International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2018; 6(3): 2470-2472

Received: 13-03-2018
Accepted: 15-04-2018

Hasan Raja
Department of Vegetable Science, NDUA&T Kumarganj Faizabad, Uttar Pradesh, India

CN Ram
Department of Vegetable Science, NDUA&T Kumarganj Faizabad, Uttar Pradesh, India

Shubham Yadav
NNPG, Department of Horticulture, Dr. RMLAU Faizabad, Uttar Pradesh, India

Sriom
Department of Vegetable Science, NDUA&T Kumarganj Faizabad, Uttar Pradesh, India

Akshay Jain
Department of Vegetable Science, NDUA&T Kumarganj Faizabad, Uttar Pradesh, India

Rohit Maurya
Department of Vegetable Science, NDUA&T Kumarganj Faizabad, Uttar Pradesh, India

Correspondence
Sriom
Department of Vegetable Science, NDUA&T Kumarganj Faizabad, Uttar Pradesh, India

Studies on correlation coefficients among yield and its contributing traits in garlic (Allium sativum L.) genotypes

Hasan Raja, CN Ram, Shubham Yadav, Sriom, Akshay Jain and Rohit Maurya

Abstract
The present investigation entitled "Studies on the correlation coefficients among yield and yield contributing traits in garlic (*Allium sativum* L.) Genotypes". The experiment was conducted in Augmented Block Design at Main Experimental Station of Department of Vegetable Science, Narendra Deva University of Agriculture, Narendra Nagar (Kumarganj), Faizabad (U.P.) during *Rabi* 2015-16. Experimental material for the present study consisted of thirty genotypes. In single plot sized 2.0 X 0.30 cm with the distance of 30 cm row to row and 10 cm plant to plant. Observation were recorded on plant height (cm), leaves per plant, length of leaf (cm), width of leaf (cm), neck thickness of bulb (cm), cloves per bulb, weight of clove (g), length of clove (cm), width of clove (cm), diameter of bulb (cm), total soluble solids (%) and bulb yield per plant (g).
The bulb yield per plant had highly significant and positive correlation with Number of cloves per bulb indicated that selection for these traits would be effective for the improvement of bulb yield per plant. The maximum positive direct effect on bulb yield per plant was exerted by number of cloves per bulb, number of leaf per plant and length of leaf. It is suggested that selection for these traits will directly increase bulb yield per plant.

Keywords: garlic, Correlation, Yield

1. Introduction
Garlic (*Allium sativum* L.) is classified under the class monocotyledone 2n=2x=16, and belongs to the section Porrum of the family Alliaceae. It is known as *Lahsun* in Hindi, is the second important bulb crop after onion grown in India. It is also important foreign exchange earner and used as spices & condiments. Garlic is rich in protein, phosphorus, potassium, calcium and carbohydrates and also considered as "Nectar of Life" in Ayurveda. A compound bulb contains the edible product of this crop. Garlic is used all over the world for flavouring, different kinds of food materials and as condiments, notable in chutneys, pickles, curry powders, curried vegetables, meat preparation, tomato ketchup in medieval Europe, it is widely used for distinguishing the smell and flavour of salted meat, fish in the Philippines, much of Eastern Asia and other parts of tropics. The dehydrated garlic in powdered or granulated form is replacing the fresh bulbs for industrial and home use in many countries. The major garlic growing countries are France, Spain, U.S.A., Brazil and Egypt. Asia contributes major parts in total world production. It was used in England as early as first half of the 16th Century.
In India, the total area covered under garlic is about 0.26 Million hectare with production of 1.42 Million tonnes and their productivity is 5.43 tonnes per hectare of bulb. (Anonymous, 2015) [1]. Madhya Pradesh is the leading state in garlic production, its share, 0.06 Million hectare area with 0.27 Million tonnes production. The important garlic growing states are Gujarat, Maharashtra, Uttar Pradesh, Andhra Pradesh, Orissa, Tamil Nadu and Rajasthan.
Garlic has higher nutritive value than other Allium bulb crop. Garlic is the rich source of carbohydrate 29.0 g, protein 6.3 g and phosphorus 310 mg of 100g fresh weight. It is rich source of thiamine 0.16 mg and riboflavin 0.23 mg of 100 g fresh weight. It contains fair amount of calcium 30.0 mg of fresh weight. Ascorbic acid content is quite higher in green garlic.

Garlic is vegetatively propagated by cloves, and those cultivars that still bolt, by inflorescence bulbils. Some modern cultivars produces flowers mixed with bulbils, but the flowers never set seeds. Garlic thus presents an interesting problems as to the origin of many cultivars, differing in maturity, bulb size, clove size and number, scale colour, bolting and presence and absence of flowers, it is not known how much variation due to bud mutation has arises after garlic became vegetatively propagated.

Materials and Methods

Geographically the experimental site (Kumarganj, Faizabad) falls under humid sub-tropical climate and is located at 26.47° N latitude and 82.12° E longitude at an altitude of 113 meter above the mean sea level. Geographically, it falls in the north east gangetic alluvial plains of eastern U.P. region.

