SCREENING FOR RESISTANCE AGAINST JUJUBE LEAF ROLLER *ANCYLIS SATIVA* LIU

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ABSTRACT: *The present study was conducted to screen the resistance potential against leaf roller of jujube. Seven different varieties of Jujube viz; Golden Gola, White Gola, Black Gola, Lootari Gola, Soofy Umeran and White Kherol were selected to screen out the resistant potential against Ancylis sativa. All the varieties were selected based on their genetic potential and popularity in the local market. Cultivar screening for the resistance against Leaf roller was evaluated using direct count of infested leaves and healthy leaves in the different jujube orchards of Hyderabad, Tando Allahyar, Mirpur Khas Tando Muhammad Khan and Matiari. The overall ranking for resistance and susceptibility of variety was assigned based on our modified scale and overall mean infestation of four different locations for three different pests. During study it was recorded that infestation percentage of A. sativa on Golden Gola variety was comparatively higher than the other vareities. The overall mean infestation percentage of all varieties observed during two years, showed that White Kherol (2.03 and 1.77%), Black Gola (4.64 and 4.94%), Soofi Umran (5.30 and 5.25%) and Lootari Gola (5.45 and 5.53at%) were ranked as resistant (R), whereas, White Gola (8.30 and 8.90%) as moderately resistant (MR) against leaf roller. The performance of Golden Gola was found suceptible (S) against Ancylis sativa based on the mean infestation (12.10 and 11.90%).*

KEY WORDS: Jujube, *Ancylis sativa*, leaf roller

INTRODUCTION

Jujube is one of important fruit tree, provide nutrients energy for human consumption and play a vital role in the development of human body [1,2]. Recent research proved that fresh jujubes contain higher anti-oxidant ingredients than apples, strawberries, blueberries, plums, raspberries and blackberries [3]. Jujube is known to suffer from various insects pest and diseases, about 23 different insect have been reported to cause economic losses in jujube plantation [4, 5]. However, jujube leaf roller, especially in Sindh province of Pakistan is causing tremendous yield losses every year. Though several management strategies have been applied to control this pest, but the impact of those control measure is not quite effective. There was a need to find out the way, specially the screening of resistance germplasm from the available population of jujube leaf roller *Ancylis satva*. Thus the present study was conducted to screen the resistance potential against leaf roller of jujube.

MATERIALS AND METHODS

Six different varieties of Jujube viz; Golden Gola, White Gola, Black Gola, Lootari Gola, Soofy Umeran and White Kherol were selected to screen out the resistant potential against leaf roller. All the varieties were selected based on their genetic potential and popularity in the local market.

Screening methods

Screening for the resistance against *Ancylis satva* was evaluated using direct count of infested leaves by various insect pests. Five trees of each variety were tagged and kept under observation. The total number of damaged and healthy leaves out of 100 randomly selected leaves/branches in each tree of all varieties was observed individually. The percentage of leaves damage was calculated as follows:

Percent Infestation = Number of damaged leaves/ Total number of observed leaves*100

The resistance potential of all varieties against leaf roller was also confirmed in five different localities including Hyderabad, Tando Allahyar, Tando Muhammad Khan, Mirpur Khas and Matiari. Based on the percent incidence, jujube varieties were classified though infestation scales for Leaf roller as mentioned in Table 1.

RESULTS

Cultivar screening for the resistance against Leaf roller (*Ancylis sativa*) was evaluated using direct count of infested leaves and healthy leaves in the different jujube orchards of Hyderabad, Tando Allahyar, Mirpur Khas and Matiari. The results presented here for screening of varieties was pooled and mean infestation of each variety for three major insect pests is explained below. The overall ranking for resistance and susceptibility of variety was assigned based on our modified scale and overall mean infestation of four different locations for leaf roller *Ancylis satva*

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Evaluation of jujube cultivars against *Ancylis sativa*.

Table 1. Infestation scale for the screening of resistance against *Ancylis sativa*.

