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Short Communication

Estimates of heritability, genetic advance and correlation between yield and its components in onion (*Allium cepa* L.)

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The rate of selection process depends upon the heritability of the character involved; hence the genetic variability and correlations for quantitative and qualitative characters are of great value in selecting desired genotypes in plant-breeding programme. The knowledge of association of yield components with yield and among themselves will be helpful in the improvement of complex character like yield for which direct selection is not very effective. The aim of the present study was to estimates the magnitude of genotypic and phenotypic variation, heritability, genetic advance and correlation for selecting superior genotypes in relation to yield. The experiment was laid out with 22 onion genotypes at experimental farm of National Research Centre for Onion and Garlic, Rajgurunagar, Pune in a randomized block design with two replications in late *Kharif* season. The data was taken on quantitative and qualitative attributes along with the yield. The genotypic coefficient of variations was low as compared to the phenotypic variations (Table 1). The phenotypic coefficient of variations was lowest for the character T.S.S., while highest for the character percentage of bolters. The genotypic coefficient was lowest for the characters dry matter of leaves and percentage of "B" grade bulb, while highest for the character percentage of bolters followed by percentage of doubles. The maximum phenotypic variability was found in the character bulb weight followed by percentage of doubles and marketable yield. The characters, percentage of 'A' and 'B' grade bulbs showed moderate variability (Table 1). Similar trend was observed in respect of genotypic variability. The estimates of phenotypic variance were higher than the genotypic variances. Heritability percentage was observed that the most of the characters studied had moderate heritability value. Very high estimates of heritability percentage were observed in character polar diameter of bulbs followed by T.S.S. The other character like, total yield neck thickness and percentage of 'A' grade bulbs showed moderate heritability percentage. The highest genetic advance was observed in character bulb weight, it was followed by percentage of 'A' grade bulbs. The character number of leaves and percentage of dry matter of leaves was recorded with lowest genetic advance. The perusal of results table 1 indicated that, phenotypic co-efficient of variation was higher than genotypic co-efficient of variation, indicated that all the genotypes tested, phenotypically different and good amount of variation existed in the population.

The PCV ranged from 6.40 (T.S.S.) to 50.94 (percent of the double bulbs) indicated the wide variability among the genotypes tested. Further, the environment has played significant role in expressing their attributes of the genotypes tested. The GCV ranged from 0.00 (dry matter of leaves and percent B grade bulb) to 39.17 (percent bolters). The broad sense heritability is ranged from 0.00 (No. of leaves, dry matter of leaves, percent of B grade bulb) to 76.90 (polar diameter). The maximum heritability was recorded for polar diameter and it was followed by T.S.S., total yield and percent A grade bulbs. Genetic advance was higher in bulb weight followed by percent A grade bulb and marketable yield. Johnson *et al.* [1] reported that selection pressure can be exercised on the character showing higher heritabllity coupled with genetic advance. In the light of the above results selection pressure can be exercised in the present study mainly on two attributes i.e. bulb weight and percent of A grade bulbs. Further, these results indicated that addictive gene action is playing important role in the expression of these attributes and the selection pressure can profitably exercised on these attributes. The genotypes can be selected for, further evaluation in subsequent generations. Inspite of the fact that genotypes registered higher heritability for Polar diameter, TSS of bulb, total yield and neck thickness but the genetic advance was very meager. Under this circumstances selection based on these characters would not be helpful as they registered minimum genetic advance and as such these characters not to be considered for exercising selection pressure, Mohanty [2]. Genotypic correlation coefficients for all the

Table 1. Components of variance, heritability (H) and genetic advance (GA) of different characters of onion genotypes

