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# Correlation Coefficient and Path Analysis in Table Pea (*Pisum sativumvar. Hortense L.*)

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***Authors' contributions***

*This work was carried out in collaboration among all the authors. Author AG conducted the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors BS and SP managed the analysis of the study. Authors SR and JS managed the literature search. All the authors read and approved the final manuscript.*

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## ABSTRACT

An experiment was layout at the Horticulture Research Centre, SVPUAT, Meerut During 2018-2020 to estimate correlation coefficients and path coefficient analysis in Table pea using 36 genotypes including eight parents and 28 $F_1$ on nine quantitative characters. Correlation coefficient result showed that seed yield per plant have highly significant and positive correlation with number of pods per plant (0.821, 0. 818), length of first fruiting node (0.587, 0.585), number of seeds per pod (0.547, 0.517), days to 50% flowering (0.467, 0.464), plant height (0.447, 0.447), width of pod (0.387, 0.284), length of pod (0.375, 0.363) and number of first fruiting node (0.353, 0.349). Path coefficient result showed that the highest positive direct effect on seed yield per plant was exhibited by several pods per plant, several seeds per pod and days to 50% flowering at both genotypic and phenotypic level.

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## 1. INTRODUCTION

Table pea *(Pisum sativum var.hortense)* is a very common nutritious vegetable grown in winter season throughout the country. It is a self-pollinated crop having chromosome number 2n=2x=14. It is very healthy in terms of nutrition, extensively consumed and most liked in various forms [1]. In India, it is grown in Rabi season in north plains and the hilly regions as a summer vegetable. Green shelled peas are utilized mainly as vegetables, whereas, dried are consumed as a pulse. It also plays an important role in agricultural systems as it enhances soil structure and provides breaks for disease control [2].

In-plant breeding, the correlation coefficient measures the mutual relationship between various plant traits and determines the component and traits on which selection can be based for genetic improvement in yield. The correlation coefficient can be estimated at genotypic and phenotypic levels.

Seed yield is a quantitative parameter afflicted by several factors. Thus, the interrelationships between seed yield and its contributing traits improve breeding efficiency through the use of appropriate selection indices [3]. The path coefficient analysis facilitates the genotypic correlation into the direct and indirect contribution of various characters on seed yield [4].

## 2. MATERIALS AND METHODS

The experimental material comprised of 36 (8 parent and 28 $F_1$) genotypes of table pea which are being maintained at Horticultural Research Centre, SVPUAT, Meerut(U.P.).The experiment was conducted in Randomized Complete Block Design with three replications during *Rabi* season in 2018-2020 to assess correlation coefficient and path analysis. Sowing was done with the spacing of 45 cm plant to plant and 10 cm from seed to seed. All the recommended agronomic package of practices and plant protection measures were followed to raise a healthy crop. Observations were recorded on five randomly selected plants from each treatment in each replication for days to 50% flowering, plant height (cm), number of first fruiting node, length of the first fruiting node (cm), number of pods per plant, length of a pod (cm), the width of a pod (cm), no. of seeds per pod, seed yield per plant (g). The correlations between different characters at the genotypic and the phenotypic level were suggested by Searle [5]. Path-coefficient was carried out as analysis suggested by Wright [6] and as elaborated by Dewey and Lu [7].

## 3. RESULTS AND DISCUSSION

The correlation coefficients between the different characters were analysed at both genotypic and phenotypic levels presented in Tables 1 and 2 respectively. In the present investigation, in general, the magnitude of genotypic correlation coefficients was higher than the phenotypic correlation coefficients. This designated a strong genetic association between the traits and the phenotypic expression which was suppressed due to environmental influence. Similar findings had also been reported by Davi et al. [8], Singh et al. [9] and Lal et al. [10]. In the present study, the correlation coefficient was estimated between nine characters. At both genotypic and phenotypic level, Seed yield per plant has a highly significant and positive correlation with several pods per plant, length of first fruiting node, number of seeds per pod, days to 50% flowering, plant height, the width of a pod, length of pod and number of the first fruiting node. Thus, it showed that these traits are useful for taking them as the basis of selection for high yielding genotypes. Comparable results were reported by Pal and Singh [11] was observed highly significant correlation with days to 50 per cent flowering, the number of seeds/ pod and number of pods/plants. Selvi et al., [12] was noted a significant correlation for days to 50% flowering, pod length, number of pods/plants. Similarly, Pandey et al. [13] noted for several green pods, number of node per plant, length of a pod (cm), plant height (cm). Srivastava et al. [14] exhibited positive and highly significant correlation with 100 seed weight, number of pods per plant, number of seeds per pod and biological yield (g).

