Pak. j. sci. ind. res., vol. 35, no. 4, April 1992

EFFECT OF TRANSPLANTING AND DIBBLING ON THE YIELD AND YIELD COMPONENTS OF COTTON (*GOSSYPIUM HIRSUTUM* L.)

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(Received July 20, 1991; revised May 5, 1992)

The investigations were carried out to study the effect of transplanting with and without soil, and dibbling methods on plant morphology, seedcotton yield, and its components on cotton (*Gossypium hirsutum* L.) Cv. MNH-93. It was concluded that there were no significant differences between dibbling and transplanting the seedlings with soil. Both these treatments produced significantly higher number of successful hills, monopodial and sympodial branches, number of bolls per plant and yield of seedcotton than transplanting the seedlings without soil. However, there were no treatment effects on ginning turn out and fibre length.

Key words: Cotton, Transplanting, Dibbling, Fibre quality.

Introduction

The unexpected early rains after sowing and before emergence of seedlings cause crust formation and result in poor plant stands. Sometimes, under severe conditions, re-sowing becomes necessary. However, it is possible that transplanting may be useful to fill gaps in order to achieve acceptable plant stands. Abdel-Ghaffar *et al.* [1] concluded that transplanted plants had lower seedcotton yield than early or late direct-sown plants. They also determined that yields were higher where older seedlings were transplanted. Patel and Shah [2] further observed that cotton seedlings grown in polythene bags and transplanted late with on-set of rains gave higher seedcotton yield as compared with a direct late-sown crop. Abbas *et al.* [3] also reported that transplanting in mid-April using 20-days old seedlings produced the highest number of plants, successful hills, fruiting branches and open bolls. The younger seedlings, early transplanting and earlier directly-sown plants gave increased seedcotton yield and yield components. Gopalaswamy *et al.* [4] observed that transplanting 30-day old seedlings on 3 dates gave higher yields than sowing on the same dates; the difference in yield between the two methods increased with a delay in sowing/transplanting. Deshmukh *et al.* [5] while studying the feasibility of advancing the sowing date by transplanting cotton seedlings with the on-set of rains observed that the cotton seedlings grown on raised seedbeds gave better seedcotton yield than sowing cotton seeds in a thick layer of 8–10 cm of F.Y.M., fine river sand and sawdust on optimum date. Salam [6] reported transplanting of cotton after the harvest of wheat in southern cotton growing areas in China that raising cotton seedlings in nutrition pots and then transplanting them to the field after wheat harvest permits early sowing. It is required that seedlings be raised, 30–40 days before wheat harvest. A sketch of instrument called Pot maker used to make pots from the wet soil for raising of seedlings for transplanting is shown in Fig. 1. Haque [7] visited China alongwith a Pakistani team and reported that cotton in Fung Pang Peoples Commune is sown by seed drill followed by transplanting. When the transplanting system is used seedling is done on raised ground on the periphery of cotton field in March. On attaining the height of 15 cm, the seedlings are transplanted in May. If transplanting would be successful under Multan conditions, it could be utilized for gap filling. The present study was initiated to see the effect of transplanting on cotton under Multan conditions.

Material and Methods

The experiment was conducted during 1984-85 and 1985-86 on MNH-93 at the Cotton Research Institute, Multan. The nursery was planted on June 1984 and June 1985. The direct sowing in the both years was also done on the same date by dibbling 4 or 5 seeds per hill with 30 cm between plants and a row width of 75 cm. The net plot size was 7.6 x 3.1 m. Thinning in the nursery was completed on 25th June, 1984 and 26th June, 1985, to provide space for proper nourishment of the plants to be transplanted later on in the field. Final thinning in

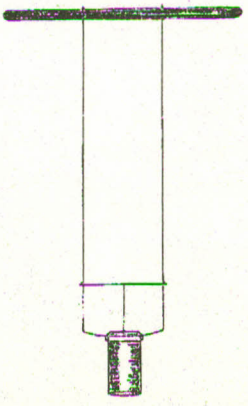

Fig. 1. Implement for making pots for transplanting.

the direct-sown treatment was done 30 days after transplanting the seedlings from the nursery. The plantlets were transplanted with soil and by pulling the seedlings and transplanting with soil. Hence the treatments were dibbling (T_1), transplanting with soil (T_2) and transplanting without soil but with all leaves and cotyledons (pulling) (T_3).

After transplanting, the treatments T_2 and T_3 were irrigated. Other cultural operations like weeding, hoeing, irrigation and plant protection thereafter were kept uniform for all the treatments. The experimental design was randomized complete block with three replications. The data for the following characters were recorded.

(1) Number of plants survived after transplanting (%); (2) Seedcotton yield (kg/ha); (3) Ginning turn out (%); (4). Staple length (mm); (5) Plant height (cm); (6) Number of bolls/plant and (7) Monopodial and sympodial branches per plant.

The analysis of variance was used and significant differences among the treatments were determined by protected LSD test at 5% probability level as described by Steel and Torrie [8].

Results and Discussions

Survival percentage. Transplanting the seedlings with soil resulted in a higher percentage survival than transplanting by pulling without soil (Table 1). Averaged over two years, 95% of the seedlings survived transplanting with soil and 74% by transplanting without soil. There was no difference between direct-sowing and transplanting with soil. Poor survival in transplanting without soil treatment may be due to excess transpiration of trauma from the plants and root injuries while pulling up a cotton plant without soil.