Scale	% leaf damage *Ancylis sativa*	Reaction	Acronym
0	0 %	Highly resistant/Immune	HR
1	1-5%	Resistant	R
3	5.1-10%	Moderately resistant	MR
5	10.1-15%	Susceptible	S
7	>15%	Highly Susceptible	HS

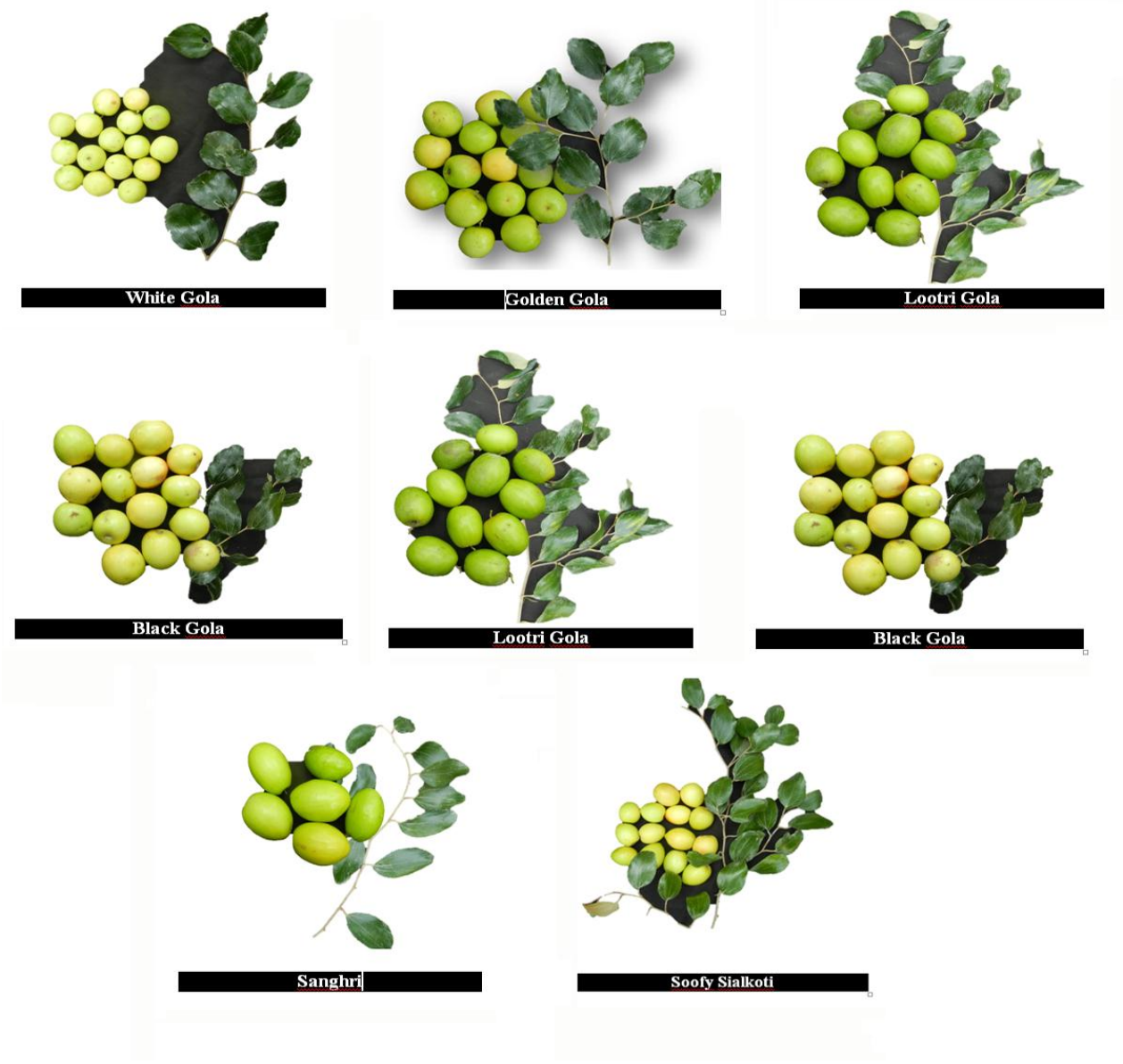

Plate 1. Jujube varieties used for resistance screening in current study

The infestation percentage of *A. sativa* on Black Gola variety was significantly higher in the beginning of July (18.40 and 15.00%) for both years, 2007 and 2008, respectively. It reduced in the month of August, however, the infestation percentage was on 15th September and gradually decreased in the later months (Figure.1).

The infestation percentage of *A. sativa* on Golden Gola variety was comparatively higher than other varieties. Significantly higher infestation was recorded on 15th July (48.20 and 52.20%) for both years, 2007 and 2008, however, there was no significant difference was observed for both years. Similar to Black Gola, the infestation percentage was reduced in the beginning of August (14.80 and 11.40%) and again increased on 15th September (22.60 and 25.80%) of both year, 2007 and 2008, respectively. In the later month, the infestations percentage gradually decreased (Figure.2).

