Himachal Journal of Agricultural Research 34(2):122-124, 2008

Short Note

Standardization of planting time and spacing in garlic (*Allium sativum* L.) under sub-tropical conditions of Himachal Pradesh

Happy Dev
Dr Y.S. Parmar University of Horticulture and Forestry
Vegetable Research Station, Kalpa, District Kinnaur-172 108, India.

Abstract

The healthy cloves of garlic cultivar GHC-1 were planted on five dates at fortnightly intervals starting from October 01 to December 01 in combination with three spacings viz. 20x10 cm, 20x15 cm and 20x20 cm for three consecutive years during *rabi* 2001-02 to 2003-04 at Experimental Farm of Regional Horticultural and Forestry Research Station, Bhota, District Hamirpur (HP). From the present studies it was concluded that maximum bulb yield harvested during second fortnight of May when cloves planted on October 16 at a spacing of 20x10 cm in the well prepared plots having sandy loam soils under low hill conditions of Himachal Pradesh. Yield and growth was not much affected by early planting, however, significant reduction was observed in late planting. Obviously, bulb size was found to be increased to various extents with increase in spacing., No effect of planting time as well as spacing was observed on number of cloves per bulb.

Key words: Garlic (*Allium sativum* L.), planting time, spacing, sub-tropical conditions.

Garlic (*Allium sativum* L.) is the second most widely used cultivated *Allium* after onion. It has long been recognized all over the world as a valuable condiment and spice for foods, flavouring agent used for seasoning various vegetables and meat dishes and for preparation of pickles and chutneys. It is a popular remedy for various ailments and physiological disorders and used in pharmaceutical preparations. The bulbs are rich source of protein, carbohydrates, phosphorus, vitamin C and contain about 0.1 per cent volatile oil. The use of garlic is prohibited in certain Indian communities on religious considerations. The crude extract of garlic clove has fungicidal, bactericidal, insecticidal and medicinal properties. It is grown throughout the country in an area of 70 thousand hectares with a production of 500 thousand tones and is a good foreign exchange earner crop as large quantities of garlic are exported every year, during the year 2003-04, 2.24 thousand tones of garlic was exported earning 0.86 million dollars (FAO, 2003-04). It is commonly grown under rain fed and partially irrigated conditions in the sub tropical parts of Himachal Pradesh as a *rabi* season crop at kitchen garden as well as commercial scale with various planting times and spacings. Moreover, in the recent years, garlic cultivation has spread in new areas where monkey menace is a bottleneck for the production of other winter vegetable crops. Hence, it becomes imperative to study the appropriate planting time and spacing for the new garlic cultivar GHC-1 to get maximum bulb yield. Therefore, the studies were conducted to determine the optimum planting time and appropriate spacing and to evaluate the growth and yield behavior as influenced by planting time and spacing for GHC-1 cultivar of garlic.

The present investigations were conducted during three consecutive *rabi* seasons 2001-02 to 2003-04 at the Experimental Farm of Regional Horticultural and Forestry Research Station, Bhota, Hamirpur (HP). The sandy loam soil of well-prepared field was incorporated with recommended manures and fertilizers. The healthy cloves of garlic cultivar GHC-1 were planted on five dates at 15 days interval starting from October 01 to December 01 during *rabi* seasons of 2001-02 to 2003-04 at three spacings viz. 20x10 cm, 20x15 cm and 20x20 cm in the beds of size 3.00 x 1.80 m. These 15 treatment combinations were laid out in randomized block design with three replications. The harvesting of crop was done in May when the tops turn yellowish or brownish and show signs of drying up and bend over. The data on bulb yield (q/ha) was recorded on plot basis, whereas that of bulb size (gm), plant height (cm) and cloves per bulb (No.) was recorded on 20 randomly selected plants. Days to maturity (No.) were also counted from planting to harvesting.

Table 1. Mean performance of garlic cv. GHC-1 as affected by planting time and spacing under sub-tropical conditions of H.P.

