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Varietal screening of different groundnut varieties/genotypes against thrips infesting summer groundnut

[1]S. M. Mithapara, [2]A. M. Bharadiya, [3]D. J. Majithia and [4]B. P. Baldaniya
[1]Research Scholar, [2]Associate Research Scientist. [3]Research Scholar, [4]Research Scholar
[1]Department of Entomology, College of Agriculture,
[1]Junagadh Agricultural University, Junagadh (Gujarat) - 362 001, India.

ABSTRACT

An experiment was carried out at the Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh. Based on thrips incidence minimum of 2.88 thrips per three terminal leaves per plant recorded in the genotype JB-1464 and the variety TG-37A recorded a maximum population of 6.62 thrips per three terminal leaves per plant. Among all varieties/genotypes, genotype JB-1464 is highly resistant to thrips and genotypes JB-1484 (3.42), JB-1475 (3.58) and J-106 (3.69) are resistant to thrips and varieties TG-37A (6.62) is susceptible to thrips.

***Key words*: Screening, varietal, genotypes, groundnut**

I. INTRODUCTION

Groundnut (*Arachis hypogaea* Linn.) is one of the world's most important leguminous oilseed crops. The word groundnut (*Arachis hypogaea* L.) is derived from the Greek word "Arachis" meaning legume and "hypogaea" meaning below ground. It is commonly known as peanut, monkey-nut and goobernut. Groundnut is native to South America. It was found in Brazil or Peru as early as 950 BC and later spread to Africa, North America, Europe and Asia. The major groundnut producing countries are China, Nigeria, U.S.A., Taiwan, Indonesia, Senegal, Ghana, Argentina and Brazil. It is the most important commercial crop mostly grown in semi-arid tropical regions like India. The crop can be grown successfully in areas receiving rainfall from 600 mm to 1200 mm. The best soil for the groundnut crop is sandy loam, loamy and medium black (1).

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop of tropical and sub-tropical regions of the world. In India, groundnut is mostly grown in five states *viz.*, Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra which accounts for 70 per cent of the total area and 71 per cent of the total production of summer groundnut. In India, the total area under kharif groundnut cultivation was 40.684 lakh ha with a production of 66.152 lakh tonnes and a yield of 1626 kg/ha. However, during the summer season, it is grown in an area of 8.393 lakh ha with a production of 16.018 lakh tonnes and the yield was 1909 kg/ha. (2). Groundnut crop is grown as rain-fed in bulk during kharif season but it is also taken during the summer season, wherever, the irrigation facilities are available. The crop is grown as monoculture in the Saurashtra region of Gujarat. Junagadh, Rajkot, Amreli, Jamnagar, Bhavnagar and Kutch districts of Gujarat state contribute about 15% total production of summer groundnut of Gujarat state.

In Gujarat, the total area under kharif groundnut cultivation was 16.272 lakh ha with a production of 39708.76 million tonnes and a yield of2440 kg/ha. However, during the summer season, it is grown in an area of 0.51 lakh ha with a production of 949.29 million tonnes and the yield was 1843 kg/ha. (3).

Among different insect pests infesting this crop in Gujarat, the thrips are considered a key pest. The damage caused by this pest depends on the population of damaging stage of an insect, crop growth stage, cropping pattern in the area and prevailing environmental conditions (6). Among different insect pests, white grub cause yield losses up to 20-100%, tobacco caterpillar causes up to 15-30%, red hairy caterpillar causes up to 75%, leaf miner causes up to 49%, jassids causes up to 17% and thrips causes up to 17% yield losses (4).

II. RESEARCH METHODOLOGY

The field experiment was conducted at the Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh during summer 2020. Experiment was laid out in a Randomized Block Design (RBD) with 26 treatments and 2 replications. The row to row distance was kept to be 30 cm and plant to plant distance is 10 cm.

Methodology for recording the observation

To study the susceptibility of different varieties/genotypes of groundnut, an experiment was carried out on 26 different varieties/genotypes of groundnut during summer 2020. One line of each variety/genotype was grown with the spacing of 30 cm x 10 cm and the same would be followed for other replication. All other agronomical practices were followed as per the scientific recommendations and varieties/genotypes under the experiment were free from the insecticides throughout the season. From the line of each variety/genotype, five plants were randomly selected. The observation on thrips population was recorded from three terminal leaves of each plant at vegetative, flowering and 70% maturity stage of the crop. The data, thus obtained were subjected to statistical analysis for assessing the least susceptible verities/genotype against the thrips on groundnut. Groundnut pod and haulm yield was recorded in each variety/genotype.

