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# STUDY OF DIRECT AND INDIRECT INFLUENCES OF SOME YIELD, QUALITY AND PHYSIOLOGICAL CHARACTERS ON GRAIN YIELD IN PEA (*Pisum Sativum L.*)*

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The genotypic correlation coefficient of some yield, quality and physiological components with grain yield were partitioned into direct and indirect effects in two different crosses of pea. Pods per plant, days to flowering and seed number per pod in cross 'T-163 X EC-33866' and days to maturity, pods per plant and specific leaf weight in cross 'T-163 X 485' were observed as direct component affected the grain yield to a great extent.

The technique of path analysis introduced by wright (1981) has been used widely in attempting to elucidate patterns of association for traits such as components of yield. This analysis provides clearcut picture of the relative importance of direct and indirect effects. The present investigation was undertaken to findout the direct and indirect influences of different characters with grain yield in pea (*pisum sativum L.*).

## MATERIALS AND METHODS

The experiment material comparised two different triple test cross progenies (Kearsey and Jinks, 1968) developed from the crosses of pea (T-163 x EC-33866; T-163 x 485). 120 families was sown in R.B.D. with 3 replications at New Dairy Farm of C.S.A. University of Agricultural and Technology, Kanpur during 1980–81. Row to row and plant to plant spacings were kept 60 cm and 15 cm respectively. Data on 5 competative plants were recorded for days to flowering (DF), days to maturity (DM), specific leaf weight (SLW), pods per plant, seeds per pod, harvest index (HI), 100-seed weight (100 SW), seed water absorption capacity (SWAC) and time of cooking (TC) and grain yield. Genotypic correlation of different characters with grain yield were partitioned into direct and indirect effects in both crosses (Dewey and Lu. 1959).

## RESULTS AND DISCUSSION

The path coefficient analysis among nine characters and yield in two different crosses of pea are given in Table 1 a, 1 b. In T–163 X EC-33866 cross pods per plant had high direct effect on

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Table 1 a : Correlation coefficient along with direct and indirect effects of different characters on grain yield in pea cross T-163 X EC-33866

| Characters | DF | DM | SLW | Pods/ plant | Seeds/ pod | HI | 100 SW | SWAC | TC | Genotypic correlation with grain yield |
|---|---|---|---|---|---|---|---|---|---|---|
| DF | *1.3290* | —1.0949 | —0.0995 | 1.4963 | —0.5038 | 0.0043 | —0.0853 | 0.1040 | —0.1783 | 0.972 |
| DM | 1.2898 | *—1.1282* | —0.1733 | 1.7513 | —0.4989 | 0.0045 | —0.0706 | 0.1175 | —0.1746 | 1.117 |
| SLW | 0 2805 | —0.4147 | *—0.0321* | 0.9246 | —0.1655 | 0.0021 | 0.0785 | —0.0529 | —0.1281 | 0.492 |
| Pods/Plant | 1.1283 | —1.1209 | —0.2473 | *1.7627* | —0 5293 | 0.0046 | 0.0074 | 0.1085 | —0.1363 | 0.968 |
| Seeds pod | —1.0782 | 0.9064 | 0 1256 | —1.5310 | *0.6210* | —0.0039 | —0.0252 | —0.0336 | 0.2539 | —0.765 |
| HI | —1.5375 | 1.3600 | 0.2622 | —2.1823 | 0.6648 | *—0.0037* | 0.0685 | —0.1162 | 0.2156 | —1.268 |
| 100 SW | 0.4862 | —0.3414 | 0.1586 | —0.0559 | 0.0670 | 0.0011 | *—0.2330* | 0.1754 | 0.0990 | 0.356 |
| SWAC | —0.4612 | 0.4418 | —0.0832 | —0.6378 | 0.0696 | —0.0014 | — 0.1365 | *0.2998* | 0.1610 | —0.675 |
| TC | 3.6718 | —3.0515 | —0.9351 | 3.7069 | —2.4426 | 0.0124 | 0.3585 | 0.2479 | *—0.0645* | 2.003 |

Residual effect = 0.0246

*Italics* denote direct effect

DF = Days to flowering
DM = Days to maturity
SLW = Specific leaf weight
HI = Harvest index

100 SW = 100—Seed Weight
SWAC = Seed water absorption capacity
TC = Time of cooking

Table 1 b: Correlation co-efficient along with direct and indirect effects of different characters on grain yield in pea cross T-163 x 485.

| Characters | DF | DM | SLW | Pods/ plant | Seeds/pod | HI | 100 SW | SWAC | TC | Genotypic correlation with grain yield |
|---|---|---|---|---|---|---|---|---|---|---|
| DF | — *0.8525* | 0.6097 | 0.3770 | —0.0878 | —0.3629 | 0.0482 | —0.6725 | —0.0317 | 0.6854 | 0 025 |
| DM | — 0.8837 | *0.5882* | 0.1328 | —0.361 | —0.4947 | —0.0189 | —0.0521 | 0.0193 | 0.7925 | 0.047 |
| SLW | — 0.0598 | 0.1452 | *—0.0263* | —0.0060 | —0.1713 | 0.0283 | 0.0001 | —0 0118 | —0.1906 | —0.0229 |
| Pods/plant | 0.4913 | —0.3234 | —0.0498 | *0.0665* | 0.6347 | 0.0493 | 0.0014 | —0.0191 | 0.0054 | 0.859 |
| Seed/pods | — 0.2972 | 0.2794 | 0.0884 | —0.0400 | *—1.0412* | 0.0628 | 0.0874 | 0.1326 | 0.3240 | —0.529 |
| HI | + 0.2677 | 0.0715 | —0.0997 | —0.0208 | —0.4207 | *—0.1563* | 0.0213 | 0.0265 | 0.2813 | —0.029 |
| 100 SW | — 0.4763 | 0.2368 | —0.0806 | —0.0022 | 0.7016 | 0.8256 | *—0.1298* | —0.2079 | 0.3240 | 0.494 |
| SWAC | 0.0747 | 0.0313 | —0.0175 | —0.0032 | —0.3816 | —0.0114 | 0.0746 | *0.3167* | —0.3673 | —0.239 |
| TC | 0.5900 | —0.4707 | 0.0980 | —0.0003 | 0.3406 | 0.0442 | 00.4555 | 0.1341 | *—0.9902* | —0.209 |

Residual effect = 0.4476

*Italics* denote direct effect.

grain yield followed by days to flowering and seed number per pod. The maximum direct positive response of pods per plant might be attributed to the indirect effects via harvest index, 100-seed weight and seed water absorption capacity. The days to flowering had positive direct effect on grain yield as manifested by high value of positive correlation. However, days to maturity, specific leaf weight, harvest index, 100-seed weight, seed water absorption capacity and time of cooking have no direct effect on grain yield. It is interesting to note that though time of cooking had no direct effect on grain yield, its indirect effect through pods per plant is very high. In T-163 X 485 cross grain yield was mainly influenced by days to maturity, seed water absorption capacity, pods per plant and specific leaf weight. While negative direct effect on grain yield was observed by seeds per pod, time of cooking, days to flowering, harvest index and 100 seed weight. The residual effect of T163 x EC-33866 was 0.0246 and T-163 X 485 was 0.4476 also revealed that beside these characters other component characters also influenced the grain yield and due consideration should be given to those characters.

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