Traits	Yield (q/ha)				Bulb weight (g)				Plant height (cm)				Maturity (days)				Cloves / bulb (No.)			
Treatments	2k1-2	2k2-3	2k3-4	Pooled	2k1-2	2k2-3	2k3-4	Pooled	2k1-2	2k2-3	2k3-4	Pooled	2k1-2	2k2-3	2k3-4	Pooled	2k1-2	2k2-3	2k3-4	Pooled
Oct 01 & 20x10 cm	95.2	176.2	156.7	142.7	41.7	56.6	49.5	49.3	60.0	57.2	67.9	61.7	225	240	240	235	12	11	12	11.7
Oct 01 & 20x15 cm	109.2	170.1	159.2	146.2	55.5	59.5	52.5	55.8	60.0	55.1	67.8	61.0	225	240	240	235	13	13	13	13.0
Oct 01 & 20x20 cm	119.6	140.4	142.8	134.3	71.4	64.7	58.2	64.8	60.0	54.4	69.2	61.2	225	240	240	235	12	12	11	11.7
Oct 16 & 20x10 cm	99.2	192.5	185.2	159.0	63.5	65.4	63.4	64.1	62.0	48.3	61.2	57.2	210	225	225	220	12	13	12	12.3
Oct 16 & 20x15 cm	134.2	135.0	165.4	144.9	68.8	66.5	64.5	66.6	58.0	50.2	64.3	57.5	210	225	225	220	12	14	14	13.3
Oct 16 & 20x20 cm	108.7	130.1	158.2	132.3	72.0	67.4	68.2	69.2	60.0	63.5	60.5	61.3	210	225	225	220	13	13	12	12.7
Nov 01 & 20x10 cm	91.5	127.5	122.5	113.8	45.5	55.5	51.4	50.8	58.0	48.8	59.2	55.3	195	210	210	205	12	14	11	12.3
Nov 01 & 20x15 cm	95.4	122.4	114.7	110.8	52.6	57.8	56.2	55.5	60.0	52.7	57.2	56.6	195	210	210	205	14	11	12	12.3
Nov 01 & 20x20 cm	105.3	120.7	109.2	111.7	66.7	58.7	59.7	61.7	55.0	55.9	63.5	58.1	195	210	210	205	10	11	14	11.7
Nov 16 & 20x10 cm	89.9	130.2	136.7	118.9	35.7	44.5	43.6	41.3	48.0	40.4	57.2	48.5	180	195	195	190	10	12	13	11.7
Nov 16 & 20x15 cm	101.6	112.1	112.6	108.8	40.0	46.4	47.4	44.6	52.0	50.3	56.4	52.9	180	195	195	190	10	11	12	11.0
Nov 16 & 20x20 cm	93.3	110.5	119.4	107.7	45.5	44.5	50.8	46.9	50.0	51.5	58.5	53.3	180	195	195	190	9	11	12	10.7
Dec 01 & 20x10 cm	57.6	75.4	52.4	61.8	31.3	26.6	22.4	26.8	42.0	33.4	49.2	41.5	165	180	180	175	9	11	13	11.0
Dec 01 & 20x15 cm	57.4	60.3	57.2	58.3	28.6	28.5	27.4	28.2	40.0	41.2	52.1	44.4	165	180	180	175	9	13	14	12.0
Dec 01 & 20x20 cm	67.6	60.2	52.5	60.1	35.7	29.4	27.5	30.9	42.0	42.1	51.2	45.1	165	180	180	175	10	14	12	12.0
CD (P= 0.05)	27.2	22.4	28.9	26.2	7.4	3.4	3.9	4.9	5.9	5.5	7.2	6.2	-	-	-	-	NS	NS	NS	-

The data were subjected to analysis as per the procedures suggested by Panse and Sukhatme (1978).

