CHARCTERS ASSOCIATION AND PATH ANALYSIS OF PEANUT

(ARACHIS HYPOGAEA L.) FOR POD YIELD

BILAWAL RASHEED¹, HAROON -UR-RASHEED², ABID FARID³ & AYUB KHAN⁴

¹,²Department of Agriculture, University of Haripur, Khyber Pakhtunkhwa, Pakistan
³,⁴Department of Environmental Sciences, COMSATS, Abbott bad, Khyber Pakhtunkhwa, Pakistan

ABSTRACT

Groundnut (Arachis hypogaea L.) also known as Peanut is one of the essential oilseed crop grown in Pakistan. The present study design to valuation the correlation amongst different traits for instance (sound mature kernel %, plant height, pod plant¹ kernel pod¹, shelling %, 100 kernel weight, 20 pods length) on pod yield of groundnut. Thirteen diverse origin genotypes of groundnut comprised ICGV-886464, ICGV-93163, ICGV-92001, Commet-73, ICGV-92028, ICGS-108, ICGV-93128, ICGV-93125, PI-139921, ICGS-45, PG-479, ICGV-92050, ICGS-08 being the part of this experiment was shown on May 20, 2007 at ARINM, Swat, Khyber Pakhtunkhwa. The current finding from experiment exhibited that sound mature kernel% had a positive and significant correlation with pod yield, however, plant height, pod plant¹ and shell %revealed positive and non-significant correlation with pod yield but kernelplant¹, 100 kernel weight and 20 pods length displayed negative and non-significant association with pod yield. Path analysis show that the contribution of character viz, Sound Mature Kernel%, pod plant¹, 100 Kernel Weight and 20 Pods Length was in positive direction, Therefore, these character were identified to be the important character which could be used in selection for yield.

KEYWORDS: Groundnut, Genotypes, Khyber Pakhtunkhwa, Pakistan

INTRODUCTION

Groundnut (Arachis hypogaea L.) also known as Peanut is one of the essential oil seed crop grown in Pakistan. Round the world it is cultivated at approximately 90 countries Thakur et al., (2015). Its 4th position in oilseed crop and 13th in food crop globally, Shinde et al., (2014). During 2013-14 groundnut was cultivated in 91 thousand hectares (area) with 95 thousand tons (production) annum⁻¹ (Anonymous). It is self-pollinated related to family Leguminosae (Fabaceae). Its chromosome no is 2n=40 Patidaret et al., (2014). It essentiality inhuman food is due to calcium, iron and vitamin B complex like thiamine, niacin, riboflavin and vitamin A, and also includes an average 47% of fat and 25% of protein Shinde et al., (2014). It is mainly grown for grain yield however its haulm is important for livestock feed.Dinet et al., (2012).

examined the Pod yield shown significantly positive genotypic association with traits such as number of pods plant$^{-1}$ and pod yield. Similarly, number of pod plant$^{-1}$ revealed positive direct effect on pod yield and 100 kernel weight. Thakur et al., (2013) examined the trait and find that pod yield reveal positively highly significant correlation with pod length and sound matured kernel%, whereas negatively highly significant correlation was shown with pod plant$^{-1}$ and shelling %. Similarly, pod length and kernel length shown that pod yield in positive direction. Khan et al., (2012) evaluated 49 groundnut genotypes for their physiological efficiency, significant and positive correlation was examined between pod yield and harvest index, however significant and negative correlation was noted between haulm yield and harvest index. Pod yield show positive significant association with 100-kernel weight, sound mature kernels%, shelling% and oil content.

**MATERIALS AND METHODS**

The present study covers thirteen assorted origin groundnut genotypes included ICGV-886464, ICGV-93163, ICGV-92001, Commet-73, ICGV-92028, ICGS-108, ICGV-93128, ICGV-93125, PI-139921, ICGS-45, PG-479, ICGV-92050, ICGS-08. The experiment was shown on May 20, 2007 at ARINM, Swat, Khyber Pakhtunkhwa. Randomized Complete Block experimental design having four replications was used. A plot size of 4 x 0.45m, containing a single row was conserved for individually genotype. Fertilizer was applied at a proportion of N: P$_2$O$_5$: K$_2$O 25: 60:60 kg ha$^{-1}$ respectively, at the stage of sowing. All recommended agronomic measurements were adopted accordingly. Quantitative traits from five randomly selected plants to each plot of the replication were noted at the time of harvesting. Statistics observations on eight given traits include pod yield and its components include sound mature kernel %, plant height (cm), pod plant$^{-1}$ kernel pod$^{-1}$, shell %, 100 kernel weight (gm), and 20 pods length (cm) were observed.

