GENETICS OF SEED LONGEVITY IN SOYBEAN

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Introduction

In Telangana Soybean is cultivated in an area of about 7.0 lakh acres and annual requirement of quality seed is 2 lakh quintals. In soybean cultivation, non availability of required quantity of quality seed is the major problem which often results in poor yield. Number of characters is known to be associated with soybean seed quality during storage which are under genetic control. Genetic improvement of these characters is essential to breed varieties with greater storability. Hence, estimation of genetic variability for these characters in the existing germplasm is essential for formulation of effective breeding programmes. Karmakar et al. (2004) identified bold seeded soybean lines with good seed longevity. The objective of the study was to estimate the genetic variability for seed quality parameters

Material and Methods

The experiment was conducted at Department of Seed Science and Technology, Professor Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad with 26 (22 entries + 4 checks - I.S 335, JS 93-05, Basar and Bheem) genotypes harvested from summer crop 2014-15 were evaluated for hundred seed weight (g); germination (%), field emergence (%), seedling vigour index I and II after accelerated ageing in Completely Randomized Design. Standard germination test was conducted in four replications of 100 seeds each genotype, as per ISTA, 2004. Normal seedling numbers were expressed as a percentage of germination. Field emergence count was taken on the eighth day after sowing and the emergence percentage was calculated taking into account the number of seedlings emerged three centimeters above the soil surface. Accelerated ageing test was conducted (Copeland and Mc Donald, 1995). The parameters estimated were PCV and GCV (Falconer, 1981); heritability (Johnson et al., 1955); Genetic advance (Johnson et al., 1955).

Results and Discussion

Significantly high germination percentage was recorded by NRC-2011-A-3-10 (92.0%) followed by NRC-2011-F-15 (90.0%) compared to the superior check Basar (76.0%). The Seedling vigour Index – I was significantly high (2770) in NRC-2011-A-3-10 whereas seedling vigour index –II was high (612) in NRC-2011-F-15, compared to checks(Fig.1). All the parameters recorded a wide range for hundred seed weight (8.9-17.4 g), germination (64-92%) , field emergence (61-72%) and seed vigour index-II (316-612). The PCV and GCV were moderate for all the parameters indicating relatively low variability in the existing germplasm. These results do match with the findings Malek et al. (2014) in soybean. The low heritability estimates coupled with low to moderate genetic advance for hundred seed weight, germination and field emergence is an indicative of both additive and non additive gene action in inheritance of these traits. High heritability coupled with high genetic advance was recorded for seedling vigour indices which indicated additive gene action hence can be relied upon for selection. Similar results were reported by Gupta and Punetha (2007) in soybean. The significant positive correlation recorded between laboratory germination, vigour and field emergence after accelerated ageing indicated reliability of lab data for predicting field performance of seed after ageing (Table 1.).

Conclusions

The variability observed for seed quality parameters was moderate indicating need for creation of variability. Once the variability is created, the simple selection schemes may result in improvement of the traits as high heritability and genetic advance were recorded.

Table 1. Phenotypic correlation among seed quality traits in soybean genotypes.

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<thead>
<tr>
<th></th>
<th>100 Seed weight (g)</th>
<th>Germination (AA)</th>
<th>Field emergence (AA)</th>
<th>Seedling vigour index- I(AA)</th>
<th>Seedling vigour index- II(AA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Seed weight (g)</td>
<td>1.0000</td>
<td>-0.0415</td>
<td>-0.0677</td>
<td>-0.0708</td>
<td>0.0404</td>
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<tr>
<td>Germination (AA)</td>
<td>1.0000</td>
<td>0.9815**</td>
<td>0.8522**</td>
<td>0.8234**</td>
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<tr>
<td>Field emergence (AA)</td>
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<td>0.8736**</td>
<td>0.8023**</td>
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<tr>
<td>Seedling vigour index- I(AA)</td>
<td>1.0000</td>
<td></td>
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<tr>
<td>Seedling vigour index- II(AA)</td>
<td></td>
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<td>1.0000</td>
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Fig 1. Per se performance of soybean genotypes for seed quality parameters

Fig 2. Genetic parameters for seed quality parameters in soybean genotypes

References

Copeland, L.O., and McDonal, M.B. 1995. Seed science and technology (3rd ed.)
Falconer, D.S. 1981 Introduction to Quantitative Genetics. ELBS, Longman