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CORRELATION ANALYSIS ON GROWTH & YIELD ATTRIBUTES IN GARDEN PEA (*PISUM SATIVUM VAR HORTENSE* L.) VARIETIES

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ABSTRACT

In order to evaluate the character association for 14 quantitative Variables in 15 different Genotypes of Garden pea during the Rabi season of 2018–19 and 2019-20 season, a field investigation was conducted at the Experimental field, Department of Horticulture, College of Agriculture, University of Agricultural Sciences, GKVK, Bangalore under Open Field and Shade net Condition. Yield of pods per plant exhibited significant and Positive Correlation with many of yield attributes under both conditions. At phenotypic level, yield per plant exhibited highly significant and positive correlation with weight of pod (0.722), length of pod (0.748), days to last pod picking (0.751), width of Pod (0.768), number of leaves per plant (0.775), height of Plant (0.831), number of primary branches per plant (0.888), length of internode (0.868) under Open field Condition. At phenotypic level, yield of pods per plant exhibited significant and positive correlation with height of Plant (0.705), negatively correlated with days to first flowering (-0.314) and days to maturity of pod (-0.094) under Shade net condition.

Keywords : *Pisum sativum var. hortense* L., Character association, Quantitative traits, Phenotypic correlation.

Introduction

Legume crops such as Garden peas (*Pisum sativum* L.) are cultivated all over the world for both their raw and Processed forms. With an output of 64.99 lakh tonnes, India is the world's second-largest producer of Peas, behind China (FAOSTAT, 2020). The major pea growing states are Uttar Pradesh, Madhya Pradesh, Punjab, Himachal Pradesh, West Bengal and Chhattisgarh. In Madhya Pradesh, pea is covering an area of 106.51 thousand ha and 1113.47 thousand million tonnes production with 10.45 tones/hectare productivity (Anonymous, 2017).

Economic yield is regarded as a superior and intricate characteristic that is the outcome of the multiplicative interaction of factors that contribute to yield. Because yield attributing traits are complex, yield through association studies should be taken into account. Moreover, selection for yield and quality traits can be better achieved if the information with respect to correlation between such traits is also available with a better understanding of the association between the

relevant characters with yield which is provided through path coefficient analysis (Kumar *et al.*, 2015)

Studying correlation coefficients offers the chance to quantify the strength and direction of the relationship between yield and the attributes that contribute to it. Therefore, in order to apply the selection process on highly linked traits to improve the crop's potential yield, the current study was carried out to determine the correlation between various yield-attributing qualities in 15 genotypes of genetically heterogeneous Peas.

Materials and Methods

Experiment material

The goal of the current study was to assess the 15 genotypes (Table 1) of garden pea collected from different places in India and being maintained at main experimental Research station of university of agriculture sciences, Bangalore.

In 2018–19 and 2019–20, the genotypes were sown in three replications using a Randomized Block

Design with a row–row spacing of 30 cm and a plant–plant spacing of 10 cm. Prior to seeding, Nitrogen @25 kg/ha, Phosphorous @75 kg/ha, Potassium @ 50 kg/ha.

The crop was grown using suggested agronomic techniques as outlined in the UAS, G.K.V.K, Bangalore, Package of Practices for Vegetable Crops. By tagging five competitive plants from each plot, observations were made on 15 morphological traits: Height of plant, No. of branches/plant, Days for 50% flowering, No of leaves/plant, Length of internode, Leaf Area/ Plant, Days for first flowering, Days for 50% flowering, Days to first pod picking, Days to maturity of pod, Days to last pod picking, Length of Pod, Width of pod, Weight of pod, Yield of pods per plant

Table 1. List of pea genotypes used in present study

Treatment. No	Varieties of Garden pea
1.	Kashi Mukti
2.	Kashi Ageti.
3.	Kashi Nandhini
4.	Kashi Uday
5.	Pant Sabji Matar-2 (PSM-2)
6.	Pant Sabji Matar-3 (PSM-3)
7.	Pant Sabji Matar-4 (PSM-4)
8.	Pant Sabji Matar-5 (PSM-5)
9.	Arka Karthik
10.	Arka Apoorva
11.	Arka Uttam
12.	Kashi Samridhhi
13.	Kashi Shakti
14.	Pant Uphar
15.	Magadi Local

Correlation analysis

Correlation and path coefficients for all possible combinations were estimated by using formulae suggested by Al-Jibouri *et al.* (1958) and Dewey and Lu *et al.* (1959) respectively.

