

## **IDENTIFICATION OF SUNFLOWER HYBRIDS APPROPRIATE FOR DRYLAND AGRICULTURE**

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### **SUMMARY**

The commercial F1 hybrids are usually meant for irrigated conditions wherein, their potential is fully exploited. Further, it is possible that, the order of merit of hybrids under dryland conditions might be different from the one under irrigated conditions. This experiment was taken up with the objectives of (i) comparing the yield levels of the available promising hybrids with one another, (ii) comparing the efficiency of "flat bed" (FB) method of layout with "ridges and furrows"(RF) in conserving soil moisture, and (iii) finding out the response of hybrids to fertilizers under dryland conditions. Four hybrids and three traditional varieties were involved in the study carried out during 1993-94 and 1994-95 by adopting a double split plot design with three replications. Between "Fertilizers" (F) and "no fertilizers" (NF) treatments, and between FB and RB treatments, though the differences were not significant, numerically the F and FB were superior to NF and RF, respectively in increasing yield levels. The differences in yields between F and NF were upto 0.2 t/ha. Hybrids were significantly superior to the traditional varieties for yield, thus leading to the conclusion that even under dryland conditions, hybrids are preferable to the traditional varieties. Among the hybrids, ISFH-306 was the best which showed an yield potential of 1.5 t/ha.

## INTRODUCTION

Hybrids in any crop express their full potential for yield and other characters under irrigated conditions, that too only when supplied with adequate quantity of fertilizers. They are sure to outyield the traditional varieties under irrigation. Hybrids that perform well under irrigated conditions may or may not perform well under dryland (moisture stress) conditions and may even fail to outyield the varieties. This experiment was an attempt to compare the performance of hybrids with that of varieties in drylands and to identify hybrids specifically suitable for the drylands.

## MATERIALS AND METHODS

The experiment was conducted during 'August-November' of 1993 and 1994. Two varieties (EC 68415 and Morden) and three hybrids (ISFH-306, KBSH-1 and MSFH-17) were involved during 1993, while during 1994, EC 68415 was replaced by EC 68414 and an additional hybrid (GAU-SUF 306) was involved. The design adopted was double split plot with three replications wherein, the methods of land layout (Ridges and furrows v/s Flat bed) were the main plot treatments, fertilizer levels (recommended NPK i.e., 38 kg N, 50 kg P<sub>2</sub>O<sub>5</sub> and 30 kg K<sub>2</sub>O per ha and no fertilizers) were the sub-plot treatments, while the genotypes (varieties and hybrids) were the sub-sub plots. The plot size was 3.6 m x 5.6 m and the spacing was 60 cm x 20 cm except for the short duration variety Morden, for which it was 45 cm x 20 cm. During 1993, the rainfall during crop growth was 733.9 mm with 27 rainy days, the corresponding figures for 1994 being 377.8 mm and 23 days.

## RESULTS AND DISCUSSION

The data on plant height, head diameter and seed yield recorded in different treatments is presented in Table 1. Between the main plot treatments i.e., Ridges and Furrows (RF) and Flat bed (FB), there was no significant difference for any of the characters. This was probably because there were no long dry spells during the crop period leading to almost same moisture status both under RF and FB (Table 2). In the studies on the effects of three planting patterns (Ridge, Furrow and Flat) and three population densities on the growth and yield of sunflower hybrids (Flamme, Upsolveraflor and Isostar) conducted at Sultan Qaboos University Experiment Station, it was observed that the seed and oil yields were higher in the ridge planted sunflower than those planted in furrow or flat patterns, the order of merit being ridge > flat > furrow; but the magnitude of yield differences between 'Ridge' and 'Flat' planted crop was not high enough to compensate for the additional cost involved in mainly ridges (Esechie *et al.*, 1996). In an experiment conducted in Punjab, India, ridge sowing with polyethelene sheet mulching was superior to flat bed method, it preponed emergence of seedlings, bud appearance and anthesis and also increased the seed and straw yield by 15 and 25 per cent respectively (Sekhon *et al.*, 1997).

Similarly, between sub-plot treatments i.e., Recommended NPK and no fertilizers (no NPK) also there was no significant difference for any of the characters except for seed yield during 1994. Even during 1993, between NPK and no NPK, there was considerable numerical differences for seed yield, the yield in the NPK treatment (567 kg/ha) being 31 per cent greater than in no NPK treatment (432 kg/ha).

