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Comparison of Direct Seeding with Transplantation Stages of Sunflower

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Abstract: To study the response of sunflower to direct seeding and transplantation at 2, 4 and 6 leaves stages, experiments were conducted at Agricultural Research Institute Tarnab Peshawar during Spring, 1997. The experiments were laid out in Randomized Complete Block design with four replications. The effect of direct seeding and transplantation stages were significant for all the characters studied. Direct seeded crop gave best results followed by early transplanted seedlings. While the yield was severely affected as the transplantation was delayed to six leaves stage. Maximum days to 50% flowering (78), days to maturity (109), plant height (172 cm), head diameter (23.50 cm) and achene yield (3467 kg/ha) were recorded in the direct seeded plots which decreased with advance in the age of transplanted seedling. The minimum days to 50% flowering (72), days to maturity (102), plant height (104 cm), head diameter (17.75 cm) and achene yield (1017 kg/ha) were recorded in the six leaves stage transplanted crop.

Key words: Sunflower (*Helianthus annuus* L.), transplantations, direct seeding

Introduction

Sunflower (*Helianthus annuus* L.) is one of the important oilseed crops that originated in the new world specifically in either Peru or Mexico. It is considered to be a good source of both oil and proteins. Oil contents ranges between 40-50% in its achene. Sunflower is highly valued for edible purposes because of high contents of oleic acids. Sunflower oil is considered to be the most suitable for margarine production, for hydrogenation and as cooking oil. The industrial uses of sunflower oil are in the production of soaps, paints, varnishes and candles. The plant is a good nectar source for honey bees. The stalks can also be used in the paper industry for making papers and boards in addition to their use for fuel. After oil extraction, the resulting meal is a rich source of fats and proteins for livestock and poultry birds Arnon (1972). It has a tap root system which grows as deep as 3m. Sunflower grows 1.5 m tall. The stem is circular, 3-6 cm in diameter with rough hairs. The leaves are large, hairy, ovate and petiolate (Weiss, 1983). Sunflower produces a disc shaped head called the "Capitulum" on top of the stem. The head commonly varies from 10-30 cm in diameter (Heiser, 1976). Sunflower is a temperate zone crop, but it is adaptable to a wide range of climatic conditions. It is grown on all types of the soils provided they are well drained. Acidic and saline soils are not desirable, though it can tolerate a PH range from 6.5-8.0 (Hatam and Abbassi, 1994).

In Pakistan, sunflower can be grown throughout the country on irrigated as well as rainfed areas, but its production is too low to meet or even narrow down the gap between requirements and production. During 1998-99 Pakistan imported 1.325 million tons of edible oil against the domestic production of 0.55 million tons costing Rs. 43.00 billion. (Anonymous, 1999 Annual Report Pakistan Oilseed Development Board). In 1997-98 sunflower was grown on 98459 hectares in Pakistan, which produced 129693 tones of seeds. Its yield is 1300 kg/ha (MINFAL, 1997-98) which is very low as compared to other agriculturally advanced countries. Sunflower yields in Argentina, Turkey, France, USSR are 1435, 1535, 2595 and 1439 kg/ha respectively (FAO, 1989).

Shad Khan (1982) reported that direct seeded crop of

sunflower gave best results which decreased with advance in the age of transplanted seedlings.

Khan (1976) reported that direct seeded crop gave 1805 kg/ha achene yield as against 966 kg per hectare given by transplanted crop.

Being a non-traditional crop, detailed work on cultural practices are urgently needed in order to formulate suitable recommendations for the proper development of the crop. Since limited research work on transplantation has been done in Pakistan, it was considered necessary to have a research project on the response of sunflower to transplantation stages.

