Comparative Growth and Vegetative Development of Land Races and Improved Varieties of Soybean

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Abstract: Land races of soybean [Glycine max (L.) Merrill] namely Kulat brown, Mothi and Kulat white and Improved varieties Weber-84 and NARC-II were compared for growth and vegetative development at NWFP Agricultural University Peshawar during summer 2000, using Randomized Complete Block Design with four replications. All the parameters studied except percentage emergence, exhibited significant differences in means among the varieties. On the average Land races and improved varieties demonstrated 4.8 and 5.8 days to emergence, 80.5 and 80.9% emergence, 116.9 and 86.1 days to maturity, 75.8 and 64.7 cm plant height, 6075 and 5003 kg ha\(^{-1}\) biological yield and 21.9 and 25.5% harvest index, respectively. Land races on the average emerged one day earlier, matured one month later, produced 17% taller plants, produced one thousand kg extra biomass as compared with improved varieties. It is expected that with the above characteristics Land races could be utilized as potential fodder crop. Further research is suggested on grain yield potential and reproductive development in Land races.

Key words: Land races of soybean, growth and vegetative development of soybean, Land races vs improved varieties in soybean

Introduction

Improved cultivars of soybean [Glycine max (L.) Merrill] were introduced in the country from USA in the early sixties. These cultivars belonged to the long duration maturity group from Southern United States of America, which could not replace any of the established crop to fit in to the cropping pattern. A research strategy was developed to introduce soybean cultivars of short maturity groups so that to mature during the period between the two major crops and could be fitted in the prevailing cropping pattern. However no major achievement has been made and soybean is still considered as one of the non-conventional oil seed crop in the country. Because of the recent identification of some Indigenous Land races it was considered appropriate to investigate the comparative growth and development of the Indigenous Land races and improved cultivars of soybean. The objective was to determine the suitability of Land races for various purposes like maturity and biomass production based on its growth and vegetative development in comparison with improved cultivars. Intensive investigations were carried out on a large number of different soybean cultivars, Improved lines and germplasm for determining the development pattern, maturity and biomass production by Sharif (1995) and Hameed-ur-Rashid (1996) in Peshawar Chavan and Patil (1997) and Bhatia et al. (1999) in India, Wilcox and Zhang

Materials and Methods

Three Land races of soybean namely, Kulat brown Mothi and Kulat white and two improved cultivars i.e. Weber-84 and NARC-II were planted on May 15, 2000 at NWFP. Agricultural university Peshawar. A Randomized Complete Block Design having four replications was used. Each plot measuring 3x2m consisted of four rows, 3 m long and 50 cm apart. Precisely twenty seeds per meter row length were planted in a mellow compact seedbed. A basic dose of 25 kg N and 64 kg P₂O₅ ha⁻¹ as Diammonium Phosphate was applied at the time of planting. Uniform agronomic practices were followed regarding, irrigation, weeding, hoeing and harvesting. Two central rows each 3m long were harvested for determining biological yield and harvest index percentage. After statistical analysis means were compared using LSD at 5% probability level.

Results and Discussion

Means of the various vegetative parameters for the test varieties are presented in Table 1. Variety NARC-II took significantly the highest number of days (6.1) to emergence. Minimum number of days (4.3) were required for Mothi to emerge. On the average Land races and improved varieties took 4.8 and 5.8 days to emergence. Means for percentage emergence did not very significantly. Percentage emergence ranged from 79.8 in Kulat white to 81.8 in Mothi. The average percentage emergence recorded for Land races and improved cultivars was 80.5 and 80.9, respectively. The differences in the means for days to maturity among the cultivars were significant. Mothi and Weber-84 took the maximum 119.6 days and minimum (82.8 days) to maturity, respectively. On the average Land races and improved varieties took 116.9 and 86.1 days, respectively. It is evident that improved cultivars matured about thirty days earlier than the Land races. Wide variation in the number of days to maturity has also been reported by Sharif (1995), Chavan and Patil (1997) and Bhatia et al. (1999). Significant differences in means for plant height among varieties were observed. Mothi and Weber-84 produced the tallest (78.7 cm) and the shortest (64.3 cm) plants, respectively. The average plant height of Land races and improved varieties was 75.8 and 64.7 cm, respectively. It shows that Land races produced 17% taller plants than improved varieties and plant height was considered a typical varietal characteristic. The differences in the means for biological yield among the varieties were different significantly. Kulat white and NARC-II produced significantly the highest and the lowest biological yield as compared with other varieties. However no statistical differences were detected between Kulat white and Mothi as high yielders and between NARC-II and Weber-84 as lowest yielders. The average biological yield produced by Land races and improved varieties was 6075 and 5003 kg ha⁻¹. Land races produced about one thousand more biomass, which could be contributed to its higher plant height and longer growing period. Significant differences in means for the harvest index percentage ranged from 18.5% for Mothi to 29% for Weber-84. The average harvest index for the Land races and improved varieties was 21.9 and 25.5%, respectively.
Table 1: Comparative growth and vegetative development of land races and improved cultivars of Soybean cultivars

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Days to emergence (%)</th>
<th>Emergence (%)</th>
<th>Days to maturity</th>
<th>Plant height (cm)</th>
<th>Biological yield (Kg ha⁻¹)</th>
<th>Harvest index (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kulat brown</td>
<td>4.8c</td>
<td>80.0</td>
<td>118.4a</td>
<td>73.8a</td>
<td>5576bc</td>
<td>23.1bc</td>
</tr>
<tr>
<td>Mohi</td>
<td>4.3d</td>
<td>81.8</td>
<td>119.6a</td>
<td>78.7a</td>
<td>6103ab</td>
<td>18.5c</td>
</tr>
<tr>
<td>Kulat White</td>
<td>5.3b</td>
<td>79.8</td>
<td>112.8b</td>
<td>75.0a</td>
<td>6545a</td>
<td>24.2b</td>
</tr>
<tr>
<td>Weber-84</td>
<td>5.5b</td>
<td>81.5</td>
<td>82.8d</td>
<td>64.3b</td>
<td>52529bc</td>
<td>29.0a</td>
</tr>
<tr>
<td>HARC-II</td>
<td>6.3a</td>
<td>80.3</td>
<td>89.4c</td>
<td>65.1b</td>
<td>4747c</td>
<td>21.9bc</td>
</tr>
<tr>
<td>LSD%</td>
<td>0.3</td>
<td>NS</td>
<td>1.9</td>
<td>8.6</td>
<td>949.3</td>
<td>4.7</td>
</tr>
</tbody>
</table>

It is concluded that Land races have faster emergence at least by one day, some what equal emergence percentage, longer growing period, taller plants, about 1000 ha⁻¹ more biomass and lower harvest index.

References