

Evaluate the Cotton Transplantation and its Impact on Yield Performance Components in Saline Lands

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ABSTRACT

This study examines the effects of planting order and transplant's age in saline soils on performance. Thus the main factor is planting order and the minor factor is transplant's age. In this study, in each pot a seed of Sepid cotton variety was planted. The project was examined by two split plots and in a randomized complete block design with three replicates. The soil type was silt loam with 7/6 pH and the electrical conductivity of 9/68 dS/m and planting order element was two rectangular and zigzag areas. According to the analysis results, zigzag planting variance due to a more uniform distribution and less competition between plants to receive food, will provide a more favorable growth condition and adds to the number of vegetative branches. The number of bolls per plant in rectangular planting order was less than those in zigzag planting order. Thus it can be said that zigzag planting order in saline lands will perform better. Delay in transplantation will reduce performance and the same factor reduces the number of bolls, vegetative branches and grain weight.

Key words: Cotton performance components, saline lands, planting order, cotton transplantation.

Introduction

One way to shorten the period of crop growth is transplantation. Research shows the best common method in cotton transplantation is the use of paper pots. In cotton transplantation, it is possible to save seed, remove the thinning process, and optimize the usage of limited water resources especially in spring periods when adjacent fields simultaneously irrigate their plantations. Cotton transplantation together with annual autumn corn plantation, increase the productivity of the farm land. The inclement weather at the early of growth season, including a persistent rain, low temperatures and low sun light makes transplantation a superior method, compared with direct seeds planting. Also older transplants ages are superior compared to younger transplants [6]. Cotton cultivation is common in many parts of the world, including Latin America, Asia and Europe, for several unique properties in its fibers. Emergence the new technology to extract edible oil and protein from its grains for human consumption, and also its usable grain and forage for livestock consumption, adds largely to the importance of this agricultural - Industrial crop [3]. Like other agricultural plants, cotton is affected by several factors including genotype, planting date, and soil fertility and moisture, density, etc. Plant density influences on

competitiveness between the boots, and directly affects the components performance. In cotton plantation, generating more number of bolls per area unit is essential for a higher efficiency. In this line, regarding the importance of cotton and its value in the international market, and to continue its production and to improve the efficiency of transplantation in salty lands, the present research studies and determines the planting order and its performance in late cultivation in salty lands.

1.2 Theoretical basis and background of research:

Salinity is one of the non-biological challenges which affects production and quality of crops [5]. Ray and Khaddar [13] showed that soil salinity, decreases the formation and development of vegetative branches. One of the effects of soil salinity on plants is ion toxicity (by sodium and chlorine) and osmotic stress, and metabolic imbalance is caused by ionic toxicity, osmotic stress and mineral deficiency [19]. For this reason applying transplantation in saline lands requires more attention. In Furrow and Ridge (or Gutter Connected) plantation method in saline lands, most of minerals are compressed the highest point of Ridge due to water evaporation. To avoid the effect of minerals on seed germination or transplantation, it is better to

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locate the plant in rather salt less surroundings of the Ridge [11]. Accordingly zigzag planting appears to be appropriate to reduce salinity damage.

Research has shown that transplantation compared with direct seed planting, increases the cotton yield. Also transplantation keeps the sensitive cotton germination stage safe from saline soils, and thus has good effects on cotton yield. In addition, it will provide adequate opportunity for original land preparation [2,17,19], but recent research has not fully accepted this conclusion [14,7,12]. As research results are different, it requires further investigation in this case.

According to Choi *et al.* [4] transplanting after barley harvest, increase the cotton yield compared with direct seed planting, but in transplantation after barley harvest, the cotton yield has been the same as direct seed plantation. Seif-El-Nasr *et al.* [15] showed that transplantation, not only reduces the use of fertilizer, but also increases the yield compared to direct seed planting and also transplanting after wheat harvest.

In a research with 30 and 40 days old ransplants, it was found that cotton yield will be reduced with delay in transplantation. But transplants in different ages, have shown similar behavior. [16].

Other studies suggest that the cotton yield has been reduced by delay in transplantation and transplants' age. [1,8]. Jawaheri [14] transplanted cotton on April 21, May 10, May 31 and June 20 and showed that in delayed transplantation the cotton yield and many of its components have been reduced.

Also Khalili Samani [10] showed that the number of vegetative branches in cotton plant was

highly influenced by distances between plants and rows.

