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The effect of very narrow cultivation of cluster cultivars on population dynamic *Bemisia tabaci* (Gen.) in the cotton fields Golestan province of Iran.

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ABSTRACT: Cotton cultivation is expanding in very high densities under the name of Ultra Narrow Row in cotton-rich and developed countries. The advantages of this planting method include increasing maturity as well as crop yield. This experiment is to examine and compare the population of cotton whitefly On 3 cluster cultivars and one control, using the method of narrow planting distance of 20 × 20 and 20 × 80 cm as a factorial design in the form of a randomized complete block design with 3 replications in Hashemabad cotton research station in Gorgan during two years 2018- 2019 was evaluated. Statistics of different stages of cotton whitefly pest were recorded weekly in the tested treatments and recorded in special tables. Based on the 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 wash of 1696 gr in the plot and Golestan cultivar 80 cm with 1622.9 gr in the plot with the highest yield and cultivar T2 With a distance of 20 cm, 847.2 gr had the lowest yield in plot. Infestation rate of cluster cultivars tested in very narrow cultivation of whitefly population density on Golestan cultivars with a distance of 80 cm, Sajedi with a distance of 20 cm with 65.50 and 57.75 whitefly in the leaves had the highest infestation, respectively, and on Sajedi cultivars with a distance of 80 cm with a density of 46.75 whitefly on the leaves had the least infestation.

***Keywords*:** Bemisia tabaci, Cotton, UNR, and Golestan Province.

INTRODUCTION

In the planting system, very narrow row spacing with spacing of rows between 20 and 40 cm is considered (Kirby *et al.,* 1990). 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 and plant height and length of branches and decreases (Galanopoulous,*et al.,*1980). 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). In China, various UNR cropping systems are carried out on a large scale in more than 1 million hectares of cotton fields about 10 years are dedicated to this method of cultivation. One of the potential benefits of ultra-narrow cotton row systems is that they reduce production costs under certain conditions and make it possible to increase yields, especially in poor soils or short areas of the season (Bin Mohamad and Sappenfield, 1982).

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 suckling pests such as thrips, aphids, white fly and cotton grasshoppers (Darvish, Mojeni, 2012, 2013). The aim of this study was to investigate the effects of very low distance farming (UNR) on the populations of sucking pests in arable crops in Golestan province for the first time.

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).

Infestation levels of cultivars of cotton aphid population, Golestan and sepid with a distance of 80cm, respectively, with a density of 53.42,49.18 and 41.35 aphids per leaf has the highest infestation, Sepid and Sahel varieties 25cm,respectively, with a density of 9.26 and 7.11 aphids per leaf had the lowest infestation. Population Bemisia levels of cotton cultivars in Golestan, Sahel and Sepid 25cm respectively with densities of 27.63,24.31 and 20.86 Bemisia on leaf number, maximum infestation and Sepid Varity with a distance of 80cm with a density of 6.15 Bemisia number of leaves have the least infestation. Therefore Golestan cultivar with an average yield important sucking pests such as population infestation, aphids and whitefly the lowest cotton cultivation in agriculture ultra-narrow row 80 and 25 centimeters had in the cotton fields(Mojeni,2019).

The cultivar Saiokra 324 had more yield and yield than the number of bolls per plant. This figure is more than 400 to 600 kilograms in comparison to the Sahel variety and produces more than 200-500 kilograms from Zeta-2 variety. 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).

The results of studies by Wright *et al*., (2011) showed that fiber yield decreased by 9 plants per row compared to 1 and 5 plants. The yield of fiber of early cultivar and limited growth was not influenced by density, but in the case of complete clay and unlimited growth, with increasing density, the yield decreased.

Increasing the yield of the product by increasing the density in the above mentioned method, regardless of weather conditions, is also reported in some reports (Jesus Rossi, *et al.,* 2004). In the closure of a faster or shadow surface, the area of life for weeds is severely reduced (Phlip, 2001). On the other hand, this reduces water evaporation after irrigation and saves it (Jesus Rossi, *et al.,* 2004). The study of the increase in the number of cotton plants ranging from 50,000 per hectare to 125 thousand. The population of important sucking pests such as aphids and white fly were easily controlled due to the increase of their natural enemies in the cotton field (Wright, *et al.,* 2015).

Material and Methods:

In this method (UNR), planting is used instead of the distance of open rows at distances below 40 cm.This research was carried out in Hashemabad cotton research station in Gorgan on 2018-2019. The treatments included 3 cluster cotton cultivars (Khorshid, T2 and Sajedi and Golestan cultivar) with two narrow planting distances of 20 × 20 and 20 × 80 cm as a factorial design. Random complete blocks were evaluated in three replications. Each plot consisted of 10 planting lines of 12 m with planting pattern of 20 × 20 and 20 × 80 cm. 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. After the emergence of pests in the field, to study population changes *Bemisia tabaci* regular weekly sampling was performed on plants on 15 leaves per plot.

Performance was also yield variety measured in the experiment. 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.