The maximum infestation (21.80 and 18.20%) of *A. sativa* on Lootri Gola variety was recorded in the beginning of July for both years, 2007 and 2008, respectively. Simlar to Black and Golden Gola, it reduced in the month of August (14.80 and 11.40%), however, it was increased on 15th September (11.20 and 11.20%) for both years, 2007 and 2008, respectively (Figure. 3).

The infestation percentage of *A. sativa* on Soofi Umran variety was also significantly higher in the beginningn of July (24.00 and 19.40%) for both years, 2007 and 2008, respectively; however, there was no significant difference was observed for both years. The infestation percentage was reduced in the beginning of August (4.6 and 2.4%) and against increased on 15th September (10.00 and 10.5%) of both year, 2007 and 2008, respectively. In the later month, the infestations percentage gradually decresed (Figure. 4).

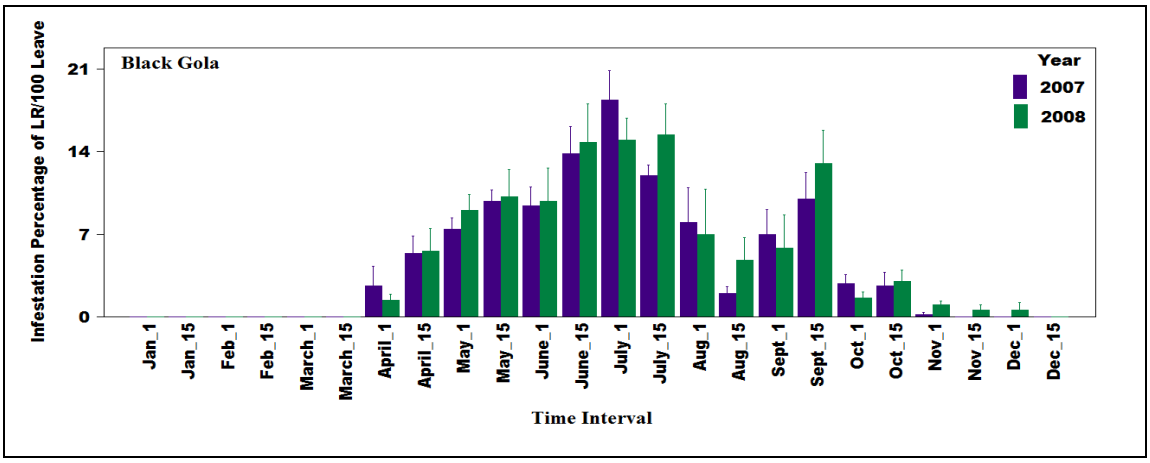

Figure.1 The infestation percentage of *A. sativa* on Black Gola varietyevaluated during 2007 and 2008.

