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Horticultural traits of Knolkhol (*Brassica oleracea* var. *gongylodes* L.) influenced as varieties and spacing

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Abstract

The field experiment was conducted at Horticulture Research Farm-I, Babasaheb Bhimrao Ambedkar University, Lucknow (U.P.), during *rabi* season of 2018-19 to study the influenced of varieties and spacing on horticultural traits of knolkhol (*Brassica oleracea* var. *gongylodes* L.). Four varieties and four spacings were evaluated in factorial randomized block design with three replications. The results revealed that the maximum plant height (17.59 cm and 29.60 cm), number of leaves (11.50 and 19.00), leaf length (12.50 cm and 24.43 cm), leaf width (10.32 cm and 26.70 cm) at 30 DAT and at harvest were recorded in variety White Vienna. plant spread (29.80cm) were noted in variety Palam Tender Knob. The stem girth, days to knob initiation and knob harvest were not assessed non-significant with varieties. In general, lowest values of growth attributes were noted under Pusa Virat. In case of spacing the maximum plant height (18.07 cm and 31.14 cm), number of leaves (11.66 and 18.12), leaf length (13.01 cm and 24.93 cm), leaf width (10.39 cm and 26.79 cm) at 30 DAT and at harvest and plant spread (30.84 cm) were recorded in spacing 60 x45 cm.

Keywords: Growth attributes, Knolkhol, spacing, varieties

Introduction

Knolkhol (*Brassica oleracea* var. *gongylodes* L.) is a winter season crop under cole group and belongs to Brassicaceae family that originated in Mediterranean coastal countries. It is also known as kohlrabi and Ganth gobhi. It is widely grown in Jammu & Kashmir, West Bengal and to a lesser extent in Maharashtra, Assam, Uttar Pradesh and Punjab as a rare exotic vegetable. Knolkhol has a bulb-like swollen edible portion called knob. The stem's fleshy turnip-like expansion develops completely above ground. The knob is harvested for human use as a raw or cooked vegetable, while young leaves are also utilised in some areas (Chadha, 2019) [4]. Kohlrabi taste feels like broccoli or cabbage, but it's gentler and sweeter. The knobs have a crunchy texture and a rich flavour. One hundred gram of comestible portion of Knolkhol contains 92.7 g moisture, 1.1 g protein, 0.2 g fat, 1.5 g fibre, 3.8 g carbohydrates, 25 cal. energy, 20 mg calcium, 18 mg magnesium, 10 mg oxalic acid, 35 mg phosphorus, 0.4 mg iron, 0.12 mg sodium, 37 mg potassium, 0.09 mg copper, 143 mg Sulphur, 36 I.U. vitamin A, 0.12 mg riboflavin, 0.5 mg nicotinic acid, 0.05mg thiamine and 85 mg vitamin C (Bose, 2001) [3]. It contains sulforaphane, a cancer-fighting compound. All components of the knolkhol plant have been reported to have enormous therapeutic powers. Asthma, cancer, high cholesterol, heart disorders, indigestion, muscle and nerve functioning, colon cancer, skin problems and weight loss are among the medicinal characteristics of the crop. Knolkhol is mostly cultivated as a winter vegetable crop that thrives best in cool and moist climates Seeds germinate successfully at temperatures ranging from 15 to 30°C. The ideal temperature for its growth is between 15 and 25 °C, depending on the cultivar. It may be cultivated in a wide range of soil. However, uniform growth is encouraged by good soil conditions and fertility. The ideal pH range of soil is 6.0-7.0 (Choudhary, 2015) [5]. In the growth and development of a crop, varieties are important. Only a few cultivars of knolkhol, such as Pusa Virat, White Vienna, Early White Vienna and Palam Tender Knob were developed for the cold winters of North India. Maintaining an appropriate plant population per unit area is essential for knolkhol better growth and higher production. Optimum spacing ensures judicious use of natural resources and makes the intercultural operation easier as suggested by (Hasan *et al.*, 2017) [7]. The spacing of crop varied according to climatic condition, soil fertility and cultivar adaption to particular region. (Bairwa *et al.*, 2017) [1] reported that under the wider spacing, the plant was more vigorous in terms of growth of plants, which may be due to less competition for light, nutrients and moisture as compared to closer spacing (Kaur *et al.*, 2020) [8].

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Hence, in the present study efforts have been made to understand the combined effect of varieties and spacing on growth attributes of knolkhol under Lucknow conditions.

Materials and Methods

A field experiment was carried out at Babasaheb Bhimrao Ambedkar University, Lucknow, (U.P.), during *rabi* season of 2018-19. The experimental site is situated at 80° 92' East longitude and 26° 76' North latitude and 123 meter above MSL (Mean Sea Level). The climate of Lucknow is characterized by sub-tropical with hot, dry summer and cool winters. The soil of experimental field is sandy loam and slightly alkaline in nature with soil pH 8.2. Seedlings of 30 days old were transplanted on November 2nd, 2018. In a factorial randomized design with three replications, four varieties: Pusa Virat, White Vienna, Early White Vienna and Palam Tender Knob with four spacings: 30 x 30 cm, 45 x 30 cm, 45 x 45 cm and 60 x 45 cm were evaluated. The application of recommended dose of fertilizer (180: 120: 100 kg ha⁻¹ NPK) through urea, diammonium phosphate and muriate of potash. Appropriate management practices were adopted. Randomly five plants were selected in each plot and data were recorded on the plant height, leaves per plant, leaf length, leaf width, plant spread, stem girth, days to knob initiation and knob harvest. The data of both years were pooled and analysed statistically as per methods advocated by Panse and Sukhatme (1985) [11].