In the present study, path coefficient analysis showed that direct and indirect effect at the genotypic level was slightly higher as compared to direct and indirect effect at the phenotypic level which is presented in Tables 3 and 4 respectively. Path coefficient analysis revealed a highest positive direct effect on seed yield per plant was exhibited by several pods per plant, the number of seeds per pod and days to 50% flowering at both phenotypic and genotypic level. These findings were earlier reports of Sharma et

al. [15] observed that seed yield was the positive direct effect with the number of pods per plant and plant height. Rahman et al. [16] result showed that positive direct effect by the number of pods per plant, pod length, number of seeds per pod, days to 50 per cent flowering, Singh et al. [17] observed that direct positive effect on seed yield per plant was found by green pod yield/plant, number of first fruiting node, length of the pod, days to 50% flowering and plant height. Khan et al. [18] was noted direct effect by plant height, internodes length, hundred seed weight, number of seeds pod and seeds plant. Highly positive indirect effects on seed yield per plant are exhibited by days to 50% flowering, plant height, number of first fruiting node, number of pods per, number of seeds per pod at both phenotypic and genotypic level. Alike results were formerly stated by Kumar and Sharma [19], Togay et al. [20], Sharma et al. [15]. Those

**Table 1. Estimates of the genotypic correlation coefficient between different characters in pea**

| S. No. | Characters | DF | PH | NFFN | LFFN | NPP | LP | WP | NSP | SY |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DF | 1.000 | -0.026 | -0.178 | 0.051 | 0.191* | -0.223* | 0.163 | 0.077 | 0.467** |
| 2 | PH | | | 0.708** | 0.709** | 0.736** | 0.471** | 0.422** | 0.259** | 0.447** |
| 3 | NFFN | | | | 0.654** | 0.660** | 0.672** | 0.159 | 0.355** | 0.353** |
| 4 | LFFN | | | | | 0.838** | 0.664** | 0.250** | 0.231* | 0.587** |
| 5 | NPP | | | | | | 0.650** | 0.371** | 0.435** | 0.821** |
| 6 | LP | | | | | | | 0.276** | 0.286** | 0.375** |
| 7 | WP | | | | | | | | 0.546** | 0.387** |
| 8 | NSP | | | | | | | | | 0.547** |
| 9 | SY | | | | | | | | | 1.000 |

*DF- Days to 50% flowering, PH-Plant height (cm), NFFN- Number of first fruiting node, LFFN- Length of first fruiting node, NPP- No. of pods per plant, LP- Length of pod, WP- Width of pod, NSP- No. of seeds per pod, SY- Seed yield per plant (g)*

**Table 2. Estimates of phenotypic correlation co-efficient between different characters in pea**

| S. No. | Characters | DF | PH | NFFN | LFFN | NPP | LP | WP | NSP | SY |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DF | 1.000 | -0.026 | -0.173 | 0.050 | 0.190* | -0.211* | 0.117 | 0.070 | 0.464** |
| 2 | PH | | | 0.699** | 0.706** | 0.734** | 0.454** | 0.315** | 0.247* | 0.447** |
| 3 | NFFN | | | | 0.645** | 0.649** | 0.634** | 0.121 | 0.337** | 0.349** |
| 4 | LFFN | | | | | 0.831** | 0.641** | 0.176 | 0.218* | 0.585** |
| 5 | NPP | | | | | | 0.625** | 0.285** | 0.410** | 0.818** |
| 6 | LP | | | | | | | 0.156 | 0.272** | 0.363** |
| 7 | WP | | | | | | | | 0.399** | 0.284** |
| 8 | NSP | | | | | | | | | 0.517** |
| 9 | SY | | | | | | | | | 1.000 |

*DF- Days to 50% flowering, PH-Plant height (cm), NFFN- Number of first fruiting node, LFFN- Length of first fruiting node, NPP- No. of pods per plant, LP- Length of pod, WP- Width of pod, NSP- No. of seeds per pod, SY- Seed yield per plant (g)*