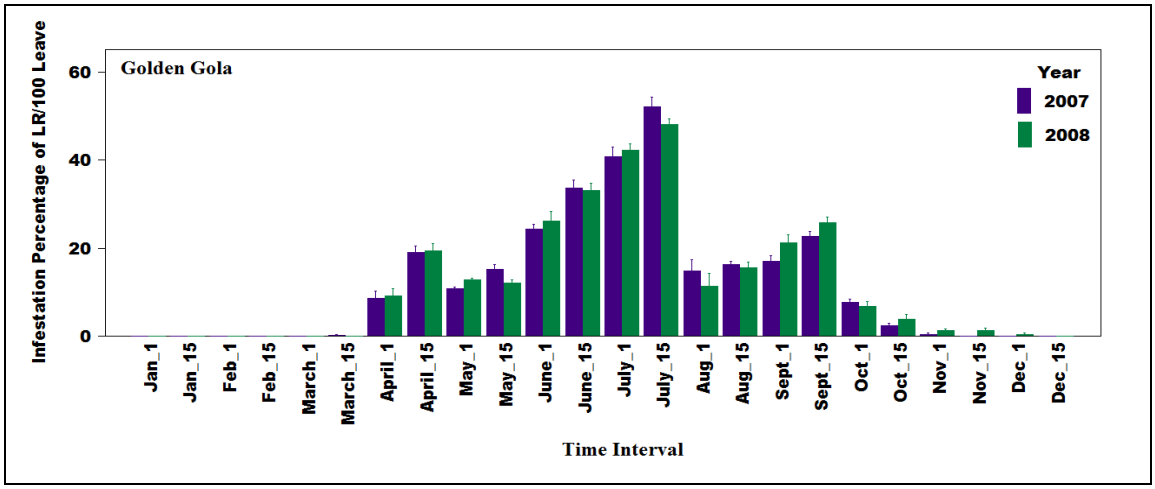

Figure.2 The infestation percentage of leaf roller (*A. sativa*) on Golden Gola variety evaluated during 2007 and 2008.

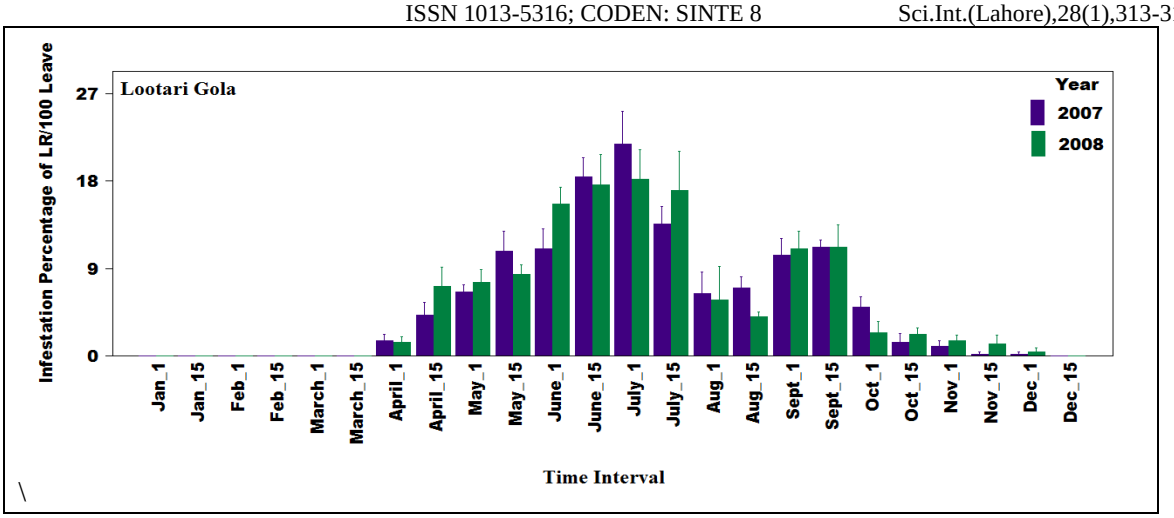

Figure.3 The infestation percentage of leaf roller (*A. sativa*) on Lootari Gola variety evaluated during 2007 and 2008.

