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Correlation and path coefficient analysis in onion (*Allium cepa* L. var. *aggregatum* Don.)

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Abstract : A study on the association of metric traits involving twenty aggregatum onion ecotypes (*Allium cepa* L. var. *aggregatum* Don.) revealed that the yield components like plant height, leaf length, leaf breadth, number of leaves, weight of plant, number of bulbs, bulb length, bulb diameter and volume of bulb exhibited significant positive association with yield. These components were also positively inter correlated among themselves. The path coefficient analysis indicated that plant height, leaf breadth, weight of plant, bulb length, shape index, days to maturity and harvest index, had direct positive effect on yield. While leaf length, number of leaves, number of bulbs, bulb diameter, volume of bulb and storage life had negative direct effects. Plant height and weight of plant are dependable indices of selection in identifying the yield potential of individual ecotypes. ***(Key words** : Correlation, Aggregatum onion, Path analysis).*

Onion is a commercially important vegetable crop grown throughout India in an area of 277 thousand ha. Out of the average production of 2934 thousand metric tonnes per annum, part of it is exported and the rest is domestically utilised. In Tamil Nadu, aggregatum onion (*Allium cepa* L.var. *aggregatum* Don.) is grown in an area of 22.30 thousand ha with an average production of 1.85 lakh tonnes per annum. In planning and evaluating a breeding programme for such a crop, the study of correlation co-efficient between co-efficients between yield and its components and their relative contribution to the yield is of great value indicating the association between characters at phenotypic and genotypic level, ultimately helping in selecting for desirable characters. Path coefficient analysis proposed by Wright (1921) facilitates the partioning of correlation coefficients into directs and indirect effects of various characters on yield and other attributes. It also permits to study the specific forces acting to produce a given correlation in correlated variables. Such information on the interrelationship of different traits in aggregatum onion is meagre. However reports pertaining to similar studies in common onion reveal that bulb yield per plant is positively correlated with plant height, leaf length, leaf breadth, number of leaves, bulb diameter, bulb neck thickness and bulb size (Soni *et al.* 1993) and with weight of plant, number of leaves, number of bulbs, bulb density, and shape index for aggregatum onion (Suthanthira Pandian and Muthukrishnan, 1980 and 1982).

Materials and Methods

The material for the present investigation comprised of twenty ecotypes of onion. These were grown in a randomized block design with three replication at the University Orchard, Faculty of Agriculture, Annamali University, Annamali Nagar during 1996-97. The crop was raised during March and normal cultural operations were carried out to ensure a healthy stand. Observations were recorded on plant height, leaf length, leaf breadth and number of leaves at the time of harvest, weight of plant, number of leaves at time of harvest, weight of plant, number of bulbs, bulb yield, bulb length, bulb diameter, shape index, volume of bulb, days to maturity, harvest index and storage life. Correlation coefficients of yield and yield components and intercorrelations among the various components were calculated (Panse and Sukhatme, 1961) and path coefficient analysis was done as proposed by De Way and Lu, (1969).

Results and Discussion

The plant height, leaf length, leaf breadth, number of bulbs, bulb length, bulb diameter and volume of bulb exhibited significant positive correlation with yield as well as between themselves. Hence it can be inferred that selection based on any of these traits either alone or in combination, will result in identifying lines with high yield. Within the yield components, plant height exhibited significant positive association with leaf length, leaf breadth, number of leaves, weight of plant, number of bulbs, bulb yield, bulb length, bulb diameter and volume of bulb. The association of number of bulbs with plant height, leaf length, leaf breadth, number of leaves, weight of plant, bulb yield, bulg length, bulb diameter and volume of bulb was positive and significant. There was no association between days to maturity on one hand and bulb yield and number of bulbs on the other hand indicating that they are independently inhertited. Such a situation is favourable to choose ecotypes with higher yield and more number of bulbs coupled with earliness.

Table 1. Genotypic and phenotypic correlation coefficients (r) between yield and its component characters

	Characters		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Bulb yield	G	1.0000	0.9853**	1.0415**	0.9864**	0.9870**	0.9934**	0.6412**	0.9863**	0.9858**	-0.4614*	0.9930**	-0.4123	0.2814	-0.1066
		P	1.0000	0.8795**	0.8744**	0.7230**	0.7662	0.9916**	0.5343**	0.8907**	0.8274**	-0.3261	0.9339**	-0.2600	0.2055	-0.0739
2.	Plant height at harvest	G		1.0000	1.0077**	1.1249**	0.7071**	1.0198**	-0.5971**	1.0094**	1.0437**	-0.4244	1.0210**	-0.4076	0.3803	-0.1805
		P		1.0000	0.9736**	0.7047**	0.4232	0.8593**	0.4592*	0.8493**	0.7880**	-0.2085	0.8700**	-0.3022	0.2551	-0.0632
3.	Leaf length at harvest	G			1.0000	1.1014**	0.6191**	1.0311**	0.6214**	1.0143**	1.0542**	-0.4237	1.0352**	-0.4292	0.3313	-.01768
		P			1.0000	0.7264**	0.4114	0.8577**	0.4698*	0.8480**	0.7781**	-0.1989	0.8631**	-0.3258	0.2267	-0.9028
4.	Leaf breadth at harvest	G				1.0000	0.6184**	1.0821**	0.5803**	0.9938**	0.9938**	-0.5415**	1.0478**	-0.3625	0.3976	-0.0433
		P				1.0000	0.3977	0.7123**	0.3912	0.7412**	0.7363**	-0.2316	0.7919**	-0.2210	0.1899	-0.0124
5.	No. of leaves at harvest	G					1.0000	0.5263**	0.5298**	0.6361**	0.5348**	-0.0560	0.5024*	-0.6776**	0.0392	-0.3190
		P					1.0000	0.3970	0.3562	0.4754*	0.3616	-0.0052	0.4016	-0.4193	0.0461	-0.1473
6.	Weight of plant	G						1.0000	0.6678**	0.9697**	1.0551**	-0.5271**	0.9966**	-0.4117	0.1761	-0.1136
		P						1.0000	0.5425**	0.8698**	0.8186**	-0.3551	0.9295**	-0.2719	0.0876	-0.0722
7.	Number of bulbs	G							1.0000	0.6588**	0.5291**	-0.2544	0.5740**	-0.3327	-0.1165	-0.1513
		P							1.0000	0.5630**	0.4827*	-0.1642	0.5211**	-0.1773	-0.0505	-0.1240
8.	Bulb length	G								1.0000	0.9456**	-0.2325	0.9122**	-0.5722**	0.3101	-0.3425
		P								1.0000	0.7898**	-0.0928	0.8385**	-0.3520	0.2481	-0.2299
9.	Bulb diameter	G									1.0000	-0.5934**	1.0277**	-0.3425	0.1983	0.0219
		P									1.0000	-0.5267**	0.8840**	-0.1785	0.1698	-0.0103
10.	Shape index	G										1.0000	-0.5540**	0.2836	-0.2235	0.5815**
		P										1.0000	-0.4429*	0.1591	-0.1018	0.2388
11.	Volume of bulb	G											1.0000	-0.2916	0.2281	-0.0647
		P											1.0000	-0.2009	0.1740	-0.0210
12.	Days to maturity	G												1.0000	-0.1064	0.5247**
		P												1.0000	0.0727	0.2362
13.	Harvest index	G													1.0000	0.1742
		P													1.0000	0.0772
14.	Storage life	G														1.0000
		P														1.0000

* Significant at 5% level ** Significant at 1% level