Categorization of varieties/ genotypes

The different groundnut varieties/genotypes were grouped into six categories of resistance to thrips *viz.*, highly resistant, resistant, moderately resistant, moderately susceptible, susceptible and highly susceptible based on no. of thrips/three terminal leaves. For this purpose, the mean value of individual genotype ($\overline{X}_i$) was compared with the mean value of all genotypes ($\overline{X}$) and standard deviation (SD) following the scale adopted by Kansagara (5). The retransformed data was used for computation of $\overline{X}$, $\overline{X}_i$ and SD in case of this parameter. The scale used for categorizing different verities/genotypes was under.

Observations recorded

1. No. of thrips /three terminal leaves/plant.

Table 1: Categorization of groundnut varieties/ genotypes was under

Category of resistance	Scale for resistance
Highly resistant	$\overline{X}_i < (\overline{X} - 2SD)$
Resistant	$\overline{X}_i > (\overline{X} - 2SD) < (\overline{X} - SD)$
Moderately Resistant	$\overline{X}_i > (\overline{X} - SD) < \overline{X}$
Moderately susceptible	$\overline{X}_i > \overline{X} < (\overline{X} + SD)$
Susceptible	$\overline{X}_i > (\overline{X} + SD) < (\overline{X} + 2SD)$
Highly susceptible	$\overline{X}_i > (\overline{X} + SD)$

III. RESULTS AND DISCUSSION

To check the susceptibility of groundnut varieties/genotypes, 3 varieties and 23 genotypes were screened for the resistance/susceptibility against thrips at Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh during summer, 2020.

From the data at vegetative stage on a mean number of thrips population presented in Table 2 and graphically depicted in Fig. 1. It can be seen that none of the varieties/genotypes were found free from the incidence of thrips. However, minimum of 4.71 thrips per three terminal leaves per plant recorded in genotype B-1464 and which was at par with JB-1498 (5.80 thrips per three terminal leaves per plant), JB-1475 (6.00), J-106 (6.25), JB-1494 (6.84), JB-1547 (6.97), JB-1486 (7.08), JB-1487 (7.13) and J-105 (7.18). While variety TG-37A recorded maximum population of 11.83 thrips per three terminal leaves per plant. More or less same trend of efficacy were observed at flowering, maturity and pooled over periods.

Categorization of groundnut varieties/genotypes for susceptibility

The different groundnut varieties/genotypes were also grouped into six categories of resistance *viz.*, highly resistant (HR), resistant (R), moderately resistant (MR), moderately susceptible (MS), susceptible (S) and highly susceptible (HS) based on thrips population and it's damage on groundnut by comparing the mean incidence of individual varieties ($\overline{X}_i$) with a mean incidence of all varieties ($\overline{X}$) and standard deviation (SD). The categorization of different groundnut varieties is summarized in Table 3.

Based on the infestation of thrips

The data revealed that genotype B-1464 (2.88 thrips per three terminal leaves plant) was observed highly resistant (HR) to thrips. The genotype *viz.*, JB-1498 (3.42), JB-1475 (3.58), J-106 (3.69) were observed resistant (R) against thrips, the population ranged from 3.42 to 3.69 thrips per three terminal leaves per plant. Genotype *viz.*, JB-1494 (4.12), JB-1547 (4.25) JB-1486 (4.27), JB-1487 (4.42), J-105 (4.44), and JB-1471 (4.85) categorized into the group of moderately resistant (MR) as the infestation was recorded in the range of 4.12 to 4.85thrips per three terminal leaves per plant. In case of varieties/genotypes *viz.*, GG-34 (5.18), GJG-31 (5.30), JB-1492 (5.30), JB-1500 (5.30), JB-1442 (5.31), J-100 (5.37), J-97 (5.41), JB-1506 (5.43), TG-73 (5.43), JB-1484 (5.44), J-107 (5.51), JB-1505 (5.70) and JB-1453 (5.70) thrips per three terminal leaves per plant and were categorized into moderately susceptible (MS) group. In the case of varieties/genotypes *viz.*, JB-1485 (6.13), J-101 (6.21) and TG-37A (6.62), the infestation were recorded in the range of 5.87 to 6.78 thrips per three terminal leaves per plant and so were categorized into susceptible (S) group. None of the varieties/genotypes came under highly susceptible (HS) category.

Thus, from the above results, it can be concluded that among all varieties/genotypes, JB-1464 is highly resistant to thrips and genotypes JB-1484 (3.42), JB-1475 (3.58) and J-106 (3.69) are resistant to thrips and JB-1494 (4.12), JB-1547 (4.25), JB-1486 (4.27), JB-1487 (4.42), J-105 (4.44) and JB-1471 (4.85) are moderately resistance to thrips and variety TG-37A is susceptible to thrips.