Results and Discussion

Correlation coefficients obtained for the 14 characters of Garden Peas genotype are presented in Table 2&3 under Open field and Shade net Condition.

Correlation coefficients for Yield and yield attributes in Garden Pea Varieties

Results indicated the phenotypic correlation coefficient among the different characters of garden pea genotypes are presented in Table 2. Height of plant was significantly positively correlated with days to last pod picking (0.645), leaf area (0.688), length of

pod (0.754), weight of pod (0.758), width of Pod (0.776), length of internode (0.807), yield of pods per plant (g) (0.831), and number of primary branches per plant (0.839). These results are in accordance with Singh *et al.* (2018), in field pea, and Pandey *et al.* (2016), in pigeon pea.

Result obtained with regard to days to first flowering was significantly positively correlated with yield of pods per plant (0.354), days to last pod picking (0.683), days to maturity of pod (0.808), days to fifty percent flowering (0.870), days to first pod formation (0.879). These results are in accordance with Patel *et al.* (2006), in field pea, and Pal and Shivendra (2012) and Singh *et al.* (2018), in Garden Peas.

Result obtained with regard to Days to fifty per cent flowering was significantly positively correlated with days to last pod picking (0.685), days to first pod formation (0.789), days to maturity of pod (0.803), days to first flowering (0.870), yield of plant (g) (0.299) and negatively correlated with weight of pod (-0.068). These results were in accordance with Pal and Shivendra (2012) and Singh *et al.* (2018) in Garden Peas.

Result obtained in the present investigation with regard to days to first pod formation was significant and positively correlated with days to fifty per cent flowering (0.789), days to maturity of pod (0.861), days to first flowering (0.879), yield of pods per plant (0.366. But negatively correlated with weight of pod (-0.057) and width of pod (-0.058). These results are in accordance with Patel *et al.* (2006), in Garden Peas. Singh and Sharma, (2019).

Result obtained with regard to days to maturity of pod was significantly positively correlated with days to fifty per cent flowering (0.803), days to first flowering (0.808), days to first pod formation (0.861), days to last pod picking (0.671) and yield of pods per plant (0.344) but negatively correlated with weight of pod (-0.085). These results are in accordance with Singh and Singh (1969) and Togay *et al.* (2008), in Garden Peas.

Result obtained with regard to days to last pod Picking was significantly positively correlated with height of Plant (0.645), days to first flowering (0.683), days to fifty per cent flowering (0.685), Leaf area (0.738), number of leaves per plant (0.763), and yield of pods per palnt (0.751). These results are in accordance with Singh and Singh (1969) and Togay *et al.* (2008), in Garden Peas.

At phenotypic level, yield of pods per plant exhibited highly significant and positive correlation with weight of pod (0.722), length of pod (0.748), days to last pod picking (0.751), width of Pod (0.768),

number of leaves per plant (0.775), height of Plant (0.831), number of primary branches per plant (0.888), length of internode (0.868). These results were in

accordance with Khan *et al.* (2017), in Garden peas and Bhuvanewari *et al.* (2017), in field pea.