**Statistical Analysis**

Correlation coefficients and Path Analysis were worked out by using SPSS v.21 statistical computer software and Microsoft Excel respectively.

**RESULT AND DISCUSSIONS**

**CORRELATION**

**Sound Mature Kernel%**: It showed a positive and significant association with pod yield, indicating that increase in sound mature kernel % would increase pod yield. While positive and non-significant correlation was observed in plant height, pod plant$^{-1}$ and kernel plant$^{-1}$. Whereas shelling %, 100 kernel weight and 20 pods length display negative and non-significant association with sound mature kernel%. The similar finding was perceived from Thakur et al., (2013) that sound mature kernel % show negative association with shelling%. From research findings of Parameshwarappa et al., (2005) and Patil et al., (2006) show positive correlation with pod yield.

**Plant Height**: Positive and non-significant correlation was seemed in 100 kernel weight and pod yield, whereas other trait include pod plant$^{-1}$, kernel plant$^{-1}$, shelling % and 20 pods length show negative and non-significant association with plant height. The present result also association with the previous finding of Jonah et al., (2010) that plant height showed positive correlation with pod yield.

**Pod Plant$^{-1}$**: according to the examined data positively highly significant correlation was seemed in shelling %. Pod Plant$^{-1}$ display positive and non-significant correlation with plant height whereas kernel plant$^{-1}$, 100 kernel weight and
20 pods length show negative and non-significant association. The present finding also associated with the previous finding of Shah et al., (1993) and Celal et al., (2004) that pods plant\(^{-1}\) is positively correlated with pod yield. Pod yield revealed significant and positive correlations with pods plant\(^{-1}\) found by Chishti et al., (2000); Sadeghi et al., (2012) and Makinde et al., (2013).

**Kernel Pod\(^{-1}\):** Shelling %, 100 kernel weight and 20 pods length show positive and non-significant association with kernel pod\(^{-1}\), whereas pod yield produced negative and non-significant correlation in such condition.

**Shelling %:** Pod yield show positively non-significant variation but 100 kernel weight and 20 pods length display negatively non-significant correlation with shelling %. Patil et al., (2006) in the present study, shelling % had positively association with pod yield.

**100 Kernel Weight:** Positively and negatively non-significant outcome obtained from 20 pods length and pod yield respectively. Thakur et al., (2013) 100-kernel weight show negatively associated with pod yield.

**20 Pods Length:** Negatively non-significant differences observed between 20 pods length and pod yield. Thakur et al., (2013) display that Pod plant\(^{-1}\) show negatively correlation with 20 pod length.

### Table 1: Genotypic Correlation Coefficients among Yield and Its Components in Groundnut

<table>
<thead>
<tr>
<th>Character</th>
<th>Sound mature Kernel%</th>
<th>Plant Height</th>
<th>Pod Plant(^{-1})</th>
<th>Kernel Plant(^{-1})</th>
<th>Shell %</th>
<th>100 Kernel Weight</th>
<th>20 Pods Length</th>
<th>Pod Yield (Kgha(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound Mature Kernel%</td>
<td>.324</td>
<td>.262</td>
<td>.159</td>
<td>-.049</td>
<td>-.220</td>
<td>-.064</td>
<td>.653</td>
<td></td>
</tr>
<tr>
<td>Plant Height</td>
<td>.281</td>
<td>.387</td>
<td>.604</td>
<td>.875</td>
<td>.469</td>
<td>.836</td>
<td>.015</td>
<td></td>
</tr>
<tr>
<td>Pod Plant(^{-1})</td>
<td>-.196</td>
<td>-.032</td>
<td>-.422</td>
<td>.179</td>
<td>-.137</td>
<td>.037</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shell %</td>
<td>.521</td>
<td>.917</td>
<td>.150</td>
<td>.559</td>
<td>.655</td>
<td>.903</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 Kernel Weight</td>
<td>-.036</td>
<td>.755</td>
<td>-.355</td>
<td>-.539</td>
<td>.344</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 Pods Length</td>
<td>.906</td>
<td>.003</td>
<td>.234</td>
<td>.057</td>
<td>.249</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Correlation is significant at 0.05 level, = Significant at 0.05 probability level, NS = Non-significant

### PATH ANALYSIS

Path analysis revealed maximum positive direct contribution toward pod yield by 20 Pods Length (0.2622), 100 Kernel Weight (0.2809), Pod Plant\(^{-1}\) (0.3992) and Sound Mature Kernel% (0.7719). This positive direct contributor character would advance the pod yield of groundnut genotypes.