Results and discussion:

According to the studies carried out, the data obtained from or transduction of different traits showed the results of the analysis of the combined mean of the test data the treatments of cultivars have a significant difference in cultivars in very narrow rows. In terms of average yield, the amount of washes obtained in cluster cultivars tested in very narrow crops by performing combined analysis of variance in Sajedi cultivar with cultivation distance of 80 cm with 3392kg/ha and Golestan 80 cm with 3245.8kg/ha had the highest yield in Group a and Golestan and T2 cultivars with a distance of 20 cm with 2168.5kg/ha and 1694 kg/ha , respectively, in group c with the lowest yield at the level of 5% showed a significant difference (Tables 1 and 2).

In terms of the average infection rate of cotton whitefly population in the cluster cultivars tested by performing combined analysis of variance in very narrow crops Golestan cultivars with a distance of 80 cm Sajedi with a distance of 20 cm, with a density of 65.50 and 57.75 pieces of whitefly per leaf in group a and Sajedi with a distance of 80 cm and T2 80 cm with a density of 55.94 and 46.75 pieces of whitefly per leaf, respectively in group b, they showed a significant difference at the 5% level compared to the control (Tables 7, 8 and Figure 1).

Whitefly cotton is active in the cotton fields of Golestan province from the end of July to the middle of October. Sahel cultivar 25 cm with 24.31 white fly had the highest density and Golestan® cultivar 80 cm with 19.81whitefly had the lowest density (Darvish,Mojeni, 2012,2013). In the studied cluster cultivars, Golestan and Sajedi cultivars with a density of 65.50 and 57.75(whitefly per leaf) had the highest infection and Sajedi cultivar with a density of 46.75 whitefly on the leaf had the least infection (Mojeni, 2019). The results were the same as studies in other countries. Narrow row cultivation of cotton production can have a significant impact on the management of these insects, but little information is available to make appropriate adaptations to insect control strategies. Important cotton pest's population such as aphids, whiteflies, and spider mites is reduced. Almost all cotton pests can be controlled indirectly with a very narrow culture system (Wright, *et al.,* 2011). 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).

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

Table 3. Analysis of composite variance related to the effect of very narrow agriculture on the population of whitefly *Bemisia tabaci* on cluster cultivars in Hashemabad station 2018-2019

Sources of changes	df	S.S	MS	F
Rep.	2	99.875	49.937	0.20ns
Treat.	7	1074.667	153.523	0.61**
year	1	35769.006	35769.006	142.25**
Erro.	37	9303.616	251.449	
CV	21.91 %			

Table 4. Comparison of mean Lsd and grouping related to population density of cotton whitefly in treatments

Treat.(variety)	Whitefly (Num/leaf) average.	5 %
Golestan80 cm	65.50	a
Sajedi 20cm	57.75	ab
Golestan 20 cm	57.42	ab
Khorshid 80 cm	57.34	ab
Khorshid 20 cm	57.14	ab
T2 20 cm	56.72	ab
T2 80 cm	55.94	ab
Sajedi 80 cm	46.75	b

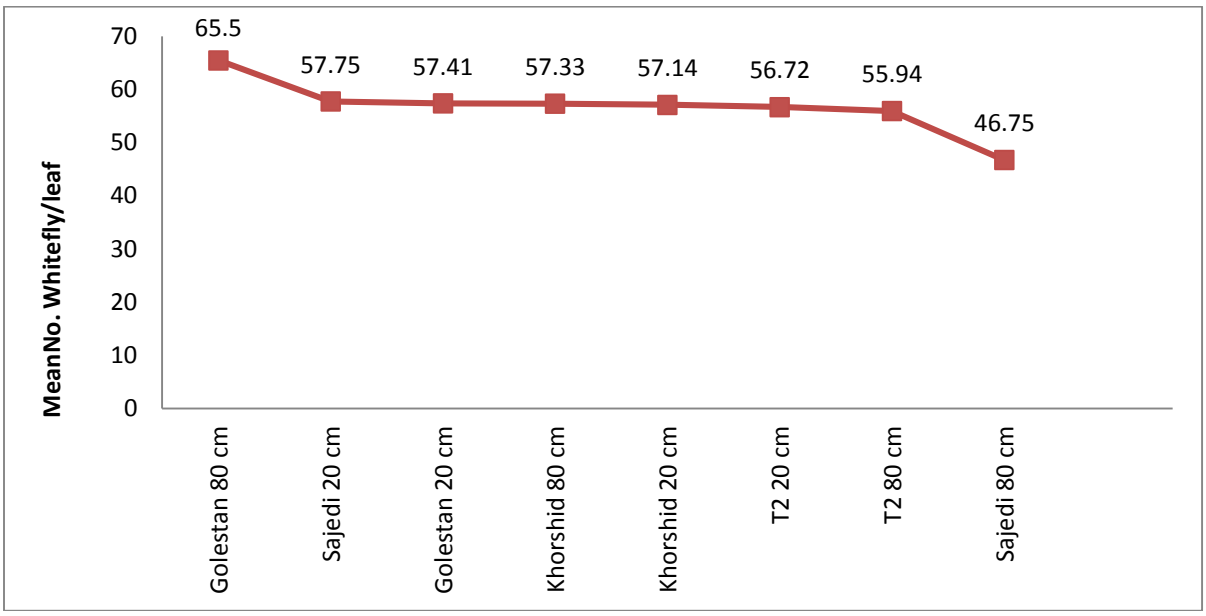

Figure 1. Mean dynamic of population *Bemisia tabaci* on cotton cluster cultivars in in the field's cotton of Golestan province 2018-2019.

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