Table 2: Correlation Coefficients for Yield and yield attributes in Garden Pea Varieties

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	.839**	.630*	.807**	.688**	0.223	0.145	0.246	0.363	.645**	.754**	.776**	.758**	.831**
2	.839**	1	.616*	.780**	0.498	0.158	0.139	0.277	0.324	.608*	.627*	.764**	.646**	.888**
3	.630*	.616*	1	.683**	.730**	0.467	0.346	0.477	0.469	.763**	.790**	0.401	.547*	.775**
4	.807**	.780**	.683**	1	.522*	0.192	0.085	0.166	0.172	.621*	.749**	.723**	.779**	.868**
5	.688**	0.498	.730**	.522*	1	0.262	0.256	0.189	0.405	.738**	.632*	0.484	.520*	.615*
6	0.223	0.158	0.467	0.192	0.262	1	.870**	.879**	.808**	.683**	0.332	0.024	0.088	0.354
7	0.145	0.139	0.346	0.085	0.256	.870**	1	.789**	.803**	.685**	0.100	0.063	-0.068	0.299
8	0.246	0.277	0.477	0.166	0.189	.879**	.789**	1	.861**	.546*	0.274	-0.057	-0.085	0.366
9	0.363	0.324	0.469	0.172	0.405	.808**	.803**	.861**	1	.671**	0.185	0.027	-0.085	0.334
10	.645**	.608*	.763**	.621*	.738**	.683**	.685**	.546*	.671**	1	.629*	.611*	0.481	.751**
11	.754**	.627*	.790**	.749**	.632*	0.332	0.100	0.274	0.185	.629*	1	.596*	.818**	.748**
12	.776**	.764**	0.401	.723**	0.484	0.024	0.063	-0.057	0.027	.611*	.596*	1	.711**	.768**
13	.758**	.646**	.547*	.779**	.520*	0.088	-0.068	-0.085	-0.085	0.481	.818**	.711**	1	.722**
14	.831**	.888**	.775**	.868**	.615*	0.354	0.299	0.366	0.334	.751**	.748**	.768**	.722**	1

** Significant at 1% probability level

* Significant at 5% probability level

1	Height of plant	5	Leaf Area/ Plant	9	Days to maturity of pod	13	Weight of pod
2	No. of branches /plant	6	Days to first flowering	10	Days to last pod picking	14	Yield of pods/ plant
3	No of leaves/plant	7	Days to 50% flowering	11	Length of Pod		
4	Length of internode	8	Days for first pod picking	12	Width of pod		

Correlation Studies for yield and yield attributes under shade house condition

Correlation coefficients obtained for 14 characters of Garden pea genotype under shade net condition are presented in Table 3.

Result obtained with regard to Height of plant under shade net condition was significantly positively correlated with yield of pods per plant (0.705), leaf area (0.715), width of Pod (0.720), length of internode (0.726), weight of pod (0.848), number of primary branches per plant (0.858), and length of pod (0.583) but negatively correlated with days to maturity of pod (-0.134), days to first flowering (-0.191). These results are in accordance with Sinha *et al.* (2020) and Panchbhaiya *et al.* (2018), in tomato.

Result obtained with regard to Days to first flowering under shade net condition was positively correlated with number of leaves per plant (0.013), days to last pod picking (0.223) and weight of pod (0.153) but negatively correlated with height of plant (-0.191), leaf area (-0.210), number of primary branches per plant (-0.228), width of pod (-0.258), yield of pods per plant (-0.314), length of internode (-0.479). These results are in accordance with Sharma, *et al.* (2019), in tomato.

Result obtained with regard to Days to fifty percent flowering under shade net condition was

significantly positively correlated with days to maturity of pod (0.650), days to last pod picking (0.807) and yield of pods per plant (0.154) but negatively correlated with, length of internode (-0.143). These results are in accordance with Sharma, *et al.* (2019), in tomato

Result obtained with regard to Days to first pod formation under shade net condition was significantly positively correlated with Yield of pods per plant (0.450). Days to 50 percent flowering was negatively correlated with length of internode (-0.044). These results are in accordance with Sinha *et al.* (2020) and Panchbhaiya *et al.* (2018), in tomato.

Result obtained with regard to Days to maturity of pod under shade net condition was significantly positively correlated with days to fifty per cent flowering (0.650) and days to last pod picking (0.789), but negatively correlated with length of internode (-0.66), yield of pods per plant (-0.094). These results are in accordance with Sinha *et al.* (2020), in tomato

Result obtained with regard to Days to last pod picking under shade net condition was significantly positively correlated with days to maturity of pod (0.789), days to fifty per cent flowering (0.807), and yield of pods per plant in g (0.119). These results are in accordance within Panchbhaiya *et al.* (2018), in tomato.