Materials and Methods

This research was conducted in the cotton research station field of Karkandeh in 2010, in two split plots and in a randomized complete block design with three replicates. The soil type was Silt loam with pH 7/6 and the electrical conductivity of 9/68 dS/ m. Planting design indicator were two rectangular surface with one zigzag row on the Ridge. The length and diameter of used paper pots were respectively 13 and 2/3 cm. In each pot a seed of Sepid cotton variety was planted. Transplantation was mechanical and thinning operations and gap filling took place a month after the date of transplantation. To prevent any disease or pests, the Oxydemeton methyl pesticide was used in the nursery. Based on chemical analysis of soil and crop recommendations, 50 kg of nitrogen (from urea source), 100 kg of phosphorus (from source of ammonium phosphate), and 100 kg of potassium (from potassium sulfate source) was added per hectare of land. 5/3 liters per hectare of Ethalfuralin herbicide was used before planting to combat weeds. The crop was harvested on November 16 and December 16. 15 random plants from each plot were selected to examine the average number of bolls per plant and the number of branches.

1.4 Findings:

The results of the research are presented in Table 1 and then will be analyzed.

Table 1: Variance analysis and other variable

Variable	df	Monopodia (no.plant-1)	Sympodia (no.plant-1)	Bolls (no.plant-1)	Bolls no.	Bolls weight (g.boll-1)	seeds (no.boll-1)	seeds weight (g10-3seed-1)	plant height	Seedcotton yield
Transplanting age(TA)	2	5.159	10.98	1.125		0.002	0.0048	20.08	98.254	305669
Transplanting date(Td)	2	2.698	1.565	125.986		0.056	35.026	718.25	48.265	5618982
Error a	3	0.056	3.049	2.016		0.098	0.028	2.015	29.512	2788955
Planting arrangement(Pa)	1	4.631	3.876	10.742		0.054	0.044	81.25	34.256	110988
Error b	4	0.098	4.181	18.184		0.029	3.199	0.028	46.231	50981
Td.Ta	3	1.589	15.284	2.487		0.318	0.009	9.892	128.365	6754213
Pa.Ta	3	0.456	4.187	0.365		0.0375	0.668	6.183	46.233	3487456
Td.Ta.Pa	3	0.012	18.369	4.425		0.0045	0.0085	2.576	157.988	9684213
Error c	36	0.988	5.0231	2.545		0.0838	2.425	61.185	58.231	1975632
C.V(%)		17.48	15.985	12.584		6.874	5.346	7.645	136.248	15.285
Transplanting date	20-May	4.485	3.812	14.33		4.583	28.103	103.989	122.364	32968
	15-June	3.987	2.765	10.864		4.458	29.856	96.659	98.564	2586
	Singel Row	3.905	2.709	12.175		4.381	28.985	97.988	97.233	2787
	Double Row	4.493	3.905	13.098		4.478	29.465	101.654	108.359	3083

Based on ZHU [19] the decrease of vegetative growth duration and encountering the growth stages with warm months of the year reduces the production and development of vegetative branches. As you can see the results of combined variance analysis (Table 1) also shows a delayed transplant will reduce the number of vegetative branches. Based on the results of variance analysis, the transplantation method compare with direct seed plantation method,

increases the number of vegetative branches. Khalili Samani [10] showed that the number of vegetative branches in cotton plants is affected by changes in and the distance between and inside the planting rows. Accordingly, the present study using the results of variance table analysis showed that the bushes' height variations in the transplantation method compared with the direct seed planting method are the same and insignificant. Zigzag planting due to a

more uniform distribution and less food competition between plants, makes the growth conditions more favorable and adds to the number of vegetative branches. As you can see delay in transplantation has reduced the number of bolls per plant, but has increased the number of seeds per boll. The number of bolls per plant with rectangular planting is less than those in zigzag planting. As Kamel *et al.*, [7] recognized, the transplant age and the number of bolls per plant was not significantly correlated. But the performance of cotton in the bolls, in zigzag planting was higher compared to rectangular planting. Since zigzag planting made the effects of soil salinity insignificant and also increased the number of bolls per plant, it increased the performance of cotton in the bolls. For this reason zigzag planting will have better performance in saline lands.

1.5 Summary:

In late transplantation the short growth period reduces the number of bolls per plant and increases the number of seeds. The performance of cotton in the bolls on May 20 was higher than transplanting on June 15. The type of used fertilizer and the pot height damaged the roots during transplanting and this factor reduced the accuracy of this research. It seems that the plant height has a significant correlation with the age of transplants. Delay in transplantation reduced the height of plants and this factor has affected the number of bolls per plant. This study also considered the effect of soil moisture levels and the summary of results show that an increase in the soil moisture and reservoir reduced the apparent performance. Therefore, a closer research on impact of this factor is suggested.

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