The Experimental field had sandy loam soil, low in organic carbon, nitrogen, medium in phosphorous, potash and slightly alkaline (pH-8.0) in nature. The mechanical mixture of soil was 64.4% sand, 27.8% silt and 11.3% clay.

The experimental material of garlic used in the present study were, the collections from different places of Uttar Pradesh. Eighty genotypes have been used in the present study. The experiment was laid out in augmented block design. These 80 genotypes were evaluated and studied for their growth, yield and quality performance based on morphological and agronomical measurements.

The following observations were recorded during the course of experimentation on following characters- Plant height (cm), Number of leaves per plant, Length of leaf (cm), Width of leaf (cm),Neck thickness of bulb (cm), Diameter of bulb (cm),Length of bulb (cm), Bulb yield per plant (g), Number of cloves per bulb, Weight of clove (g), Length of clove (cm), Diameter of clove (cm), Total soluble solids (%).The observations were recorded on five randomly selected plants of each row. Average of data from the sampled plant of each treatment was used for statistical analyses in order to draw valid conclusions. The statistical parameters like mean, range were calculated as per the standard methods of analysis (Panse and Sukhatme, 1967) [10].

Results and Discussion

Correlation coefficients were worked out to measure the association among the twelve characters under the study. The estimates of these correlation coefficients are presented in (table-1).

The plant height exhibited highly significant and positive phenotypic correlation with number of leaves per plant (0.4660), length of leaf (0.6482), width of leaf (0.2598), diameter of bulb (0.4490) and length of clove (0.3204), whereas significant phenotypic correlation with neck thickness of bulb (0.2305) number of cloves per bulb (0.2254) and total soluble solids (0.2600).

Number of leaves per plant showed positive and highly significant association with diameter of bulb (0.3991), whereas significant phenotypic correlation with leaf width (0.2366), number of cloves per bulb (0.2759) and length of clove (0.2182).

Length of leaf showed positive and highly significant association with length of clove (0.3693).

The width of leaf showed highly significant and positive phenotypic correlation with diameter of bulb (0.2859) where as significant phenotypic correlation with neck thickness of bulb (0.2348).

The diameter of bulb showed positive phenotypic correlation with number of cloves per bulb (0.2278).

The number of cloves per bulb showed highly significant and positive phenotypic correlation with bulb yield per plant (0.4769).

Table 1: Phenotypic (P) correlation coefficients for twelve characters in garlic.

S. N.	Character	Number of Leaves per Plant	Leaf Length (cm)	Leaf Width (cm)	Diameter of Bulb (cm)	Neck Thickness of Bulb (cm)	Number Of Cloves per Bulb	Length of clove (cm)	Weight of Clove (g)	Diameter of Clove (cm)	T.S.S (%)	Bulb yield per plant (g)
1	Plant Height (cm)	0.4660**	0.6482**	0.2598**	0.4490**	0.2305*	0.2254*	0.3204**	-0.1018	-0.1293	0.2600*	0.0346
2	Number of Leaves per Plant		0.0637	0.2366*	0.3991**	0.0388	0.2759*	0.2182*	-0.0267	-0.0949	0.1882	0.1620
3	Length of leaf (cm)			-0.0495	0.1239	0.1259	-0.0467	0.3693**	-0.0545	0.0349	0.1601	-0.0364
4	Width of leaf (cm)				0.2859**	0.2348*	-0.0443	-0.0443	-0.0759	-0.0695	-0.0088	-0.1059
5	Diameter of Bulb (cm)					0.0448	0.2278*	0.0617	-0.0240	-0.0348	0.0093	-0.0599
6	Neck Thickness of bulb(cm)						-0.0211	-0.1033	0.0236	-0.0874	0.1372	-0.0805
7	Number 0f Cloves per Bulb							0.1401	0.0027	-0.1355	0.0940	0.4769**
8	Length of Clove (cm)								0.0378	-0.0171	0.1254	0.0597
9	Weight of Clove (g)									0.0628	-0.1171	-0.0179
10	Diameter of Clove (cm)										-0.1439	-0.1225
11	Total soluble solids (%)											-0.0415

Path coefficient analysis between eleven characters to find out direct and indirect effects with dependent character i.e. bulb yield per plant (g) are presented in table 2. Respectively.

The details of direct and indirect effects to different characters on bulb yield per plant (g) are as follows:

The highest positive direct effect towards bulb yield per plant (g) was observed for number of cloves per bulb (0.4991), number of leaves per plant (0.1650) and length of leaf (0.0798).

However, diameter of bulb (-0.2070), TSS (-0.1189), diameter of clove (-0.0800), plant height (-0.0630), neck thickness of bulb (-0.0460), width of leaf (-0.0432), length of clove (-0.0358) and weight of clove (-0.033) had exerted negative direct effect on bulb yield per plant.

