ASSOCIATION OF SEED CHARACTERS WITH NODULATION IN SOYBEANS

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If a large number of cultivars or lines are grown in the same environment, the variability observed for various plant characters is theoretically due to genetic variation. The larger the population and broader the germplasm base the greater is the proportion of genetic variability to environmental component. Further genetic correlation between characters estimated from such a population will give an insight into the feasibility of the use of associative breeding technique for a given set of characters. Strong genetic correlation between characters allows the selection of easily measurable character with the expectation that there will be correlated response for the other associated character. This procedure has been used successfully by animal breeders.

Presently super nodulating lines of soybeans [Glycine max (L.) Merrill] are being identified in Australia to increase nitrogen fixation in soybeans (Personal communication from Dr J. Thompson, Horticultural Research Station, New South Wales, Australia). It is known that genes from plant as well as Rhizobium control root nodulation in legumes. In the present investigation, by keeping the bacterial component constant through inoculation with a widely used commercial inoculant, containing effective strains of Rhizobium japonicum (Kirchner) for soybeans, the variation in root nodulation of 87

Table 1 Data on mean number of nodules per plant and seed characteristics of the germplasm lines of soybeans

<table>
<thead>
<tr>
<th>Number of cultivars</th>
<th>Mean of the group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of nodules in a group</td>
<td>Falling pink black pigmentation on the seeds</td>
</tr>
<tr>
<td>11–20</td>
<td>26</td>
</tr>
<tr>
<td>21–30</td>
<td>42</td>
</tr>
<tr>
<td>31–40</td>
<td>14</td>
</tr>
<tr>
<td>41–50</td>
<td>5</td>
</tr>
</tbody>
</table>

C.D. at 5% ± for replications N.S N.S
C.D. at 5% ± for cultivars 7 2.91

Table 2 Correlation of coefficients between mean number of nodules per plant of the germplasm lines with their seed characters

<table>
<thead>
<tr>
<th>Characters</th>
<th>Number of nodules per plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pink pigmentation on the hypocotyl</td>
<td>-0.1091</td>
</tr>
<tr>
<td>Weight of 100 seeds</td>
<td>0.3003**</td>
</tr>
<tr>
<td>Black colour of the seed coat</td>
<td>-0.2375*</td>
</tr>
</tbody>
</table>

*Significant at 5%; **Significant at 1%.

germplasm lines was studied and correlated with their seed characters to determine any association between them.

Seeds of 87 cultivars of soybean were collected from soybean germplasm collections maintained at this Institute. These seeds were the produce from the crop grown in the previous year under similar field conditions. The mean seed weight of 100 seeds from three random samples for each cultivar was recorded. A composite peat-based commercial inoculant, was obtained from Nitragin Company Inc, Milwaukee, Wisconsin, USA. Two plants for each germplasm line were grown in each pot containing 600 g of field soil in triplicate after inoculating the seeds with commercial inoculant at the rate of 250 g/25 kg seeds. After four weeks, data on the mean number of nodules per plant and hypocotyl colour for each line, were recorded. The results were statistically analysed to obtain correlation of coefficients between the colour of the seed coat (yellow or black), the hypocotyl colour (pink or not) and mean seed weight of 100 seeds, with the mean number of nodules per plant.

The data presented in tables 1 and 2 show that the mean number of nodules per plant was significantly and positively correlated with the weight of seeds of the cultivars (r = +0.3003) and negatively correlated with the black colour of the seed coat (r = -0.2375). It is hoped that these findings may be of interest to soybean breeders and rhizobiologists in selecting lines for increased nodulation. The results also could throw light on the fact that seed characteristics like colour of the coat and weight could form an easily measurable parameters for determining the nodulation potential of the cultivars.

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1. Zobel, R. W., In: World soybean research
ON THE OCCURRENCE OF PHYSALIS ANGULATA L. IN TAMIL NADU

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The species of Physalis are well known for their edible fruits. The genus is characterized by inflated fruiting calyces that enclose the berry. In Tamil Nadu, taxonomists have recognised only two species of Physalis, i.e., P. minima L. and P. peruviana L.

P. peruviana has restricted distribution. It grows in regions of high altitude of Nilgiris and Palani Hills. P. minima is common throughout. During the field survey of the Cauvery delta (Tiruchy, Attur, Tanjore, Chidambaram and Kumbakonam) we could collect two morphologically distinct forms of Physalis. One is a prostrate herb, sparsely hairy (BDUH 47), with small yellow flowers which lack maculations (dark/brown) in the corolla throat. The anthers are yellow. This is in agreement with the Hooker and Gamble’s description of P. minima. It grows in disturbed habitats such as garbage tips, near farm and domestic water outlets, on the edges of paddy fields and road sides. The other one (BDUH 56) is a glabrous, angular stemmed, erect and highly branched plant, producing yellow flowers with pale-purple maculations in corolla throat. The anthers are purple tinged. The calyces and leaves typically have purple coloration on their prominent net-veining. The latter is identified as P. angulata L. which was reported only from the northern parts of India. The present specimen was collected along the banks of Cauvery river. This species grows mainly in moist places such as edges of the paddy fields, river banks and waste lands.

Gamble treated the latter as a variety under P. minima. Reciprocal crosses were performed between these two species to verify the biological species concept. It was found that they were not crossable with each other, thereby demonstrating their genetic distinctiveness. Furthermore, the accessions of P. angulata collected from Meerpur and Tamil Nadu were found to be identical in their morphological features. Also, they were easily crossable to produce normal fertile hybrids which showed regular meiosis. In the light of these findings, it is suggested that P. angulata L. be included in the flora of Tamil Nadu along with P. minima and P. peruviana.

Key to the identification of Physalis species

i. Corolla > 1.3 cm in diameter with 5 dark-brown maculations in the throat, stems and leaves are dark-purple tinged and densely villous. Anthers and style deep-purple. Grows in high altitude regions/mountains only ... P. peruviana.

ii. Plants short with spreading branches, corolla < 0.6 cm in diameter without maculations; anthers yellow, fruit calyces green and as long as broad; stems and leaves subglabrous ... P. minima.

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