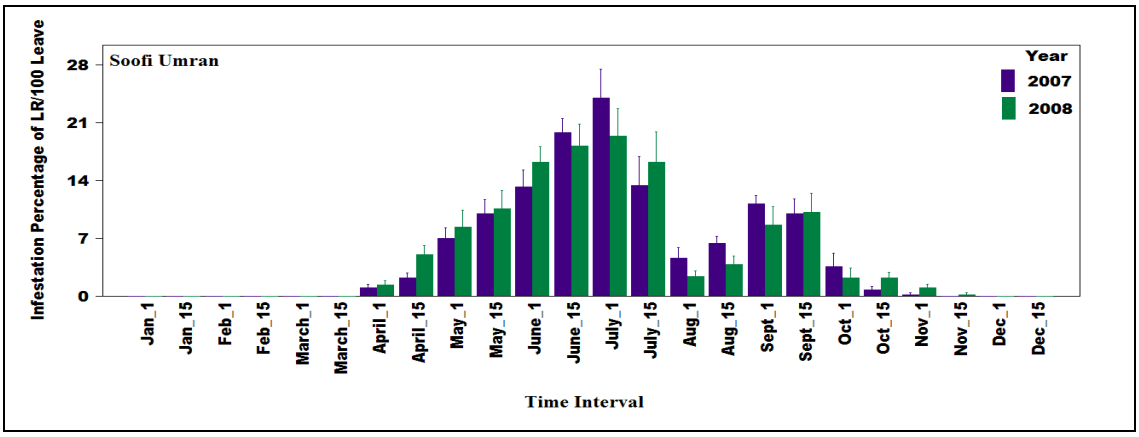

Figure.4 The infestation percentage of *A. sativa* on Soofi Umran variety evaluated during 2007 and 2008.

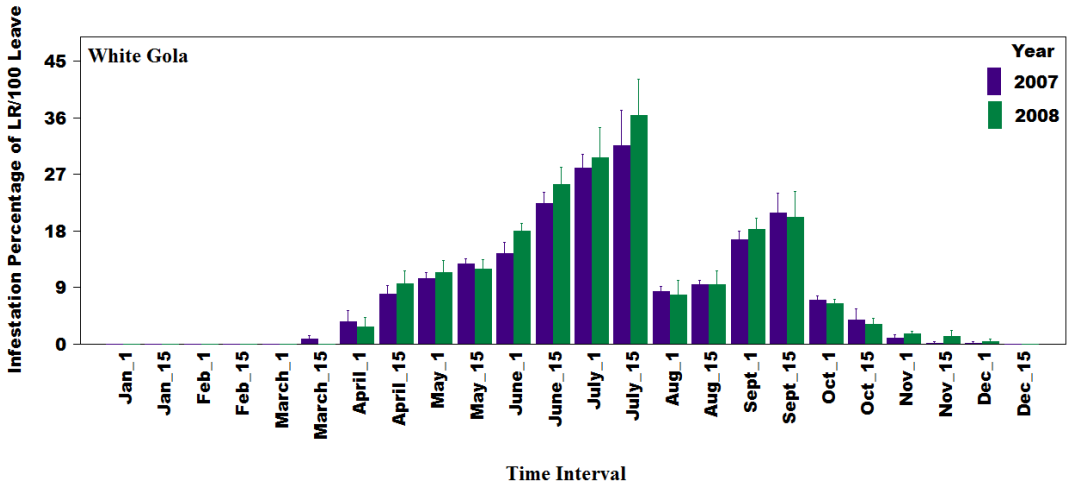

Figure. 5 The infestation percentage of *A. sativa* on White Gola variety evaluated during 2007 and 2008.