Result obtained with regard to Length of pod under shade net condition was significantly positively correlated with number of primary branches per plant (0.703) width of pod (0.727) and yield of pods/ plant (0.380), but negatively correlated with days to first flowering (-0.461). These results are in accordance with Sinha *et al.* (2020), in tomato.

Width of pod was significantly positively correlated with height of plant (0.720), length of pod (0.727), number of primary branches per plant (0.733), number of leaves per plant (0.795), leaf area (0.838), length of internode (0.840) and yield of pods per plant (0.548) but negatively correlated with days to first flowering (-0.258). These results are in accordance with Sinha *et al.* (2020), in tomato

Weight of pod was significantly positively correlated with height of plant (0.848), number of primary branches per plant (0.784) and yield of pods per plant (0.551). These results are in accordance with Sinha *et al.* (2020), in tomato.

At phenotypic level, yield of pods per plant exhibited significant and positive correlation with height of Plant (0.705), negatively correlated with days to first flowering (-0.314) and days to maturity of pod (-0.094).

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Conclusion

The phenotypic association studies revealed that selection of garden pea genotypes should be done based on highly significant correlation at both levels for improvement of Garden pea.

Table 3 : Correlation coefficients for Yield and yield attributes in Garden Pea Varieties grown under shade house condition

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	.858**	0.488	.726**	.715**	-0.191	0.042	0.064	-0.134	0.176	.583*	.720**	.848**	.705**
2	.858**	1	0.414	.667**	.796**	-0.228	0.112	0.083	0.089	0.305	.703**	.733**	.784**	0.438
3	0.488	0.414	1	.544*	.565*	0.013	0.467	0.167	0.208	.630*	.531*	.795**	0.452	0.455
4	.726**	.667**	.544*	1	.732**	-0.479	-0.143	-0.044	-0.066	0.181	.597*	.840**	.551*	.580*
5	.715**	.796**	.565*	.732**	1	-0.210	0.109	0.039	0.081	0.363	.629*	.838**	.585*	0.488
6	-0.191	-0.228	0.013	-0.479	-0.210	1	0.447	0.056	0.130	0.223	-0.461	-0.258	0.153	-0.314
7	0.042	0.112	0.467	-0.143	0.109	0.447	1	.606*	.650**	.807**	0.015	0.218	0.324	0.154
8	0.064	0.083	0.167	-0.044	0.039	0.056	.606*	1	0.451	0.503	0.033	0.184	0.103	0.450
9	-0.134	0.089	0.208	-0.066	0.081	0.130	.650**	0.451	1	.789**	0.067	0.109	0.054	-0.094
10	0.176	0.305	.630*	0.181	0.363	0.223	.807**	0.503	.789**	1	0.305	.536*	0.281	0.119
11	.583*	.703**	.531*	.597*	.629*	-0.461	0.015	0.033	0.067	0.305	1	.727**	0.447	0.380
12	.720**	.733**	.795**	.840**	.838**	-0.258	0.218	0.184	0.109	.536*	.727**	1	.550*	.548*
13	.848**	.784**	0.452	.551*	.585*	0.153	0.324	0.103	0.054	0.281	0.447	.550*	1	.551*
14	.705**	0.438	0.455	.580*	0.488	-0.314	0.154	0.450	-0.094	0.119	0.380	.548*	.551*	1

** Significant at 1% probability level

* Significant at 5 % probability level

1	Height of plant	5	Leaf Area/ Plant	9	Days to maturity of pod	13	Weight of pod
2	No. of branches/plant	6	Days for first flowering	10	Days to last pod picking	14	Yield of pods per plant
3	No of leaves/plant	7	Days for 50% flowering	11	Length of Pod		
4	Length of internode	8	Days to first pod picking	12	Width of pod		

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