Biological Forum – An International Journal **14(1): 1241-1247(2022)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Screening and Physico-Chemical Bases of Resistance in Groundnut Germplasm Lines against Thrips

Shaik Moizur Rahman*[1], K. Vijayalakshmi[2] and Ch V. Durga Rani[3]

[1]*M.Sc. student, Department of Entomology, College of Agriculture, Rajendranagar, PJTSAU, Hyderabad, India.*
[2]*Senior Professor, Department of Entomology, College of Agriculture, Rajendranagar, PJTSAU, Hyderabad, India.*
[3]*Senior Professor and Director, Institute of Biotechnology, PJTSAU, Hyderabad, India.*

(Corresponding author: Shaik Moizur Rahman)*
(Received 18 November 2021, Accepted 27 January, 2022)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Thrips are major pests of peanut (*Arachis hypogaea* L.) worldwide, and they serve as vectors of devastating orthotospoviruses such as Tomato spotted wilt virus (TSWV) and Groundnut bud necrosis virus (GBNV). Host plant resistance is an effective eco-friendly management strategy and an important component of integrated pest management (IPM) to control damage due to thrips. Hence, screening of forty germplasm lines for thrips resistance was carried out at College Farm, College of Agriculture, Rajendranagar, PJTSAU, Hyderabad during *rabi*, 2019-2020. The screening experiment was laid in Randomized block design (RBD) with two replications. Twenty-five germplasm lines including the resistant check (ICGV 86031) recorded damage rating of 2 (1 to 20 per cent), while the remaining 15 lines had DR of 3 (21-30 %) against thrips. The 5 germplasm lines *viz*., ICGV 171015 (10.30%), ICGV 03043 (12.67%), ICGV 93468 (11.50%), ICGV 00298 (10.97%) and ICGV 02266 (12.34%) were on par with the resistant check (12.59%) and were significantly different from the susceptible check (23.42%). The physico-chemical characters of germplasm lines were recorded and subjected to correlation to draw the impact of these characters on incidence and infestation (leaf damage) due to thrips. Physical characters like plant height showed positive correlation and main stem thickness, trichome density on leaf lamina, midrib and petiole showed negative correlation with incidence and infestation of thrips. However, negative correlation was observed between number of branches and thrips incidence whereas, positive correlation with thrips infestation. Biochemical parameters like total sugars, proteins showed positive correlation and phenols, tannins showed negative correlation with incidence and infestation of thrips. Resistance to thrips in groundnut was due to significantly higher trichome density on leaf lamina, higher phenol and tannin content.

Keywords: Groundnut, thrips, screening, correlation, physical, biochemical.

INTRODUCTION

Groundnut or peanut (*Arachis hypogea* L.) is one of the most important oilseed crops cultivated in the semi-arid tropics. It is a principal source of digestible proteins, cooking oil and vitamins (Savage and Keenan, 1994). Known as poor man's almond, groundnut is a crop of global economic significance due to its use as a source of diverse food products. It contains about 35-54 per cent oil, 6-24 per cent carbohydrates and 21-36 per cent proteins and forms a high-energy source (Cobb and Johnson, 1973).

In India, groundnut is cultivated during *kharif*, *rabi* and summer seasons. The area, production and productivity of groundnut in India during 2019-20 was about 48.25 lakh ha, 99.52 lakh tonnes and 2063 kg/ha, respectively (Indiastat, 2021).

Among the different pest complex, thrips are important sucking insect pests on groundnut crop known to cause yield loss and also responsible for spreading a viral disease called bud necrosis in groundnut. Baskaran and Rajavel (2013) estimated the avoidable yield loss in groundnut due to defoliators (24.5%); sucking pests (15.7%); defoliators and sucking pests (40.2%) and also the total loss due to insect pests of groundnut as 47.3 per cent. Indiscriminate and extensive use of synthetic pesticides led to problems like insecticidal resistance, resurgence of secondary pests, destruction of natural enemies, environmental pollution and health hazards. To mitigate pest problems particularly to insects, efforts have been made to develop alternatives to chemical pesticides which are effective and environmentally sustainable (Thomas and Waage, 1994). Though several

efforts were made to screen the groundnut varieties against thrips in groundnut, screening of groundnut germplasm against thrips from time to time is necessary with the newly developed promising accessions (Gadad *et al*., 2014; Praveena *et al*., 2011; Baig *et al*., 2015). The morphological and biochemical characters of plants are associated with attraction, feeding and egg laying of insect pests (Bhatti *et al*., 1976).

The identification of important morphological and biochemical characteristics of germplasm will help to understand the resistance mechanisms of plant against thrips which in turn can be used in the breeding programmes for development of thrips resistant varieties.

MATERIAL AND METHODS

The screening experiment was carried out at college farm, College of Agriculture, Rajendranagar, Hyderabad (Telangana) under field conditions during *rabi*, 2019-20. Geographic location of Hyderabad pertains to 17.3850 ^{o} North latitude, 78.4867 ^{o} East longitude and elevation of 536 metres above mean sea level (MSL). The experiment was laid out in a randomized block design (RBD) with 40 treatments (Table 1) and two replications. The plot size was 225 m^2. Each treatment was sown in two rows of 3 m each, with row-to-row distance of 30 cm and plant to plant distance of 10 cm along with resistant (ICGV 86031) and susceptible (ICGV 91114) check. The recommended package of practices was followed to raise the crop except for the plant protection measures.

Table 1: List of groundnut germplasm lines.

