

Study on Population Fluctuation of *Thrips tabaci* (L.) on Cluster Cultivars in Ultra Narrow System in the Field's Cotton Golestan Province of Iran

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Abstract: In the planting system, very narrow row spacing with spacing of rows between 20 and 40 cm is considered. This planting method increases production. Experiments to study and compare the population thrips on 3 cluster variety and one check cultivar, using the method of narrow planting distance of 20×20 and 20×80 cm in the form of factorial design in the form of a randomized complete block design with 3 replications in Hashemabad cotton research station in Gorgan during the two years 2018-2019 was evaluated. Statistics of different stages of the thrips pest it was recorded weekly in the tested treatments and recorded in special tables. Based on studies the results of combined analysis of variance show that the yield in the cultivars tested in Sajedi® cultivar with a distance of 80 cm with an average yield of 1696 gr in the plot and Golestan® cultivar 80 cm with 1622.9 gr in the plot with the highest yield and T2® cultivar with a distance of 20 cm, 847.2 gr in plot had the lowest yield. Infestation rate of cluster cultivars tested in very narrow cultivation thrips population density in Golestan® cultivars with a distance of 80 cm and Sajedi® with a distance of 20 cm, 1.723 thrips per leaf with the most infestation and Golestan® cultivar with a distance of 20 cm, 1.388 thrips least infestation was measured in leaves. Therefore Golestan® cultivar with an average yield and thrips population infestation, the lowest cotton cultivation in agriculture ultra-narrow row 20 centimeters had in the cotton fields.

Keywords: *Thrips tabaci*, UNR, Cotton, Golestan Province

1. Introduction

Compared to the more spaced row spacing system, there will be evident changes in the number of bolls per plant and the state of the canopy. In this system, the number of bolls per plant is reduced and the height of the plant and the length of branches are decreased. (Galanopoulos, *et al.*, 1980) [5]. Reducing cotton production costs, especially through early maturity, reducing pesticide use by interrupting the critical cycle of pests, reducing irrigation water consumption is one of the benefits of dense planting and in different ways, including planting narrow and very narrow intervals, plating a clump. Also, with the advent of mechanized, early harvesting of cotton has become very important. Agronomic and environmental factors that have a great effect on the precociousness of the product, we can plant density, Plant pest control, nitrogen fertilizer management and proper irrigation periods. More densities generally increase aging, but management of such farms is very important. In this

type of farming, due to increased competition, the loss of buds increases, which in each plant leads to a decrease in yields (Kucheki, 1985) [8].

In the planting system, the row spacing is very narrow, where the planting row spacing is considered to be between 20 and 40 cm. The advantages of this planting method include increasing early maturity as well as crop yield under drier climatic conditions (Philip, 2000 and 2001) [12, 13]. In the planting system, very narrow row spacing with spacing of rows between 20 and 40 cm is considered (Kirby, *et al.*, 1990) [7]. Increasing prematurity leads to reducing pesticide consumption and is one of the important factors in reducing production costs and reducing environmental pollution. Prematurity is increased by reducing the number of bolls per plant (Bin Mohamad and Sappenfield, 1982) [1]. Simultaneous ripening of bolls or their faster maturation leads to more efficient use of hormones, insecticides, and increased yield (Jesus Rossi, *et al.*, 2004) [9]. In one study (Wright, *et al.*, 2011) [14] the main goal was to

