COMPARATIVE STUDY ON THE YIELD PERFORMANCE OF SUNFLOWER HYBRIDS UNDER AGRO-ECOLOGICAL CONDITIONS OF D.I.KHAN

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ABSTRACT

Eight Sunflower Hybrids representing diverse genetic background were evaluated for achene yield, 1000-Achene weight, plant height, and oil percentage and protein contents at Agronomic Research Area, Faculty of Agriculture, Gomal University, D.I. Khan, Pakistan during spring 2005. Hybrids were found significantly different from one another for all the traits studied in the experiment. Hybrids kg ha$^{-1}$ Hysun-33 proved to be the best with maximum achene yield (2279.86 kg/ha) as compared to hybrids Sunbred-265 which gave achene yield of 1699 kg/ha. The highest 1000 achene weight was recorded from hybrid Hysun-33 while the remaining hybrids were at par with each other. Hysun-33 hybrid afforded tallest plants with 130 cm as compared to Sunbred-265 and Suncross-24 that were found shortest plants with 123 cm height each. Maximum oil contents value (41.24 %) was noted in Hysun-33 while minimum oil contents value (36.17 %) was obtained from Suncross-24. Maximum protein percentage (26.76 %) was observed in Hysun-33 which statistically at par with DK4040 (25.95 %). Minimum protein percentage (23.62 %) was shown by Suncross-24 which also at par with NK-212 (23.82 %) and Sunbred-265 (23.73 %) (Oral, E and K- Kara, 189).

Key Words: Sunflower Hybrids, Agro Ecological, Achene yield.

INTRODUCTION

Sunflower (Helianthus annuus L.) is an important edible oil crop ranking next to soybean. Sunflower is a drought tolerant and short duration crop and has a wider range of adaptability. Research work on this crop has shown that under Dera Ismail Khan agro-climatic conditions it can be grown successfully twice a year as spring and autumn crop both in irrigated and rain fed areas. Sunflower seed contains high oil content ranging from 40-50 percent and is rich in protein 23 percent. Moreover, its oil quality is better due to higher percentage of linollic acid and low percentage of linolenic acid which is the most desirable character lacking in other oils. Sunflower seed cake has proved to be good quality feed for dairy animals and particularly for poultry birds. Furthermore, sunflower is also a good source of nectar for honey production. Edible oil is an important component of human diet. Pakistan is deficient in edible oil production and a huge foreign exchange is spent on its import every year. Presently domestic production of edible oil is meeting only 35% of the total requirements which increases by 50-60 thousand tons per year due to rapid population growth expanding. Urbanization increases in household income and limited availability of animal facts (Ali et al. 2000, Nadeem 1989, Ford 1978).

The present study was therefore undertaken to determine different hybrids under Agro-ecology of D.I. Khan for finding out of the high yielding and comparatively early maturing hybrids for the economic uplift of the area farmers.

MATERIALS AND METHODS

The evaluation of trial including exotic and local hybrids, varieties and advanced lines was conducted at Agronomic Research Area, Faculty of Agriculture, Gomal University, D.I. Khan, Pakistan during spring 2005. The experiment was laid out in RCBD with eight treatments and 3 replication having a net plot size of 12 m$^2$ with plant to plant distance of 25 cm and row to row distance of 70 cm. The field was thoroughly prepared & planting was done on 20.2.2005.

Nitrogen, phosphorus and potassium were applied at the rate of 125:65:15 kg ha$^{-1}$ in the form of urea, triple super phosphate and potassium sulphate, respectively. Half of N was applied at the time of sowing and the remaining half was applied during earthing up. All other cultural practices were kept normal and uniform for all the treatments. The seed rate was used 7 kg /ha$^{-1}$. The crop was harvested at its physiological maturity.
The collected data were tabulated and analyzed statistically by using Fishers analysis of variance techniques and least significant difference test was applied at 5% probability level to compare the differences among treatment means (Steel and Torrie, 1990).

**RESULTS AND DISCUSSION**

**Achene Yield**

This data indicate that the effect of hybrids on this parameter was significant. Maximum achene’s yield (2279.86 kg ha⁻¹) was obtained by Hysun-33. Minimum achene’s yield (1699 kg ha⁻¹) was obtained by Sunbred-265. Maximum yield in Hysun-33 was recorded might be due to its higher genetic potential and its better adaptability under present climatic conditions. These results are similar with those of Dedio (1978), Potter and Mcloud (1981), Silva et al. (1982), Paradisi (1983), Beg and Aslam (1984), Akhtar (1985) and Nadeem (1989).

**1000-Achene Weight**

It was found that the weight per 1000-achenes was significantly affected by different hybrids. A maximum 1000-achenes weight (49.11g) was observed in Hysun-33 which differed significantly from all other hybrids (Table I). Minimum 1000-achene weight (48.37g) was observed in Sunbred-265. The reason for significantly higher 1000-grain weight might be their genetic character. These results are in agreement with those of Akhtar (1985) and differed those of Nadeem (1989).

