

PERFORMANCE OF EARLY AND LATE SOWN SUNFLOWER HYBRIDS UNDER ORGANIC FARMING SYSTEM IN RAINFED AREA

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Abstract

Edible oils are the main component of our daily diet. Although a large quantity of oil seed is grown in various areas of Pakistan, but the amount of oil extracted from these seeds is insufficient to meet the requirements of our country. Two hybrids (i.e. Soraj and Roshan) were sown at the National Agricultural Research Centre, Islamabad, in 2009, at different dates to check their performance. The soil is mostly clayey keeping organic material but showing low availability of phosphorus and micronutrients. Data on different parameters, i.e. number of seeds/head and weight of seed per head (g) were collected. The hybrids (Soraj and Roshan) sown early (mid July) showed outstanding performance by producing the seed weight per head 19.60 and 23.4 g as compared to the hybrids (Soraj and Roshan) sown late (end of August) having seed weight per head 11 and 12.1 g.

Keywords: Oil seed, Sunflower, Organic farming, Hybrid seed.

Introduction

Sunflower (*Helianthus annuus L*) is native to North America. Early settlers grew sunflowers for food and garden decoration, and European explorers brought sunflowers along trade routes to Spain, Italy, Egypt, Afghanistan, India, China and Russia (Susan et al., 1993). It is a successful crop both in irrigated and barani (rainfed) areas of Pakistan. The total area of sunflower crop in Pakistan is 79.61 million ha while the area under crops is 22.96 million ha comprising irrigated 17.99 million ha and 4.79 million ha of rainfed areas (Table 1). In Punjab, Multan, Bahawal pur, Sarghoda and Faisalabad districts, Peshawar in NWFP and Khairpur and districts of Hyderabad division are famous for the production of sunflower crop. Local production of sunflower crop accounted for 32% the domestic requirement while the remaining 68% of the country's domestic requirement is met through imports (Hussain, 2000). Directorate of Organic Farming under the supervision of the National Agricultural Research Center, Islamabad, is working on natural farming using modern and indigenous techniques of agriculture for chemical-free crops and to disseminate the centuries old knowledge among farming communities. The extensive root

system of sunflower plants enables to reach deep into sources of polluted water and thereby extract large amounts of toxic metals, including uranium. Sunflower seeds are a good source of vitamin E. Vitamin E has significant effects that results in the reduction of symptoms in asthma, arthritis, cancer and diabetic complications. Sunflower seeds are a good source of magnesium. Magnesium helps to reduce the severity of asthma, lower high blood pressure, and prevents migraine headaches, as well as in reducing the risk of heart attack and stroke. Sunflower seeds are also a good source of selenium to induce DNA repair and synthesis in damaged cells. Sunflower is a good source of Bio-diesel which is the only alternative fuel that runs in any conventional, unmodified diesel engine. Sunflower is also a fast growing crop and oil ratio in this crop is 40% (Hussain, 2000). The objective of this study was to evaluate sunflower performance in the rain fed areas under different sowing periods. Sowing periods were from 2nd week of July (early sowing) and late sowing during last week of August) of sunflower in rain fed areas. The effect of different periods of sunflower was studied in rain fed to see the most suitable time.

Table 1. Area, production and yield of sunflower in Pakistan.

Year	Area (000) hac	Production (000) ton
2005-06	325	348
2006-07	323	407
2007-08	375	560
2008-09	371	598
2009-10	348	554

Source: Agricultural Statistics of Pakistan (2010)

Materials and Methods

Two sunflower hybrids namely Soraj and Roshan were sown in 2nd week of July (early sowing) and late sowing during last week of August at the research farm, NARC. The row-to-row distance was kept 75 cm alongwith plant-to-plant distance of 30 cm. The seed rate was 2.4 kg per acre, planted by a seed drill with the help of a tractor. Organic fertilizer was applied at 5 bags per acre (50 kg each) before sowing while humic acid broadcasted @ 4 kg per acre. Four plots, comprising one acre each, were selected for collection of data. The early and late sowing dates of each hybrid were recorded accordingly. Head diameter of ten randomly selected flowers was measured. The heads were threshed manually and numbers of seeds per head were counted and their mean was taken alongwith their weight. 100 seeds were weighed with the help of electronic balance. The weeds were controlled by using a tractor-drawn ridger for making furrows within the lines.