determine cultivars that did not suffer from yield loss and quality traits at very high densities. Early, medium clay and full clay were applied. The fiber yield of an early cultivar and limited growth was not affected by density but in the case of full clay cultivar and unlimited growth, yield decreased with increasing density. In another study (Philip, 2001) [13], three densities were performed by spacing 25, 50, and 100 cm with three cotton varieties. It was concluded that density was highly effective on morphological traits and yield components and higher densities reduced vegetative growth and crop production of each plant, although more dry weight was obtained per unit area in the latter condition. Medium densities showed higher maturity and higher yield compared to higher densities, no significant differences were observed between cultivars. Also, the interaction effect of cultivars on density was not significant. In studies conducted on the rate of infection of successful cotton lines to major pest killers of the Tbl-180, N2G80, Skt-133 and Skt-134 lines in comparison with the common cultivar of Golestan province, the most common pests have the lowest amount of infection. In researches on the amount of infection of the population of sucking pests in Golestan province, the Skt-134, Tbl-80 and N2G80 hybrids has the least infection with the major sucking pests such as thrips, aphids, whitefly and cotton leafhoppers (Darvish Mojeni, 2012, 2013) [2, 3]. In all cultivars, the highest yield was obtained at high plant densities, so that the highest yield in Sahel cultivar was observed at plant densities of 125,000 plants per hectare, In the cultivar Saiokra 324 at a plant density of 125000 and 62500 plants and In Zeta-2 cultivar, 125000 plants were also reported. There are different opinions about the effect of row spacing on performance in different studies. Cotton farming is expanding in Ultra-Narrow Row in cotton growing countries (Ghajari and Ghadrei, 2006) [6]. In a very narrow row spacing system where the row spacing is considered to be between 20 and 40 cm, there will be obvious changes in terms of the number of bolls per plant (Donyavian, 1999) [4]. Thrips population density is very narrow gap in agriculture, the yield rate of the tested intervals Golestan® cultivar distance of 80 cm with an average yield of 4422.87gr/plots maximum yield and Sepid® with a distance of 25 cm with an average yield of 3108.33gr/plots had the lowest yield. Infestation of the tested varieties in cultivation are very narrow thrips populations on Sahel® and Golestan® cultivar with 25cm respectively, 3.52 and 3.11 thrips per leaf has the highest infestation and number density on Sahel® with distance 80cm, 1.24 thrips per leaf have shown minimal infection. Therefore Golestan® cultivar with an average yield important sucking pests such as thrips population infestation, the lowest cotton cultivation in agriculture ultra-narrow row 80 and 25 centimeters had in the cotton fields (Mojeni, 2019) [10]. Infestation rate of cluster cultivars tested in very narrow cultivation of green aphid population density on Sajedi cultivars with a distance of 80 cm and the khorshid with a distance of 20 cm with densities of 41.39 and 40.36 aphids per leaf, respectively, with the highest aphids per leaf and cultivars T2 and the khorshid with a distance of 20 cm with 23.59 and 29.04 aphids, respectively. They had the least infestation in the leaves (Mojeni, 2021) [11].

2. Material and Methods

This research was conducted in Hashemabad cotton research station in Gorgan. The treatments included 3 cotton cluster cultivars (Khorshid®, T2® and Sajedi®) and check (Golestan® cultivar) and with two narrow planting intervals of 20 × 20 and 20 × 80 cm were evaluated factorially in a randomized complete block design with three replications. Each plot consisted of 10 planting lines of 12 m with planting pattern. Two side lines and half meters from the beginning and end of each row are considered as margins and all statistics were performed from the middle rows. To study population changes of thrips regular weekly and random sampling was done on plants in each plot of 15 leaves for thrips pest the number of nymphs and adults were counted on them and recorded in special tables. The performance of each experimental plot after the removal of two lateral lines and one meter margin from the beginning and the end of each row were measured all records were taken from the middle rows. The obtained data were analyzed as a factorial experiment in a randomized complete block design using SAS software and the mean data were compared by LSD test.

3. Results and Discussion

Based on studies conducted during two years of experimentation and statistical analysis, data conversion and combined analysis of variance shows: In terms of average yield, the amount of yield obtained in the cluster cultivars tested in very narrow agriculture by performing combined analysis of variance in Sajedi® cultivar with a cultivation distance of 80 cm with 1696 gr and Golestan® 80 cm with 1622.9gr in plot has the highest yield in plot in group a and cultivars Golestan® and T2® with a distance of 20 cm with 867.4 and 847.2 gr /in plot in group c with the lowest yield at the level of 5% showed a significant difference (Tables 1 and 2).

Table 1. Analysis of composite variance related to cotton yield (gr/plot) in cluster cultivars in very narrow agriculture at Hashemabad station 2018-2019.

Sources of changes	df	S.S	MS	F
Rep.	2	0.226	0.113	0.71ns
Treat.	7	0.307	0.044	0.28**
year	1	7.821	7.821	49.10**
Erro.	37	5.894	0.159	
CV	14.17%			

Table 2. Comparison of mean LSD and grouping of performance-related treatments.

Treat. (variety)	Average yield (gr/plot)	5%
Sajedi® 80 cm	1696	a
Golestan® 80 cm	1622.9	a
Khorshid® 80 cm	1295	ab
T2® 80 cm	1196.1	ab
Sajedi® 20 cm	1039.7	b
Khorshid® 20cm	913.3	b
Golestan® 20 cm	867.4	bc
T2® 20 cm	847.2	c

In terms of infestation rate to cotton thrips population in

cluster cultivars tested in very narrow crops by combined analysis of variance of Golestan® and Sajedi® cultivars with a distance of 80 and 20 cm with a density of 1.723 per leaf, respectively, has the highest infection in group a and Golestan® cultivars. T2® cultivar with a distance of 20 cm with a density of 1.388 and 1.498 numbers per leaf in group b and c at the level of 5% compared to the control showed a significant difference (Tables 3, 4 and Figure 1).

Table 3. Analysis of composite variance related to the effect of very narrow agriculture on the population of *Thrips tabaci* (L.) On cluster cultivars in Hashemabad station 2018-2019.