Results and Discussion

Effect of varieties on growth parameters

The data on pooled mean basis (Table 1 & 2) revealed that the tallest plant (17.59 cm at 30 DAT and 29.60 cm at harvest) was recorded in White Vienna followed by Early White Vienna (17.14 cm at 30 DAT 29.06 cm at harvest) while, the shortest plant (15.67 cm at 30 DAT and 27.66 cm at harvest) was found in Pusa Virat. The variation observed in different varieties may be due to genetic nature of the cultivars. These findings are in close conformity with the results of EI-Bassiony *et al.* (2014) [6] in knolkhol. The maximum leaves per plant (11.50 at 30 DAT and 19.00 at harvest) was noticed in White Vienna followed by Palam Tender Knob (11.04 at 30 DAT and 17.78 at harvest) and minimum leaves (9.59 at 30 DAT and 16.59 at harvest) were recorded in Pusa Virat. The variation in number of leaves per plant might be due to prevailing climatic conditions and genetic makeup of different cultivars (Yadav *et al.* 2013) [12]. The maximum length of leaf (12.50 cm at 30 DAT and 24.43 cm at harvest), width of leaf (10.32 cm at 30 DAT and 26.70 cm at harvest) and plant spread (29.80 cm) were noticed in Palam Tender Knob whereas, the minimum values were observed in Pusa Virat. These results are in close conformity with the findings of Bhangre *et al.* (2011) [2] in broccoli. The stem girth, days to knob initiation and knob harvest differed non-significant among all varieties under this study.

Table 1: Effect of varieties and spacing on growth attributes of Knolkhol

Treatments	Plant height (cm)		Number of leaves per plant		Length of leaf (cm)		Width of leaf (cm)	
	30 DAT	At harvest	30 DAT	At harvest	30 DAT	At harvest	30 DAT	At harvest
Varieties (V)								
V ₁ (Pusa Virat)	15.67	27.66	9.59	16.59	11.11	22.18	8.01	23.09
V ₂ (White Vienna)	17.59	29.60	11.50	19.00	12.50	24.43	10.32	26.70
V ₃ (Early White Vienna)	17.14	29.06	10.67	16.80	11.73	23.62	8.73	25.92
V ₄ (Palam Tender Knob)	16.81	28.57	11.04	17.78	12.00	23.89	10.11	26.32
S.Em±	0.34	0.24	0.22	0.24	0.17	0.22	0.18	0.46
CD (P=0.05)	0.99	0.69	0.64	0.68	0.50	0.65	0.53	1.32
Spacing (S)								
S ₁ (30 x 30 cm)	15.40	27.04	9.90	16.89	10.75	22.84	8.42	24.56
S ₂ (45 x 30 cm)	17.28	28.38	10.37	17.32	11.72	23.10	8.88	25.09
S ₃ (45 x 45 cm)	16.45	28.32	10.88	17.84	11.86	23.27	9.48	25.58
S ₄ (60 x 45 cm)	18.07	31.14	11.66	18.12	13.01	24.93	10.39	26.79
S.Em±	0.34	0.24	0.22	0.24	0.17	0.22	0.18	0.46
CD (P=0.05)	0.99	0.69	0.64	0.68	0.50	0.65	0.53	1.32

Table 2: Effect of varieties and spacing on growth attributes of knolkhol

Treatments	Plant spread (cm)	Stem girth (cm)	Days to knob initiation	Days to knob harvest
Varieties (V)				
V ₁ (Pusa Virat)	28.23	1.10	36.61	64.62
V ₂ (White Vienna)	29.28	1.08	34.71	63.15
V ₃ (Early White Vienna)	29.52	1.10	35.12	63.54
V ₄ (Palam Tender Knob)	29.80	1.15	37.55	63.51
S.Em±	0.21	0.02	0.78	0.79
CD (P=0.05)	0.60	NS	NS	NS
Spacing (S)				
S ₁ (30 x 30 cm)	28.04	1.09	35.74	63.67
S ₂ (45 x 30 cm)	28.11	1.10	35.22	61.84
S ₃ (45 x 45 cm)	29.85	1.11	36.08	64.19
S ₄ (60 x 45 cm)	30.84	1.13	36.96	65.12
S.Em±	0.21	0.02	0.78	0.79
CD (P=0.05)	0.60	NS	NS	NS

Effect of spacing on growth parameters

The data (Table 1 & 2) revealed that the maximum plant height (18.07 cm at 30 DAT and 31.14 cm at harvest) and leaves per plant (11.66 at 30 DAT and 18.12 at harvest) were recorded in spacing 60 x 45 cm followed by 45 x 45 cm. However, the minimum plant height (15.40 cm at 30 DAT and 27.04 cm at harvest) and number of leaves (9.90 at 30 DAT and 16.89 at harvest) were observed in 30 x 30 cm. The variation may be due to more sunlight and nutrients with wider spacing. Similar results were advocated by Kumar *et al.* (2021)^[9] in sprouting broccoli. The maximum length of leaf (13.01 cm at 30 DAT and 24.93 cm at harvest), width of leaf (10.39 cm at 30 DAT and 26.79 cm at harvest) and plant spread (30.84 cm) at harvest were obtained in spacing 60 x 45 cm while, minimum values were recorded in 30 x 30 cm spacing. Plants with wider spacing received more sunlight and nutrients due to fewer plants, that might enhance vegetative growth of plant (Moniruzzaman, 2011)^[10]. The stem girth, days to knob initiation and knob harvest were not affected non-significantly with spacings.

Based on two-years field experiment, it can be concluded that the effect of varieties and spacing on the growth, yield and quality of knolkhol was significantly. The White Vienna with spacing of 60 x 45 cm proved to be most effective in increasing the plant height, number of leaves, length of leaf, width of leaf and plant spread of knolkhol.

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