

Short Communication

Correlation and path analysis in fieldpea

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Pea (*Pisum sativum* L.) var. *arvenses* is the second most important food legume of the world. It is generally a cold weather crop and can withstand light frost. To increase the grain yield, it is essential to study the correlation of grain yield with component traits and their effect on yield through path analysis so as to use them in indirect selection.

Forty-seven divergent genotypes were planted in *rabi* 2001-2002 at Main Pulses Research Station, SDAU, Sardarkrushinagar. The experiment was laid out in a simple lattice design with four replications. Each plot consisted of two rows of three-meter length. The distance between rows and within rows were 60 cm and 10 cm, respectively and recommended cultivation practices were followed. Five random plants per plot were selected for recording observations like plant height (cm), pods per plant, branches per plant, pod length (cm), seeds per pod, 100-seed weight (g), and straw and seed yield per plant. Days to flowering

were recorded on the basis of 50% flowering plants observed in each plot and days to maturity was recorded on the basis of 80% of plant's pods matured in each plot.

Inter-relationships among yield and yield attributing characters (1) and their direct and indirect effects were computed to ascertain the effectiveness of each of the casual factors as per the method described by Dewey and Lu (2).

Mean squares for yield and component traits indicated that genotypes were variable in their genetic make up for almost all the traits under study. The results showed that the values of genotypic correlations were higher than the phenotypic correlations among all the combinations except yield per plant with branches per plant, pod length, seeds per pod, 100-seed weight and harvest index, which would be due to the masking or modifying effects of the environments. Yield per plant was found positively correlated with pods per plant, branches per

Table 1. Genotypic (G) and phenotypic (P) correlation coefficients in fieldpea

| Character | | Days to flowering | Days to maturity | Plant height | No. of pods per plant | Branches per plant | Pod length | No. of seeds per pod | 100-seed weight | Harvest index | Shelling per cent |
|--------------------|---|-------------------|------------------|--------------|-----------------------|--------------------|------------|----------------------|-----------------|---------------|-------------------|
| Yield per plant | G | -0.122 | 0.352 | 0.265 | 0.744 | 0.167 | 0.192 | 0.100 | -0.216 | -0.061 | 0.807 |
| | P | -0.058 | 0.186** | 0.155* | 0.629** | 0.322** | 0.228** | 0.176* | 0.015 | 0.041 | 0.716** |
| Days to flowering | G | | 0.651 | 0.069 | 0.293 | 0.720 | 0.586 | 0.120 | -0.570 | -0.716 | 0.035 |
| | P | | 0.600** | 0.061 | 0.176* | 0.408** | 0.313** | 0.041 | -0.460** | -0.430** | 0.007 |
| Days to maturity | G | | | 0.372 | 0.736 | 0.883 | 0.448 | -0.091 | -0.683 | -0.821 | 0.465 |
| | P | | | 0.366* | 0.393** | 0.479** | 0.247** | 0.009 | -0.528** | -0.501** | 0.191** |
| Plant height (cm) | G | | | | 0.286 | -0.142 | -0.089 | -0.097 | 0.061 | -0.369 | 0.716 |
| | P | | | | 0.212** | -0.033 | -0.012 | 0.018 | 0.015 | -0.274** | 0.246** |
| Pods per plant | G | | | | | 0.628 | 0.255 | -0.262 | -0.632 | -0.576 | 0.772 |
| | P | | | | | 0.516** | 0.250** | -0.077 | -0.296** | -0.243** | 0.421** |
| Branches per plant | G | | | | | | 0.487 | -0.108 | -0.757 | -0.652 | 0.247 |
| | P | | | | | | 0.181* | -0.009 | -0.397** | -0.271** | 0.215** |
| Pod length | G | | | | | | | 0.619 | -0.228 | -0.731 | -0.005 |
| | P | | | | | | | 0.421** | -0.024 | -0.195** | 0.098 |
| Seeds per pod | G | | | | | | | | 0.069 | -0.227 | 0.228 |
| | P | | | | | | | | 0.125 | -0.028 | 0.126 |
| 100-seed weight | G | | | | | | | | | 0.630 | -0.250 |
| | P | | | | | | | | | 0.448** | -0.007 |
| Harvest index | G | | | | | | | | | | -0.129 |
| | P | | | | | | | | | | -0.019 |

*and **significant at 5 and 1% levels.