Seedcotton yield. Averaged over two years the cotton sown by dibbling gave the highest seedcotton yield (3845 kg/ha) and it was followed by transplanting with soil (3776 kg/ha) (Table 1). However, the difference was not statistically significant. Transplanting the seedlings without soil resulted in a significantly lower yield (2193 kg/ha). These findings confirm those of Abdel-Ghaffar *et al.* [1] who also reported that transplanted plants had lower seedcotton yield than direct-sown plants. However, these results are not in agreement with findings of Deshmukh *et al.* [5] who recorded higher yields from transplanted crops. The difference may be due to specific circumstances as they conducted their trials under rainfed conditions. The lower seedcotton yield in case of plants transplanted after pulling from the soil is mainly due to poor plant stand per unit area.

Ginning turn out percentage. The data for ginning turn out percentage (Table 1) revealed that there were no differences in ginning turn out percentage among the three methods of cotton sowing. However, ginning turn out percentage showed a tendency for slightly higher in direct- sown plants as compared to transplanted plants sowing during both years.

Staple length. Regarding the effect of different treatments on staple length, the methods of sowing did not affect this fibre trait. However, on the average of the two years (Table 1), the staple length trended to be marginally higher in case of transplanted plants with soil (28.4 mm) and was closely followed by direct-sown (28.2 mm), with the lowest (27.9 mm) being in the case of transplanting without soil.

Number of bolls per plant. Averaged over two years, the direct-sown plants produced the highest number of bolls per plant (35.7) followed by transplanting with soil (34.6 bolls per plant) (Table 2). The difference 1.1 bolls did not have a significant effect on seedcotton yield. However, transplanting without soil produced significantly fewer bolls per plant (21.8) than the other two treatments; one possible reason for the lower yield at seed. These findings are partly in agreement with those of Abbas *et al.* [1] who also found that directly-sown plants had a favourable effect on yield components.

Plant height. The direct-sown plants produced the tallest plants, 147 cm against 142 cm in the case of plants transplanted with soil; however, the difference was not significant (Table 2), plants transplanted without soil were significantly shorter (105 cm). From this it was observed that those plants were not able to make use of the inputs properly through out

TABLE 1. EFFECT OF TRANSPLANTING AND DIBBLING ON SURVIVAL PERCENTAGE AND SOME ECONOMIC CHARACTERS OF COTTON.

Year	Treatments	Survival (%)	Seedcotton yield (kg/ha)	Ginning turn out (%)	Staple length (mm)
1984-85	T_1	100	3890	36.2	28.2
	T_2	97	3801	36.0	28.8
	T_3	76	2238	35.7	28.0
1985-86	T_1	100	3800	37.1	28.2
	T_2	93	3751	36.8	27.9
	T_3	72	2149	36.4	27.8
Average 1984-85		91	3310	36.0	28.3
1985-86		88	3233	36.8	28.0
Mean effects for methods of sowing					
	T_1	100a	3845a	36.7a	28.2a
	T_2	95a	3776a	36.4a	28.4a
	T_3	74b	2193b	36.1a	27.9a
Ciritical differences					
Year		N.S.	N.S.	N.S.	N.S.
Method of sowing		7*	172*	N.S.	N.S.
Interaction		N.S.	N.S.	N.S.	N.S.

Figures with the same letter do not differe (P≤0.05). N.S. = Non significant. * = Significant at P ≤ .05. T_1 = Dibbling. T_2 = Transplanting with soil. T_3 = Transplanting without soil (with all leaves and cotyledons).

Table 2. Effect of Transplanting on Some Morphological Characters of Cotton.

Years	Treatments	Plant height (cm)	Number of monopodial branches/ plant	Number of sympodial branches/ plant	Number of bolls/ plant
1984-85	T_1	148	3.0	17.7	36.5
	T_2	143	2.8	15.0	35.0
	T_3	107	1.4	10.3	22.6
1985-86	T_1	146	2.8	16.7	34.9
	T_2	140	2.5	15.6	34.2
	T_3	102	1.2	9.0	20.9
Average 1984-85		133	2.4	14.3	31.4
1985-86		129	2.2	13.8	30.0
Mean effects for method of sowing					
	T_1	147a	2.9a	17.2a	35.7a
	T_2	142a	2.7	15.3a	34.6a
	T_3	105b	1.3b	9.7b	21.8b
Critical differences					
Year		N.S.	N.S.	N.S.	N.S.
Method of sowing.		7.0*	0.5*	2.2*	3.0*
Interaction		N.S.	N.S.	N.S.	N.S.

Figures with the same letter do not differ ($P \leq 0.05$). N.S. = Non significant. * = Significant at $P \leq .05$. T_1 = Dibbling. T_2 = Transplanting with soil. T_3 = Transplanting without soil (with all leaves and cotyledons).

the season and hence remained shorter. This may be due to the reason that their root system was injured while pulling up a cotton plant without soil which could never be recovered throughout the growing period.

Number of monopodial and sympodial branches per plant. The direct-sown plants produced highest number of monopodial and sympodial branches (2.9 and 17.2 per plant respectively) (Table 2). It is closely followed by the treatment where the plants were transplanted with soil. However, the differences between these two treatments for number of branches were statistically non-significant whereas the plants transplanted without soil produced significantly lower number of monopodial and sympodial branches (1.3 and 9.7) respectively.

Conclusion

It was observed that the plants transplanted with soil gave very close results to the direct-sown plants for all the characters under study. On the other hand, the plants transplanted without soil were badly affected by the transplanting shock and trauma transpiration and they remained short, developed fewer number of branches, lower number of bolls per plant and ultimately produced lower seedcotton yield. Therefore, it was concluded that transplanting may be used to fill in the gaps and raise the plant stand to a desirable level. Direct seeding cannot be utilized for this purpose because the plants would be at least 7–10 days later than the other plants. For commercial utilization of transplanting with soil, the equipment mentioned by Salam [6] was introduced among the farmers.

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