IV. ACKNOWLEDMENT

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Table 2: Incidence of thrips on different groundnut varieties/genotypes during summer season-2020

Sr. No.	Treatments	Average no. of thrips per three terminal leaves per plant			Pooled over periods
		Vegetative stage	Flowering stage	Maturity stage	
1	J-97	3.02 (9.12)	2.32 (5.36)	1.64 (2.69)	2.33 (5.41)
2	J-100	3.13 (9.80)	2.24 (5.02)	1.58 (2.50)	2.32 (5.37)
3	J-101	3.37 (11.36)	2.59 (6.71)	1.52 (2.30)	2.49 (6.21)
4	J-105	2.68 (7.18)	2.14 (4.56)	1.51 (2.27)	2.11 (4.44)
5	J-106	2.50 (6.25)	1.89 (3.57)	1.38 (1.89)	1.92 (3.69)
6	J-107	2.78 (7.70)	2.57 (6.60)	1.70 (2.89)	2.35 (5.51)
7	JB-1442	2.99 (8.91)	2.35 (5.50)	1.58 (2.50)	2.30 (5.31)
8	TG-73	3.06 (9.36)	2.32 (5.36)	1.61 (2.58)	2.32 (5.42)
9	JB-1484	2.84 (8.07)	2.41 (5.78)	1.76 (3.08)	2.33 (5.44)
10	JB-1485	3.22 (10.37)	2.51 (6.30)	1.70 (2.89)	2.48 (6.13)
11	JB-1486	2.66 (7.08)	2.12 (4.47)	1.45 (2.09)	2.07 (4.27)
12	JB-1464	2.17 (4.71)	1.70 (2.89)	1.22 (1.49)	1.70 (2.88)
13	GJG-31	2.83 (8.02)	2.32 (5.37)	1.79 (3.25)	2.30 (5.30)
14	TG-37A	3.44 (11.83)	2.74 (7.48)	1.55 (2.39)	2.57 (6.62)
15	JB-1453	2.95 (8.70)	2.28 (5.18)	1.94 (3.74)	2.39 (5.70)
16	JB-1547	2.64 (6.97)	2.10 (4.41)	1.45 (2.09)	2.06 (4.25)
17	JB-1471	2.88 (8.29)	2.21 (4.88)	1.52 (2.30)	2.20 (4.85)
18	JB-1475	2.45 (6.00)	1.86 (3.44)	1.38 (1.89)	1.89 (3.58)
19	JB-1487	2.67 (7.13)	2.12 (4.49)	1.52 (2.30)	2.10 (4.42)
20	JB-1492	2.90 (7.88)	2.25 (5.27)	1.76 (3.15)	2.30 (5.30)
21	JB-1494	2.61 (6.84)	1.90 (3.62)	1.38 (1.89)	1.96 (4.12)
22	JB-1498	2.41 (5.80)	1.76 (3.08)	1.38 (1.89)	1.85 (3.42)
23	JB-1500	3.10 (9.63)	2.24 (5.05)	1.58 (2.50)	2.30 (5.30)
24	JB-1505	3.02 (9.12)	2.41 (5.81)	1.76 (3.08)	2.39 (5.70)
25	JB-1506	2.82 (7.96)	2.35 (5.55)	1.67 (2.79)	2.28 (5.43)
26	GG-34	2.81 (7.90)	2.30 (5.36)	1.57 (2.49)	2.22 (5.18)
S. Em. ±	**T**	**0.18**	**0.17**	**0.09**	**0.08**
	P	**-**	**-**	**-**	**0.03**
	T x P	**-**	**-**	**-**	**0.15**
CD at 5%	**T**	**0.53**	**0.51**	**0.26**	**0.37**
	P	**-**	**-**	**-**	**0.08**
	T x P	**-**	**-**	**-**	**0.43**
CV%		**-**	**9.04**	**11.03**	**8.04**	**9.84**

Figure in parenthesis are retransformed value and outside are square root transformed value

Table 3: Categorization of different varieties/genotypes of groundnut for their susceptibility to thrips

Category of resistant	Scale	Varieties $\overline{X}_i$
1	**2**	**3**
Based on thrips per three terminal leaves per plant: $\overline{X}$ **= 4.96 SD: 0.91**		
Highly resistant	$\overline{X}_i <$ (3.14)	JB-1464 (2.88)
Resistant	$\overline{X}_i >$ (3.14) < (4.05)	JB-1498 (3.42) JB-1475 (3.58) J-106 (3.69)
Moderately Resistant	$\overline{X}_i >$ (4.05) < 4.96	JB-1494 (4.12) JB-1547 (4.25) JB-1486 (4.27) JB-1487 (4.42) J-105 (4.44) JB-1471 (4.85)
Moderately susceptible	$\overline{X}_i >$ 4.96 < (5.87)	GG-34© (5.18) GJG-31 © (5.30) JB-1492 (5.30) JB-1500 (5.30) JB-1442 (5.31) J-100 (5.37) J-97 (5.41) JB-1506 (5.43) TG-73 (5.43) JB-1484 (5.44) J-107 (5.51) JB-1505 (5.70) JB-1453 (5.70)
Susceptible	$\overline{X}_i >$ (5.87) <(6.78)	JB-1485 (6.13) J-101 (6.21) TG-37A© (6.62)
Highly susceptible	$\overline{X}_i >$ (6.78)	-