Table 2. Path coefficient analysis showing direct (bold letter) and indirect effects of component traits on grain yield in fieldpea

| Character | Days to 50% flowering | Days to maturity | Plant height | Pods per plant | Branches per plant | Pod length | Seeds per pod | 100-seed weight | Harvest index | Shelling percentage |
|-----------------------|-----------------------|------------------|---------------|----------------|--------------------|---------------|---------------|-----------------|---------------|---------------------|
| Days to 50% flowering | -0.008 | -0.370 | -0.002 | 0.276 | 0.447 | -0.583 | 0.071 | -0.477 | 0.634 | 0.017 |
| Days to maturity | 0.005 | -0.568 | -0.012 | 0.693 | 0.548 | -0.447 | -0.054 | -0.551 | 0.727 | 0.227 |
| Plant height (cm) | -0.001 | -0.211 | -0.033 | 0.269 | -0.088 | 0.079 | -0.005 | 0.049 | 0.319 | 0.349 |
| Pods per plant | -0.003 | -0.418 | -0.010 | 0.941 | 0.390 | -0.254 | -0.155 | -0.510 | 0.510 | 0.377 |
| Branches per plant | -0.006 | -0.502 | 0.005 | 0.591 | 0.621 | -0.485 | -0.064 | -0.611 | 0.578 | 0.120 |
| Pod length | -0.005 | -0.255 | 0.003 | 0.240 | 0.302 | -0.997 | 0.365 | -0.184 | 0.648 | -0.002 |
| Seeds per pod | -0.001 | 0.052 | -0.001 | -0.247 | -0.067 | -0.617 | 0.589 | 0.055 | 0.201 | 0.111 |
| 100-seed weight (g) | 0.005 | 0.388 | -0.002 | -0.595 | -0.470 | 0.227 | 0.040 | 0.807 | -0.558 | -0.122 |
| Harvest index | 0.006 | 0.466 | 0.012 | -0.542 | -0.405 | 0.729 | -0.134 | 0.509 | -0.886 | -0.063 |
| Shelling percentage | 0.000 | -0.265 | -0.024 | 0.728 | 0.153 | 0.005 | 0.134 | -0.202 | 0.114 | 0.487 |

Residual effect = 0.5747; * Significant at P=0.05 and ** significant at P = 0.01

plant, pod length, days to maturity and shelling percentage at genotypic and phenotypic levels. Similar relationships have also been reported earlier (3,6).

100-seed weight was negatively correlated with yield per plant at genotypic level indicating bold seeded genotypes were lower yielders. Days to flowering and maturity were positively correlated with pods per plant, branches per plant and pod length at genotypic and phenotypic levels and negatively correlated with 100-seed weight and harvest index at both the levels, indicating late genotypes had more pods, branches and pod length. Pods per plant were positively correlated with branches per plant and pod length and negatively correlated with seeds per pod, 100-seed weight and harvest index.

Path coefficient analysis provided an effective means of untangling direct as well as indirect causes of association. It permits a critical examination of specific forces acting to produce a given correlation and measures the relative importance of each of the casual factors. Strong positive direct effect of pods per plant (0.941) followed by 100-seed weight (0.807), branches per plant (0.621), seeds per pod (0.589) and shelling percentage (0.487) earlier indicated their maximum contribution towards yield. Same trend was also reported earlier (4, 5). Harvest index, days to maturity, days to flowering, pod length and plant height had shown indirect positive effects on yield. Negative direct effect on yield was observed with pod length, harvest index and plant height, indicating that direct selection of these characteristics may not be increasing

yield but selection can be made effective via indirect positive effect of characters viz., harvest index, 100-seed weight and pod length. Pods per plant, branches per plant, harvest index, shelling percentage and days to maturity showed positive indirect effect via 100-seed weight. Path coefficient analysis revealed that pods per plant, branches per plant, shelling percentage and harvest index should be given more emphasis in selection programme of peas.

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