**Table 3. Path coefficient analysis at the genotypic level on seed yield per plant (g)**

| S. No. | Characters | DF | PH | NFFN | LFFN | NPP | LP | WP | NSP | R with SY |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DF | 0.224 | 0.003 | 0.029 | -0.001 | 0.182 | 0.015 | -0.005 | 0.019 | 0.467** |
| 2 | PH | -0.006 | -0.134 | -0.117 | -0.018 | 0.702 | -0.032 | -0.014 | 0.065 | 0.447** |
| 3 | NFFN | -0.040 | -0.095 | -0.165 | -0.017 | 0.630 | -0.045 | -0.005 | 0.089 | 0.353** |
| 4 | LFFN | 0.011 | -0.095 | -0.108 | -0.026 | 0.799 | -0.044 | -0.008 | 0.058 | 0.587** |
| 5 | NPP | 0.043 | -0.098 | -0.109 | -0.022 | 0.954 | -0.043 | -0.012 | 0.109 | 0.821** |
| 6 | LP | -0.050 | -0.063 | -0.111 | -0.017 | 0.620 | -0.067 | -0.009 | 0.072 | 0.375** |
| 7 | WP | 0.037 | -0.056 | -0.026 | -0.006 | 0.354 | -0.018 | -0.033 | 0.137 | 0.387** |
| 8 | NSP | 0.017 | -0.035 | -0.059 | -0.006 | 0.415 | -0.019 | -0.018 | 0.251 | 0.547** |

*Resi = 0.145, DF-Days to 50% flowering, PH-Plant height (cm), NFFN- Number of the first fruiting node, LFFN- Length of first fruiting node, NPP- No. of pods per plant, LP- Length of a pod, WP- Width of a pod, NSP- No. of seeds per pod, SY- Seed yield per plant (g)*

**Table 4. Path coefficient analysis at the phenotypic level on seed yield per plant (g)**

| S. No. | Characters | DF | PH | NFFN | LFFN | NPP | LP | WP | NSP | R with SY |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DF | 0.229 | 0.004 | 0.024 | -0.001 | 0.179 | 0.015 | -0.003 | 0.016 | 0.464** |
| 2 | PH | -0.006 | -0.146 | -0.098 | -0.012 | 0.693 | -0.033 | -0.009 | 0.057 | 0.447** |
| 3 | NFFN | -0.040 | -0.102 | -0.140 | -0.011 | 0.612 | -0.046 | -0.003 | 0.078 | 0.349** |
| 4 | LFFN | 0.011 | -0.103 | -0.090 | -0.017 | 0.785 | -0.046 | -0.005 | 0.050 | 0.585** |
| 5 | NPP | 0.044 | -0.107 | -0.091 | -0.014 | 0.944 | -0.045 | -0.008 | 0.095 | 0.818** |
| 6 | LP | -0.048 | -0.066 | -0.089 | -0.011 | 0.590 | -0.072 | -0.004 | 0.063 | 0.363** |
| 7 | WP | 0.027 | -0.046 | -0.017 | -0.003 | 0.269 | -0.011 | -0.028 | 0.093 | 0.284** |
| 8 | NSP | 0.016 | -0.036 | -0.047 | -0.004 | 0.387 | -0.020 | -0.011 | 0.232 | 0.517** |

*Rsi=0.1599, DF-Days to 50% flowering, PH-Plant height (cm), NFFN- Number of first fruiting node, LFFN- Length of the first fruiting node, NPP- No. of pods per plant, LP- Length of a pod, WP- Width of a pod, NSP- No. of seeds per pod, SY- Seed yield per plant (g)*

characters were impacted seed yield via other characters, will be given importance while improving the yield in pea. The residual effect are 0.145 and 0.1599 for seed yield per plant at genotypic and phenotypic level respectively, which is considered to be little signifying traits studied were adequate to study the variability in seed yield *i.e.* dependent character.

## 4. CONCLUSION

The present study revealed that seed yield per plant was effected by days to 50% flowering, number of pods per plant, number of seeds per pod which had a high positive correlation and high positive direct effect which mean through breeding these characters will be effective for improvement of seed yield per plant.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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