_1S_3		7.45	64.71	12.00	5.81	4.49	364.80
V_2S_1		7.08	58.31	9.50	4.61	3.01	245.10
V_2S_2		5.69	59.31	11.00	6.53	3.78	307.39
V_2S_3		6.38	57.77	10.00	4.74	2.82	229.66
V_3S_1		6.71	64.04	10.66	5.03	3.94	320.66
V_3S_2		7.39	59.17	11.00	5.32	3.75	304.95
V_3S_3		6.48	61.87	13.33	4.47	2.69	218.83
SEm±		0.540	0.689	0.451	0.476	0.205	16.657
CD (P=0.05)		1.593	2.084	1.365	1.40	0.620	50.368

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