The number of cloves per bulb via plant height (0.1125), length of clove (0.0699) and TSS (0.0469), number of leaves per plant via plant height (0.0769), diameter of bulb (0.0659), number of cloves per bulb (0.045) and length of leaf via plant height (0.0518) and length of clove (0.0295) had exerted maximum positive indirect effects on bulb yield per plant.

However, diameter of bulb via number of cloves per bulb (0.1137), TSS via diameter of clove (0.0171), weight of clove (0.0139), diameter of clove via TSS (0.0115), plant height (0.0103), number of clove per bulb (0.0108), length of clove via weight of clove (0.0545), neck thickness of bulb (0.0037), weight of clove via number of cloves per bulb (0.0974), length of clove (0.0065), TSS (0.0038) and plant height (0.0033) had exerted negative indirect effects on bulb yield per plant.

Table 2: Direct and indirect effects of different characters on yield in garlic at phenotypic level.

S. N.	Characters	Plant height (cm)	No. of leaves per plant	Length of leaf (cm)	Width of leaf (cm)	Diameter of bulb (cm)	Neck Thickness bulb (cm)	Number of cloves per bulb	Length of clove (cm)	Weight of clove (g)	Diameter of clove (cm)	T.S.S (%)	Bulb yield per plant (g)
1	Plant height (cm)	-0.0630	-0.0294	-0.0409	-0.0163	-0.0283	-0.0145	-0.0142	-0.0202	0.0064	0.0081	-0.0164	0.0346
2	No. of leaves per Plant	0.0769	0.1650	0.0105	0.0390	0.0658	0.0064	0.0455	0.0360	-0.0044	-0.0156	0.0310	0.0225
3	Length of leaf (cm)	0.0517	0.0050	0.0798	-0.0039	0.0099	0.0100	-0.0037	0.0295	-0.0043	0.0027	0.0127	-0.0364
4	Width of leaf (cm)	-0.0112	-0.0102	0.0021	-0.0432	-0.0123	-0.0101	0.0019	0.0019	0.0032	0.0030	0.0003	-0.1059
5	Diameter of bulb (cm)	-0.0929	-0.0826	-0.0256	-0.0592	-0.2070	-0.0020	0.1137	-0.0022	0.0007	0.0027	-0.0011	-0.0599
6	Neck Thickness of bulb (cm)	-0.0106	-0.0017	-0.0058	-0.0108	-0.0092	-0.0460	0.0009	0.0009	-0.0010	0.0040	-0.0063	-0.0805
7	No. of Cloves per bulb	0.1125	-0.0017	-0.0233	-0.0221	-0.0471	-0.0105	0.4991	0.0699	0.0013	-0.0676	0.0469	0.4769
8	Length of clove (g)	-0.0114	-0.0078	-0.0132	0.0015	-0.0127	0.0037	-0.0050	-0.0358	0.0545	0.0006	-0.0044	0.0559
9	Weight of clove (cm)	0.0033	0.0008	0.0018	0.0025	0.0049	-0.0007	0.0974	0.0065	-0.033	-0.0020	0.0038	-0.0179
10	Diameter of love (cm)	0.0103	0.0076	-0.0028	0.0055	0.0072	0.0070	0.0108	0.0013	-0.0050	-0.0800	0.0115	-0.1222
11	T.S.S (%)	-0.0309	-0.0223	-0.0190	0.0010	-0.0019	-0.0163	-0.0111	-0.0149	0.0139	0.0171	-0.1189	-0.0415

References

1. Anonymous. Database area and production of garlic 2015. National Horticultural Board, Ministry of Agriculture and farmers Welfare, Gurgaon (Haryana), 2015.
2. Augusti KT. Ind. J Exp. Biol. 1977; 15:489-90.
3. Bhuyan M, Saxena BN, Rao KM. Ind. J Exp. Bot. 1974; 12:575-576.
4. Burton GW. Quantative inheritance in grasses. Proc. (6^{th}) Int. Grassland Cong. J. 1952; 1:227-283.
5. Dewey DR, Lu KH. A correlation and path coefficient analysis of yield components of crested wheat grass seed production. J Agron. 1959; 57:515-518.
6. Hanson WD, Robinson HF, Comstock RI. Biometrical studies of yield in segregating populations of Korean Lespedeja. Agron. J. 1956; 48:268-272.
7. Johnson HW, Robinson HF, Comstock RI. Estimates of genetic and environmental variability in soybean. Agron. J. 1955; 47:314-318.
8. Kothari IL, Shah JJ. Phytomorphology. 1974; 24:42-48.
9. Kenmochi K, Katayama D. Nippon Shokuhin Kogyo Gakk Aishi. 1975; 22:598:606.
10. Sharma VD, Sethi MS, Kumar A, Rarotra JR. Indian J Exp. Biol. 1977; 15:466-8.
11. Sukul NC, Das PK, De GC. Nematologica, Bengal (India). 1974; 20:187-91.
12. Searle SR. Phenotypic, genotypic and environmental correlations. Biometrics. 1965; 17:474-480.
13. Wright S. Correlation and causation. J Agnc. Res. 1921; 20:257-287.
14. Wright S. System of mating Genetics. 1921; 16:111-178.