Table 1. Influence of land layout and fertilizer levels on plant height, head diameter and yield in sunflower at Bangalore.

| Treatments                                  | Plant height (cm) |       | Head diameter (cm) |      | Seed yield (kg/ha) |       |
|---|-------------------|-------|--------------------|------|--------------------|-------|
|   | 1993              | 1994  | 1993               | 1994 | 1993               | 1994  |
| <b>A. Main plots (method of layout)</b>     |                   |       |                    |      |                    |       |
| Ridges and furrows                          | 137.7             | 103.9 | 14.84              | 12.1 | 882                | 521   |
| Flat bed                                    | 139.4             | 99.2  | 13.64              | 12.1 | 875                | 478   |
| F test                                      | NS                | NS    | NS                 | NS   | NS                 | NS    |
| C.D. at 5%                                  | -                 | -     | -                  | -    | -                  | -     |
| <b>B. Sub plots (Fertilizer levels)</b>     |                   |       |                    |      |                    |       |
| Recommended NPK                             | 140.9             | 103.0 | 14.39              | 12.2 | 986                | 567   |
| No fertilizers                              | 136.3             | 100.1 | 14.13              | 12.0 | 771                | 432   |
| F test                                      | NS                | NS    | NS                 | NS   | NS                 | *     |
| C.D. at 5%                                  | -                 | -     | -                  | -    | -                  | 45.83 |
| <b>C. Sub-Sub plots (Varieties/Hybrids)</b> |                   |       |                    |      |                    |       |
| <b>Varieties</b>                            |                   |       |                    |      |                    |       |
| EC 68414                                    | -                 | 105.5 | -                  | 12.9 | -                  | 404   |
| EC 68415                                    | 165.7             | -     | 14.71              | -    | 733                | -     |
| Morden                                      | 69.4              | 42.0  | 12.06              | 8.9  | 432                | 282   |
| <b>Hybrids</b>                              |                   |       |                    |      |                    |       |
| ISFH-306                                    | 160.0             | 119.0 | 15.29              | 12.9 | 1533               | 694   |
| KBSH-1                                      | 158.1             | 114.1 | 14.42              | 12.4 | 846                | 527   |
| MSFH-17                                     | 139.6             | 107.4 | 14.77              | 12.8 | 850                | 622   |
| GAU-SUF 306                                 | -                 | 116.1 | -                  | 13.1 | -                  | 468   |
| F test                                      | *                 | *     | *                  | *    | *                  | *     |
| C.D. at 5%                                  | 12.5              | 4.97  | 1.57               | 0.82 | 222                | 149   |

\* = Significant at 5 per cent level of probability; NS = Non-significant

Table 2. Soil moisture status in ridges and furrows and flat bed treatments at button stage during 1994.

| Soil depth<br>(cm) | Soil moisture (Gravimetric method) |          |
|--------------------|------------------------------------|----------|
|                    | Ridges and furrows                 | Flat bed |
| 0-15               | 8.86                               | 9.57     |
| 15-30              | 10.96                              | 10.60    |
| 30-45              | 12.18                              | 13.09    |

With regard to sub-sub treatments (varieties and hybrids), the hybrids were distinctly superior to the variety Morden for height, head diameter as well as seed yield. The varieties EC 68414 and EC 68415 though did not significantly differ from hybrids for height and head diameter, for seed yield, the hybrid ISFH-306 out yielded EC 68414 and EC 68415 by a wide margin; even other hybrids also numerically out yielded these two varieties. The experiments at Bangalore, India revealed that the hybrid KBSH-1 recorded higher yield than the populations EC 68414 and Morden (Anonymous, 1995). Studies conducted at Akola, Maharashtra, India for three years revealed that under dryland conditions, hybrid sunflower (PKVSH 27) significantly outyielded (1202 kg/ha), the sunflower population AKSF 9 (998 kg/ha) (Anonymous, 1996).

Thus, the results of the studies though did not lead to any inference regarding the relative efficiency of RF and FB method of layout, it became evident that NPK is definitely superior to no NPK and that the hybrids are sure to out yield varieties under dryland conditions. The hybrid ISFH-306 which not only ranked first for yield but also yielded significantly higher than the varieties during both the years appeared to be specially suitable for drylands.

## REFERENCES

- Anonymous, 1995, Annual Report 1993-94. Directorate of Oilseed Research, Hyderabad, India, pp. 105.
- Anonymous, 1996, Annual Progress Report 1995-96. Sunflower. Directorate of Oilseeds Research, Hyderabad, India, pp. 153.
- Esechie, H.A., Elias, S., Rodriguez, V. and Al-asmi, H.S., 1996, Response of sunflower (*Helianthus annuus*) to planting pattern and population density in a desert climate. *Journal of Agricultural Science*, **126** : 455-461.
- Sekhon, N.K., Hira, G.S. and Thind, S.S., 1997, Effect of seed bed temperature on growth, development and yield of early sown sunflower (*Helianthus annuus* L.). *Indian Journal of Ecology*, **24**(2) : 177-178.