The direct positive effect of Pods Length and Sound Mature Kernel% be in agreement with the observation of Jonah et al., (2010) and Zamanet al., (2011) respectively. However, the maximum negative direct contribution was contributed by shelling % (-0.0999), Plant Height (-0.2072) and Kernel Plant\(^{-1}\) (-0.5199) shown in (Table 2). Similar finding of negative direct effect of Plant Height was noticed by Zamanet al., (2011).
Sound Mature Kernel % Vs. Pod Yield

The positive direct effect of Sound mature kernel % on grain yield was (0.7719). The selection of these character consistent for crop improvement program. In case of indirect effect through plant height, Pod plant-1 and Kernel pod-1 was positive and the collection of such character will be significant. From the previous finding of Patil et al., (2006) show that sound mature kernel % had direct contribution on pod yield.

Plant Height vs. Pod Yield

The negative direct contribution was seemed in such case, i.e. (-0.2072). The indirect effect of Pod Plant-1, Kernel Plant-1, Shell % and 20 pods length was in positive direction.

Pod Plant-1 vs. Pod Yield

Pod plant-1 show positively direct effect on Pod yield (0.3992), however indirect positive effect was produced by Sound Mature Kernel% and shelling%. Plant Height, Kernel Plant-1, 100 Kernel Weight and 20 Pods Length show negative indirect effect. Patil et al., (2006) revealed the same finding that Pod Plant-1 had the maximum direct effect on pod yield.

Kernel Pod-1 vs. Pod Yield

Negatively direct contribution occur Kernel Plant-1(-0.5199). However following character includes Plant Height and Pod Plant-1 show positive indirect effect toward pod yield.

Shelling % vs. Pod Yield

It show negative direct effect (-0.0999), but the Sound Mature Kernel%, Plant Height, 100 Kernel Weight and 20 Pods Length show positive indirect contribution in pod yield through shelling%. Thakur et al., (2013) also revealed the same finding of negative direct effect on pod yield.

100 Kernel Weight vs. Pod Yield

Positively direct effect was produced by 100 kernel weight (0.2809). Plant Height, Kernel Plant-1 and 20 Pods Length produced positive indirect effect on Pod yield through 100 kernel weight. Sadeghi et al., (2012) in its experiment show the same finding that positive direct contribution produced by 100 kernel weight and 100-pod weight produced positive indirect effect on Kernel Plant-1

20 Pods Length vs. Pod Yield

20 pods length also indicating that the contribution of such character was in positive direction. Positive direction indicate the mention parameter increase the pod yield. However Kernel Plant-1 and 100 Kernel Weight. The present result positive direct effects by Pod length are agreement with Sadeghi et al., (2012).

<table>
<thead>
<tr>
<th>Character</th>
<th>Sound Mature Kernel %</th>
<th>Plant Height</th>
<th>Pod Plant-1</th>
<th>Kernel Plant-1</th>
<th>Shell %</th>
<th>100 Kernel Weight</th>
<th>20 Pods Length</th>
<th>Pod Yield (Kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound Mature Kernel %</td>
<td>0.7719</td>
<td>0.2497</td>
<td>0.2022</td>
<td>0.1226</td>
<td>-0.0375</td>
<td>-0.1700</td>
<td>-0.0492</td>
<td>0.6531</td>
</tr>
<tr>
<td>Plant Height</td>
<td>-0.0670</td>
<td>-0.2072</td>
<td>0.0406</td>
<td>0.0066</td>
<td>0.0875</td>
<td>-0.0370</td>
<td>0.0284</td>
<td>0.0374</td>
</tr>
</tbody>
</table>

Table 2: Direct and Indirect Effect of Various Traits on Grain Yield in Peanut
Table 2: Contd.,

<table>
<thead>
<tr>
<th>Characters</th>
<th>Pod Plant</th>
<th>Kernel Plant</th>
<th>Shell %</th>
<th>100 Kernel Weight</th>
<th>20 Pods Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.1045</td>
<td>-0.0782</td>
<td><strong>0.3992</strong></td>
<td>-0.0145</td>
<td>-0.3013</td>
</tr>
<tr>
<td></td>
<td>0.1939</td>
<td>-0.0167</td>
<td>0.0188</td>
<td>-0.0519</td>
<td>-0.0485</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.1418</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.1418</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.2151</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.3444</td>
</tr>
</tbody>
</table>

Italic and bold figures designates direct effects while regular digits indicates indirect effects.

REFERENCES