Results and Discussion

Hybrids show significant differences during evaluation as they response greatly to the sowing dates during both seasons. Two showers were received during the early days of September as in the month of August caused high moisture to populate the jassid on the Soraj @ 0.4 per leaf and 0.3 on Roshan. The jassid attack gradually decreased with continuously increase in the temperature and decreasing humidity in the atmosphere. Yield is a function of integrated effects of various yield components like number of plants per unit area, head size, number of seeds per head under a particular set of environmental

conditions. In early sowing, the appearance of flower buds was 50 days after sowing, while in the late sowing it was 40 days after sowing with very small flower heads. In early sowing, the number of leaves per plant were 36 in average and 28 in the late sowing. Total number of seeds on the flower head with diameter 14 cm in early sowing of Soraj were 850, having weight 15.8 g, while in late sowing, number of seeds were 844, having a weight 11 g with flower head 10 cm. Roshan gave promising results than Soraj as was sown in mid August. The flower head with diameter 16 cm had 880 seeds having weight 23.40 g (Table 3). These results are in favour with the findings of Hassan et al. 2003.

While late sowing flower head with diameter 9 cm had 804 seeds weighing 12.08 gm. It is revealed that the variety Roshan showed good results than Soraj. The crop received a number of rains after the month of August and there was observed a yield decreasing trend, which was due to humidity. The soil pH and organic matter was 7.80 and 0.81 percent before sowing as compared with the soil pH 8.30 and 0.79 percent, respectively. However, phosphorus and potassium were found better 4 ppm and 110 ppm as compared to 4.31 ppm and 96 ppm before sowing (Table 2). Different parameters were checked and analyzed which showed that early sowing hybrids gave promising results as compared to late sowing. Soraj and Roshan hybrids (Early sown) gave good yield 316 and 468 kg/ac, while late sown hybrids remained at 220 and 241 kg/ac, respectively. These results are promised by the findings of De La Vega and Hall (2002).

Table 2. Chemical Properties of soil before sowing and after harvesting of sunflower.

Activity	Soil pH	Organic matter (%)	NO ₃ -N	PO ₄ -P	K
Before sowing	8.30	0.79	0.92	4.31	96
After harvesting	7.80	0.81	0.77	4.32	110

Table 3. Number of seeds per head of sunflower hybrids.

Hybrid	Early sowing (2 nd week of July)	Late sowing (End of Aug)	Mean
Soraj	850	844	847
Roshan	880	805	842
Mean	865	824	

Table 4. Weight of seed per head of sunflower hybrids.

Hybrid	Early sowing (2 nd week of July)	Late sowing (End of Aug)	Mean
Soraj	15.80	11.00	13.40
Roshan	23.40	12.10	17.75
Mean	19.60	11.55	

Table 5. Diameter per head of sunflower hybrids.

Hybrid	Early sowing (2 nd week of July)	Late sowing (End of Aug)	Mean
Soraj	14.00	10.00	12.00
Roshan	16.00	9.00	12.50
Mean	15.00	9.50	

Conclusion and Recommendations

In rain fed areas, early sowing of sunflower during rainy season is very important while the production decreases in late sowing when weather becomes dry and afterwards cold in the month of October causing low yield. The early sown hybrids at NARC gave good yield 316 and 468 kg/ac, while the production remained low in late sowing 220 and 241 kg/ac.

To enhance the area and production of sunflower in the rain fed lands organic demonstration centers should be established for the awareness of organic agriculture within the farming community. Much attention is needed to prepare bio-fertilizers at the farms, using local infrastructures to minimize the cost of chemical fertilizers. Research institutions should be geared-up in all the four provinces of the country where research work can be carried out keeping in view the local environment, availability of irrigation water and soil conditions.

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