The infestation percentage of *A. sativa* on White Gola variety was also higher than the other varieties, however, it was lower than Golden Gola. Significantly higher infestation was recorded in the beginning of July (24.00 and 19.40%) for both years, 2007 and 2008, respectively; however, there was no significant difference was found for both years. The infestation percentage was reduced in the beginning of August (8.40 and 7.80%) and again increased on 15th September (20.80 and 20.20%) of both year, 2007 and 2008, respectively. Gradually it was decreased in the later months. The infestation percentage of *A. sativa* on White Kherol variety. It was fluctuating throughout the year, however, comparative to other varieties the infestation percentage was lower (Figure 5). Significantly higher infestation was recorded in the beginning of July (18.40 and 15.00%) for both years, 2007 and 2008, respectively; however, there was no significant difference was found for both years. The lowest infestation percentage was recorded in November (0.200 and 1.00%) of both year, 2007 and 2008, respectively. The overall mean infestation percentage of all varieties observed during two years, 2007 and 2007 (Figure 6) Based on overall mean infestation, varieties White Kherol (2.03 and 1.77%), Black Gola (4.64 and 4.94%), Soofi Umran (5.30 and 5.25%) and Lootari Gola (5.45 and 5.53%) were ranked as resistant (R), whereas, White Gola (8.30 and 8.90%) as moderately resistant (MR) against leaf roller. The performance of Golden Gola was found suceptible (S) against leaf roller based on the mean infestation (12.10 and 11.90%) of two years, 2007 and 2008, respectively, that was higher than the other varieties (Figure 7).

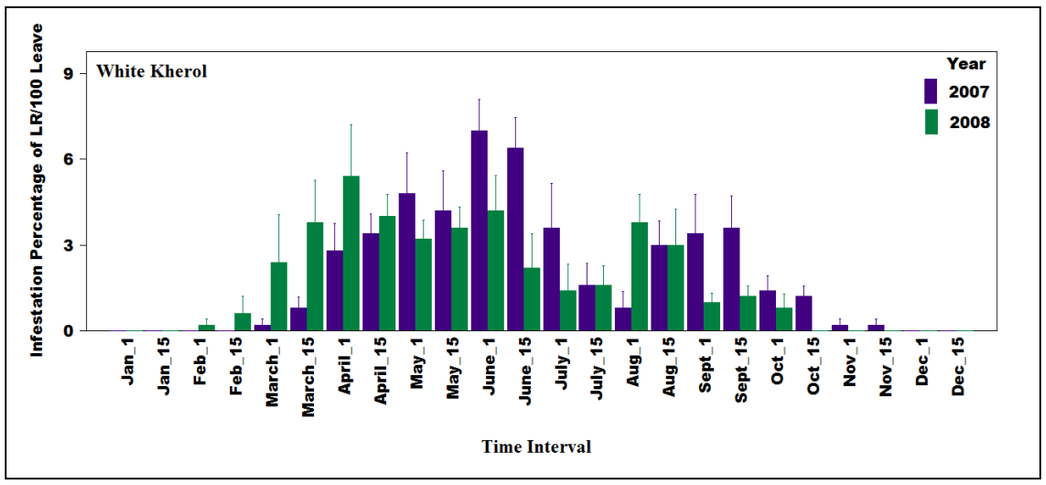

Figure. 6 The infestation percentage of leaf roller (*A. sativa*) on White Kherol variety evaluated during 2007 and 2008.