Character	Mean	PCV (%)	GCV (%)	Estimates of components of variance*			H (%)	GA**	GA as % of mean
				σp	σg	σer			
Yield	3.62	23.82	17.16	0.74	0.38	0.36	51.93	0.67	18.50
Plant height	52.33	9.65	2.34	25.53	1.50	24.03	5.88	0.15	0.28
No. of leaves	8.59	19.98	0.01	2.95	0.00	2.95	0.00	0.00	0.00
Dry matter of leaves	18.61	14.53	0.00	7.32	0.00	7.32	0.00	0.00	0.00
Polar diameter	4.99	12.52	10.98	0.39	0.30	0.09	76.90	0.87	17.43
Equatorial diameter	5.31	9.45	5.40	0.25	0.08	0.17	32.72	0.19	3.57
Neck thickness	0.80	25.01	17.86	0.04	0.02	0.02	51.03	0.15	18.75
T.S.S.	21.47	6.40	5.54	1.89	1.41	0.47	74.81	1.83	8.52
Bulb weight	68.96	23.83	15.88	270.07	120.04	150.03	44.45	10.03	14.54
'A' grade bulbs	35.71	29.94	20.47	114.36	53.45	57.91	46.74	7.04	19.71
'B' grade bulbs	26.78	31.68	0.00	72.02	0.00	72.02	0.00	0.00	0.00
'C' grade bulbs	22.02	37.65	13.29	68.76	8.57	60.19	12.47	0.75	3.40
Doubles	25.53	50.94	26.06	169.22	44.31	124.91	26.19	3.59	14.06
Bolters	10.99	87.13	39.17	91.78	18.55	73.23	20.21	1.79	16.28
Marketable yield	59.69	20.78	10.00	153.97	35.65	118.32	23.16	2.85	4.77

*σPh, σeg and σev are phenotypic, genetic and error variance of genotypes respectively; **The selection differential used was 2.00 at 5% selection intensity.

characters studied (data not presented) were higher than the phenotypic correlations. Yield, a poly-genetically controlled character, was significantly and positively associated with plant height, dry matter of leaves, equatorial diameter, bulb weight, percent A grade bulb and marketable yield. These results are in conformity with the finding of Netra Pal *et al.* [3]. Further it was also positively associated with polar diameter, B grade bulb. On the other hand it was significantly and negatively correlated with T.S.S., percent of C grade bulb and bolter. These findings were in agreements with the results of Sidhu *et al.* [4]. Significant association of growth attributes such as plant height, dry matter and yield attributes like equatorial diameter and bulb weight, A grade bulb and marketable yield increase the yield potential. Any improvement in these characters will directly increase the yield potential of the genotypes. Hence, successful exploitation of selection pressure on these attributes will help in improving genotypes. Workers like Patil *et al.* [5] and Netra Pal, *et al.* [3] indicated the same trend. Further it was also mentioned that simple and positive associations with polar diameter and B grade bulb might also enhance the yield. While exercising the selection pressure for the above attributes, which are significantly and positively associated with the yield, must be taken into consideration for exercising selection pressure. Plant height was positively associated with equatorial diameter, T.S.S., A grade bulbs, bolters and marketable yield. These results indicated that increased bulb size, dry matter, A grade bulbs will contribute for increasing the yield. Similarly polar diameter had a significant positive association with bulb weight, 'A' grade bulb and marketable yield. Similar trend was also observed for equatorial diameter. Bulb weight had positive significant association with 'A' grade bulbs and marketable yield. Above results were in close agreement with the findings of Satodia and Singh [6].

The present study indicates that yield improvement could be possible by increasing equatorial diameter and polar diameter of bulb, bulb weight and percent of 'A' grade bulbs.

References

1. **Johnson H. W., Robinson H. F. and R. E. Comstock.** 1955. Estimates of genetic and environmental variability in soyabean. Agron. J., **47**: 314-318.

2. **Mohanty B. K.** 2001. Studies on variability, heritability, interrelationship and path analysis in *kharif* onion. Crop Research, Hissar, 2001, **22**: 251-255; 10 ref.

3. **Netra Pal, Singh N. and Chaudhary B.** 1988. Correlation and path coefficient studies in onion. Indian J. Hort., **45**: 295-299.

4. **Sidhu A. S., Singh S. and Thakur M. R.** 1986. Variability and correlation studies in onion. Indian J. Hort., **43**: 260-264.

5. **Patil J. D. Desale G. Y. and Kale P. N.** 1987. Correlation studies on morphological and storage characters of some onion varieties. J. Maharashtra agric. Univ., **12**: 114-115.

6. **Satodiya B. N. and Singh S. P.** 1997. Association of morphological traits of onion bulbs to storage life. Agricultural Science Digest, Kernal, **17**: 123-125.