The garlic cv GHC-1 planted on October 16 at a spacing of 20x10 cm gave the maximum bulb yield of 159.00 q/ha (Table-1). Yield and growth was not much affected by early planting upto October 01, however, drastic reduction was observed with late planting resulting in poor bulb yield. The delayed planting after November 16 markedly reduced the bulb yields, however, crop planted earlier by one fortnight i.e. on October 01 at different spacings showed lesser reductions. Almost similar trend was observed for bulb weight also. A continuous decrease in plant height was recorded with every delay in planting the crop. This might be attributed to longer growth period of the early planted crop than the later ones before the initiation of bulb development. Decrease in number of days to maturity was observed with delay in planting. The maximum 235 days and minimum 175 days to maturity were recorded on the early and the late planting dates, respectively. Om and Srivastava (1974) reported that the planting from September 06 to October 03 was significantly superior to other sowing dates for getting better growth and yield of bulbs at Chaubattia, in the hilly region of UP. According to Mathur *et al.* (1975), the optimum time for planting of garlic was September 25, whereas, at Parbhani, the bulb yield was significantly reduced as planting was delayed from November 10 to December 10 (Anon., 1982-83). On the other hand, in northern districts of West Bengal, planting on November 11 gave the highest yield (Bose and Som, 1986).

The bulb size of plots having wider spacing was higher but the bulb yield of those having closer spacing i. e. 20x10 cm was always higher as more number of bulbs having marketable size and consumer preference could be accommodated. Purewal and Dargan (1961) in Punjab obtained the best yield at a spacing of 15x18 cm. According to Nath (1976), the cloves should be dibbled at a spacing of 15x8 cm. Highest yield of bulbs was obtained by Menezes *et al.* (1974) when planting was done at a distance of 20-30 cm between rows and 7.5 cm between plants, whereas, Purseglove (1975) recommended a spacing of 30x15 cm. Aliudin (1980) planted the garlic cloves at 6 spacings ranging from 20x20 cm to 10x7.5 cm and observed that the plant weight, bulb weight and bulb diameter decreased with closer planting. The closest spacing gave the highest yield of small bulbs and the widest spacing gave the lowest yield of larger bulbs.

The effect of planting time and spacing on number of cloves per bulb was found non significant during all the three years. Obviously, increase / decrease in clove size and as such clove weight was resulted with the increase / decrease in bulb size / bulb weight. Korla *et al.* (1981) reported high heritability for number of cloves per bulb in garlic, the character being more under the genetic control and least influenced by the environment and management practices.

Acknowledgement

This work has been done under NATP (ICAR) and the financial assistance rendered by the ATMA Hamirpur (HP) is duly acknowledged.

References

Aliudin 1980. Bulletin on garlic. Penelitian Hortikultura **8**: 3-11.

Anonymous 2003-04. Quarterly Bulletin of Statistics, FAO, Rome.

Anonymous 1982-83. *Annual Report.* Dept Hort., Marathawada Agric. Univ. Parbhani, pp 21-22.

Bose TK and Som MG 1986. *Vegetable Crops in India.* Naya Prokash, Calcutta-six.

Korla BN, Singh AK and Kalia P 1981. Genetic variability in garlic. Haryana J. Hortic. Sci. **10**: 77.

Mathur RBL., Arora PN and Parshad M 1975. Effect of planting time on production of garlic. Indian J. Agron. **20**: 46-47.

Menezes JADES, Novais RFDE, Dos Santos HL and Sans LMA 1974. Spacing in garlic. Revista Ceres **21**: 203-12.

Nath Prem 1976. *Vegetables for the Tropical Region,* ICAR, New Delhi, India.

Om H and Srivastava RP 1974. Influence of the time of planting on the growth and yield of garlic. Prog. Hort. 6: 71-76.

Panse VG and Sukhatme PN 1978. *Statistical Methods for Agricultural Workers.* Indian Council of Agricultural Research, New Delhi, India.

Purewal SS and Dargan NG 1961. Effect of fertilizers and spacing on the development and yield of garlic (*Allium sativum*). Indian J. Agron. **5**: 262-68.

Purseglove JW 1975. *Tropical crops: Monocotyledons.* ELBS, Longman, London, pp 52-56.