**Plant Height**

The plant height showed significant difference among the various treatments. Hybrid Hysun-33 gave maximum plant height 130 cm which did not significantly differ from DK-4040 which was also statistically at par with each other. Minimum plant height of 123 cm was recorded in case of Sunbred-265. The significantly difference in plant height among different hybrids were found due to different genotype in similar environmental conditions. These results are in line with those reported by Akhtar (1985) and Nadeem (1989).

**Table 1 Quantitative parameters of eight Sunflower hybrids**

<table>
<thead>
<tr>
<th>Hybrids</th>
<th>Achene yield kg ha⁻¹</th>
<th>1000 achene wt (g)</th>
<th>Plant height (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYSUN-33</td>
<td>2279.86 a</td>
<td>49.11 a</td>
<td>130 a</td>
</tr>
<tr>
<td>DK-4040</td>
<td>2250.35 a</td>
<td>48.76 c</td>
<td>129 a</td>
</tr>
<tr>
<td>SUNCROSS-24</td>
<td>1923.26 b</td>
<td>48.56 de</td>
<td>123 de</td>
</tr>
<tr>
<td>GULSHION-98 (CHECK)</td>
<td>1884.37 bc</td>
<td>48.96 b</td>
<td>128 b</td>
</tr>
<tr>
<td>NK-212</td>
<td>1816.24 c</td>
<td>48.74 cd</td>
<td>126 c</td>
</tr>
<tr>
<td>FNGRO-BEMISAL-98</td>
<td>1807.78 d</td>
<td>48.76 bc</td>
<td>127 bc</td>
</tr>
<tr>
<td>SEMSIN-51</td>
<td>1742.34 e</td>
<td>48.62 d</td>
<td>124 d</td>
</tr>
<tr>
<td>SUNBRED-265</td>
<td>1699.50 f</td>
<td>48.37 e</td>
<td>123 de</td>
</tr>
</tbody>
</table>

**Oil Percentage**

The achene oil content is considered an important parameter to determine the quality of sunflower achene. Data regarding oil percentage presented in Table II indicate that oil percentage was influenced significantly by different hybrids. Maximum oil content value 41.24% was observed in Hysun-33 followed by DK-4040 which gave 40.40% achene oil content but these two differed significantly from all other hybrids. Minimum oil contents 36.17% were observed in case of Suncross-24 hybrid. These differences may be due to its genetic superiority over other hybrids (Timirgaziu et al. 1989).

**Protein Percentage**

Achene protein content is one of the most important quality characteristics of sunflower. The data regarding achene protein contents indicate that hybrids significantly affected that protein percentage. Maximum protein percentage (26.70%) was observed in Hysun-33 which statistically at par with DK-4040 (25.95%). Minimum protein percentage (23.62%) was showed by Suncross-24 which was also statistically at par with Sunbred-265 (23.73%). It may be due to their genetic as well as phenotypic difference from other hybrids. Protein percentage is considered as more genetic character as compared to phenotypic (Nadeem, 1989).
Table II  
Quantitative parameters of eight Sunflower hybrids

<table>
<thead>
<tr>
<th>Hybrids</th>
<th>Oil percentage</th>
<th>Protein percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYSUN-33</td>
<td>41.24 a</td>
<td>26.76 a</td>
</tr>
<tr>
<td>DK-4040</td>
<td>40.40 a</td>
<td>26.76 a</td>
</tr>
<tr>
<td>SUNCROSS-24</td>
<td>36.17 d</td>
<td>23.62 e</td>
</tr>
<tr>
<td>GULSHION-98 (CHECK)</td>
<td>38.84 b</td>
<td>25.14 bc</td>
</tr>
<tr>
<td>NK-212</td>
<td>38.30 b</td>
<td>23.82 d</td>
</tr>
<tr>
<td>FNGRO-BEMISAL-98</td>
<td>36.82 cd</td>
<td>25.10 c</td>
</tr>
<tr>
<td>SEMSN-51</td>
<td>37.15 c</td>
<td>25.30 b</td>
</tr>
<tr>
<td>SUNBRED-265</td>
<td>37.80 bc</td>
<td>23.73 de</td>
</tr>
</tbody>
</table>

CONCLUSION AND RECOMMENDATIONS

Although all the cultivars included in the trial performed well under the agro-climatic conditions of D.I. Khan but hybrid Hysun-33 proved to be the best followed by DK-4040 and Gulshan-98 regarded the yield. Different factors are responsible for significant variation among different hybrids under trials. These may be varietal characteristics or hereditary characters to a certain climatic conditions and adaptability. Sunflower hybrid Hysun-33 can be preferably successfully grown in D.I. Khan due to the best adaptation to local conditions as compared to other hybrids.

REFERENCES