Materials and Methods

To compare the performance of direct seeded sunflower with transplanted sunflower and to find out the optimum time for nursery transplantation experiments were conducted at Agricultural Research Institute Tarnab, Peshawar, during spring, 1997. The experiments were laid out in RCB design with four replications. Sunflower Hybrid Peshawar-93 was planted directly and transplanted at 2, 4 and 6 leaf stages. These stages were obtained after 6, 10 and 20 days of seeding. Four rows five-meter long and 75 cm apart were planted for each treatment. Standard agronomic practices were followed through out the growing period.

Data were recorded on the following parameters:-

1. Days to flowering
2. Days to maturity
3. Plant height (cm)
4. Head diameter (cm)
5. Grain yield (kg/ha)

The data recorded were analyzed statistically using analysis of variance techniques appropriate to randomized complete block design. Least significant difference (LSD) test was used for comparison of the treatment means when F value was significant.

Results and Discussion

Days to 50% flowering: Results presented in Table 1 reveal that the maximum number of days to 50% flowering (78)

Ahmad and Quresh: Direct seeding and transplantation of sunflower

Table 1: Direct seeding and transplantation stages of sunflower

Treatment	Days to 50% flowering	Days to Maturity	Plant Height (cm)	Head Diameter (cm)	Plant Population/ha	Achene Yield (kg/ha)
Direct Seeding	78.25 ^A	109.00 ^A	172.00 ^A	23.50 ^B	45500	3467 ^A
Transplantation at 2 leaf stage	75.00 ^B	105.75 ^B	159.00 ^{AB}	22.50 ^A	39667	2734 ^{AB}
Transplantation at 4 leaf stage	73.50 ^C	104.00 ^C	133.50 ^A	21.50 ^A	44833	2167 ^B
Transplantation at 6 leaf stage	71.75 ^D	102.00 ^D	104.30 ^C	17.75 ^B	37500	1017 ^C
LSD Value at 5%	0.7998	1.334	26.14	2.013	N.S	767.

were recorded in the direct seeded crop followed by the earliest transplanted crop of 2 leaves stage (75). Days to 50% flowering decreased with delay in the nursery transplantation. The minimum number of days to 50% flowering (72) were recorded in the 6 leaves stage transplanted crop. While the 4 leaves transplanted crop took 74 days to produced 50% flowering. These results are in conformity with the findings of Khan (1982).

Days to maturity: Results presented in Table 1 reveal that maximum days to maturity (109) were recorded in the direct seeded crop followed by the earliest transplanted crop of 2 leaf stage (105.75). Days to maturity decreased as the transplantation was delayed to 4 leaves stage (104) and 6 leaves stage (102). Almost similar results were reported by Khan (1982).

Plant height (cm): Plant height was significantly affected by different treatments (Table 1). Maximum plant height of 172 cm was recorded in the direct seeded crop. Plant height decreased with delay in transplantation. The plant height of 159 cm, 133.5 cm and 104.3 cm was recorded in the crops transplanted at 2, 4 and 6 leaf stages respectively. These results are in close conformity with the findings of Khan (1976) and Khan (1982).

Head diameter (cm): Results presented in Table 1 reveal that maximum head diameter of 23.5 cm was produced by the direct seeded crop followed by the crop transplanted at 2 leaves stage (22.50 cm). Head diameter decreased with delay in transplantation. The minimum head diameter of 17.75 cm was recorded when the transplantation was delayed up to 6 leaf stage. While the crop planted at 4 leaves stage produced the head diameter of 21.5 cm. These results confirmed the findings of Khan (1982).

Achene yield (kg/ha): Results presented in Table 1 indicate that maximum achene yield of 3467 kg/ha was recorded in the direct seeded crop followed by the earliest transplanted crop of 2 leaves stage (2734 kg/ha). Achene yield of 2167 kg/ha and 1017 kg/ha were recorded when transplantation was delayed to 4 and 6 leaf stages respectively. From these results it may be concluded that for better results direct seeding is recommended and transplantation is to be carried out then nursery should be transplanted as early as possible (2 leaves stage). The results confirmed the findings of Khan (1976) and Khan (1982).

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