Sources of changes	df	S.S	MS	F
Rep.	2	0.074	0.037	0.52ns
Treat.	7	0.595	0.085	1.20**
year	1	0.148	0.148	2.09*
Erro.	37	2.628	0.071	
CV	17/13%			

Table 4. Comparison of mean LSD and grouping related to a population density of cotton thrips in treatments.

Treat. (varity)	Thrips (Num/leaf) average.	5%
Golestan® 80 cm	1.723±0.012	a
Sajedi® 20cm	1.721±0.009	a
Khorshid® 80 cm	1.611±0.019	ab
Khorshid® 20 cm	1.502±0.018	ab
Sajedi® 80 cm	1.500±0.002	ab
T2® 80 cm	1.500±0.002	ab
T2® 20 cm	1.498±0.003	bc
Golestan® 20 cm	1.388±0.110	c

Thrips pest is active in cotton fields of Gorgan region from May to late June from the 2-leaf stage to the 6-8-leaf stage of the cotton plant and causes damage to cotton fields (Darvish Mojeni 2012) [2]. According to the results of this study, in very narrow agriculture, the population of thrips has decreased. Golestan® cultivar with a distance of 25 cm, 3.52 thrips per leaf has the highest density and the same cultivar with a distance of 80 cm, 3.11 thrips per leaf is placed in the

next group. Sepid® cultivar with a distance of 80 cm had 1.24 thrips per leaf. In the 2013 study, the population of Thrips was less dense than in 2013 due to cold and humid weather conditions at the beginning of the season. Sahel cultivar with a distance of 25 per year 2013 cm with 3.11 thrips per leaf had the highest density and Sepid® cultivar with a distance of 25 cm with 2.14 thrips per leaf had the lowest infestation. Therefore, plant density higher per unit area, the thrips very is population on the cotton plant. This is due to the better shading level for thrips activity (Darvish, Mojeni, 2013) [3].

In the studied cluster cultivars, Golestan® and Sajedi® cultivars with densities of 1.723 and 1.721 had the highest infestation per leaf and T2® and Golestan® cultivars with a distance of 20 cm with densities of 1.498 and 1.388 per leaf cultivars had the lowest density. This has been done with research that cultivating a very narrow row of cotton production can have a significant impact on insect management (Mojeni, 2019) [10]. Pests such as aphids, whiteflies and thrips can be indirectly controlled with a very narrow culture system (Jesus Rossi, *et al.*, 2004) [9], which is consistent with the studies in this study. Study: Increasing the number of cotton plants from 50,000 plants per hectare to 125,000 plants per hectare the population of important sucking pests such as thrips, aphids and whitefly were easily controlled due to the increase of their natural enemies in the cotton field (Wright, *et al.*, 2015) [15].

4. Conclusion

Based on the results of analysis of variance and comparison of mean yield of cultivars, Golestan® and T2® cultivars have good yield in very narrow cultivation with an average of 867.4 -847.2gr per plot and the lowest population density of thrips 1.388 – 1.498num/leaf and are recommended to farmers for this cultivation method.

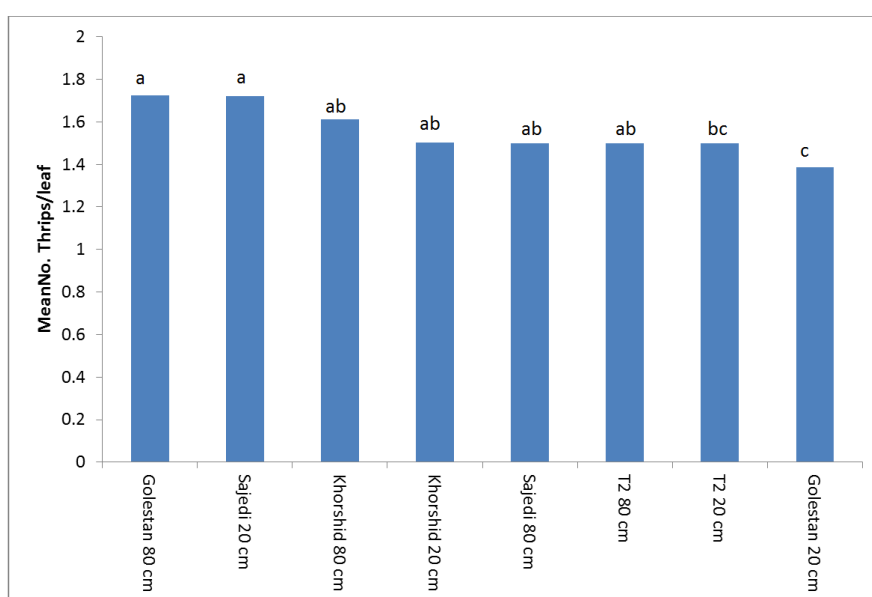


Figure 1. Mean changes of population *Thrips tabaci* (L.) on cotton cluster cultivars in Golestan province 2018-2019.

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