Note: Figures in parentheses are thrips per three terminal leaves per plant

Where, $\overline{X}_i$ = Mean value of individual variety

$\overline{X}$ = Mean value of infestation of all varieties

SD= Standard deviation

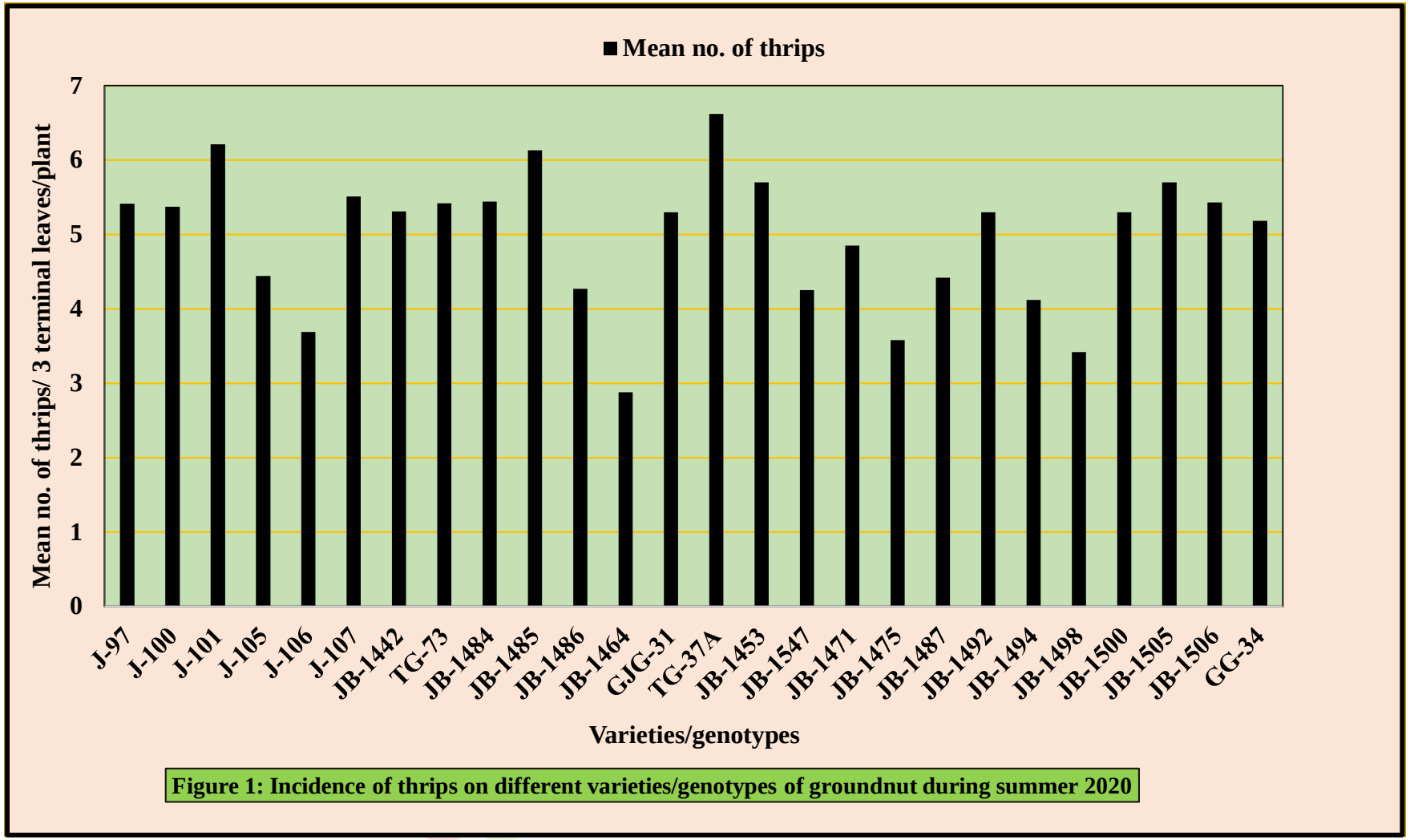

Figure 1: Incidence of thrips on different varieties/genotypes of groundnut during summer 2020