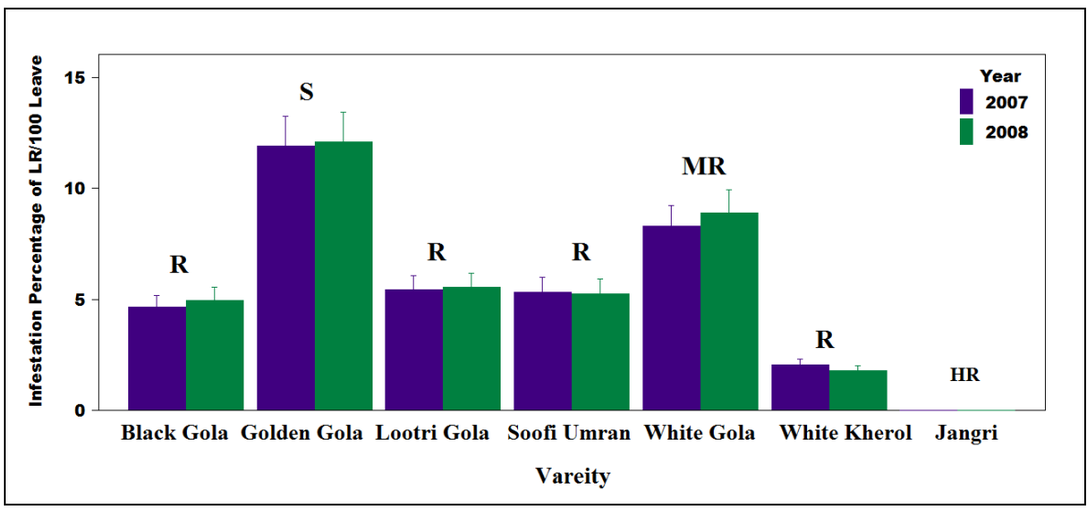

Figure. 7 Mean infestation percentage of *A. sativa* for all jujube varieties evaluated during 2007 and 2008.

DISCUSSION

Authors in [6] observed that the extent of infestation varied between cultivars from 6.7 % in Tikadi to 73 % in Gola, Gola Gurgaon-3 and Kaithli [7] and that the percentage of larvae hatched varied indicating varying degrees of resistance. As it is also well known that Gola is the common variety grown throughout Sindh, it can stand drought and salinity, produce good yields.

In this current study, cultivar screening for the resistance against *A. sativa*, has been evaluated using direct count of infested leaves and healthy leaves in the different jujube orchards of Hyderabad, Tando Allahyar, Mirpur Khas and Matiari. There was no significant difference in the two year analysis, therefore, the results presented here for screening of varieties were pooled and mean infestation of each variety for three major pests has been evaluated for resistance screening. The overall ranking for resistance and susceptibility of variety was assigned based on our modified scale and overall mean infestation of five different locations for *A. sativa*. In the earlier year, In [8], others observed the infestation of Leaf roller on young leaves of jujube (*Ziziphus mauritiana* Lamk.) trees with 83%. In their observation, around 99% cases only one larva was found per leaf.

The overall mean infestation percentage of all varieties observed for the resistance scrrening against *A. sativa* revealed the signficant difference in their resposen. Based on overall mean infestation, White Kherol, Black Gola, Soofi Umran and Lootari Gola has been ranked as resistant (R), whereas, White Gola as moderately resistant (MR) against *A. sativa*. The performance of Golden Gola was found suceptible (S) against *A. sativa* based showed the higher infestation compared to other varieties.

CONCLUSIONS

Present study is the first comprehensive research on the Screening for resistance against Jujube leaf roller *Ancylis*

sativa Liu which is main threat for Jujubes. The population density of Jujube leaf roller (*Ancylis sativa Liu* showed great variability throughout the study. The highest peak population of *A. sativa* was observed on 15th July and which was gradually decreased in the later months. The maximum infestation percentage of Jujube leaf roller (*Ancylis sativa*) was recorded at Hyderabad, Tando Allahyar, Matiari, Tando Muhammad Khan and Mirpur Khas. Significantly highest infestation percentage was recorded at Hyderabad district followed by Mirpur Khas during both years of observations. The cultivar screening for the resistance against *A. sativa* that Jangri variety was found high resistant (HR) againt Jujube leaf roller. White Kherol, Black Gola, Soofi Umran and Lootari Gola was ranked as resistant (R), whereas, White Gola as moderately resistant (MR) against *A. sativa*.

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