Sr. No.	Germplasm	Procured From
1.	ICGV 15083	ICRISAT
2.	ICGV 181052	ICRISAT
3.	ICGV 181011	ICRISAT
4.	ICGV 171015	ICRISAT
5.	ICGV 16679	ICRISAT
6.	ICGV 03043	ICRISAT
7.	ICGV 07222	ICRISAT
8.	ICGV 06424	ICRISAT
9.	ICGV 13189	ICRISAT
10.	ICGV 13200	ICRISAT
11.	ICGV 14421	ICRISAT
12.	ICGV 15423	ICRISAT
13.	ICGV 15426	ICRISAT
14.	ICGV 93468	ICRISAT
15.	ICGV 99195	ICRISAT
16.	ICGV 00298	ICRISAT
17.	ICGV 00350	ICRISAT
18.	ICGV 00351	ICRISAT
19.	ICGV 06040	ICRISAT
20.	ICGV 02266	ICRISAT
21.	ICGV 86015	ICRISAT
22.	ICGV 93437	ICRISAT
23.	ICGV 93382	ICRISAT
24.	ICGV 10001	ICRISAT
25.	ICGV 10021	ICRISAT
26.	ICGV 15264	ICRISAT
27.	ICGV 15307	ICRISAT
28.	ICGV 87141	ICRISAT
29.	ICGV SM 90704	ICRISAT
30.	ICGV 90320	ICRISAT
31.	JCG 4798	RARS, PALEM
32.	JCG 5834	RARS, PALEM
33.	JCG 2141	RARS, PALEM
34.	JCG 3341	RARS, PALEM
35.	K 6	RARS, PALEM
36.	K 9	RARS, PALEM
37.	KDG 128	RARS, PALEM
38.	DHARANI	RARS, PALEM
39.	ICGV 86031 (RESISTANT CHECK)	ICRISAT
40.	ICGV 91114 (SUSCEPTIBLE CHECK)	ICRISAT

For varietal resistance/susceptibility to thrips, per cent damage and number of thrips per terminal bud were recorded on ten randomly selected plants under each replication. Lines were categorized based on damage score (1-9) (Ranga Rao and Wrightman, 1997; Gadad *et al*., 2014; Kandakoor *et al*., 2014) by considering the mean per cent damage. The physical (morphological) and biochemical parameters were estimated by following standard procedures as prescribed by earlier workers. These parameters were correlated with thrips incidence and infestation to study their relationship.

RESULTS AND DISCUSSION

A. Incidence and infestation of thrips

The infestation and incidence of thrips was recorded during vegetative, flowering and post flowering stages of the crop growth. The mean leaf damage due to thrips ranged from 8.13 to 25.42 per cent. The lowest leaf damage was recorded in ICGV 99195 (8.13%) followed by ICGV 15264 (9.38%) and ICGV 90320 (9.54%) wherein the mean leaf damage was significantly lower than the resistant check (12.59%). The 5 germplasm lines *viz*., ICGV 171015 (10.30%), ICGV 03043 (12.67%), ICGV 93468 (11.50%), ICGV 00298 (10.97%) and ICGV 02266 (12.34%) were on par with the resistant check (12.59%) and were significantly different from the susceptible check (23.42%). The highest leaf damage was recorded in K 6 (25.42%) (Table 2).

Table 2: Per cent leaf damage and incidence of thrips in germplasm lines.

Genotype	% of Leaf Damage / Plant*			Mean	Damage Score	Thrips Per Terminal Bud
	Vegetative	Flowering	Post-Flowering			
ICGV 15083	19.75 (26.37)	22.38 (28.22)	18.00 (25.09)	20.04(26.56)	2	3.5 (2.00)
ICGV 181052	21.00 (27.26)	24.25 (29.49)	18.63 (25.54)	21.29 (27.43)	3	3.2 (1.92)
ICGV 181011	14.25 (22.17)	17.00 (24.30)	12.25 (20.47)	14.50 (22.32)	2	2.9 (1.84)
ICGV 171015	10.00 (18.41)	11.50 (19.81)	9.50 (17.94)	10.33 (18.72)	2	2.5 (1.73)
ICGV 16679	18.00 (25.09)	20.63 (27.00)	16.75 (24.12)	18.46 (25.40)	2	3.3 (1.95)
ICGV 03043	13.13 (21.23)	16.25 (23.71)	8.63 (17.06)	12.67 (20.70)	2	2.7 (1.79)
ICGV 07222	13.25 (21.33)	17.13 (24.40)	12.50 (20.68)	14.29 (22.14)	2	2.6 (1.76)
ICGV 06424	21.88 (27.87)	24.75 (29.82)	20.50 (26.90)	22.38 (28.20)	3	3.5 (2.00)
ICGV 13189	23.75 (29.14)	27.88 (31.85)	22.38 (28.22)	24.67 (29.73)	3	4.5 (2.24)
ICGV 13200	17.63 (24.81)	19.50 (26.19)	14.75 (22.58)	17.29 (24.52)	2	2.9 (1.84)
ICGV 14421	24.00 (29.32)	28.38 (32.17)	21.50 (27.59)	24.63 (29.69)	3	4.5 (2.24)
ICGV 15423	17.25 (24.53)	20.50 (26.90)	14.00 (21.89)	17.25 (24.44)	2	3.5 (2.00)
ICGV 15426	20.25 (26.73)	23.00 (28.64)	17.00 (24.30)	20.08 (26.56)	2	3.6 (2.02)
ICGV 93468	9.25 (17.69)	17.50 (24.67)	7.75 (16.14)	11.50 (19.50)	2	2.3 (1.67)
ICGV 99195	7.38 (15.73)	9.25 (17.69)	5.75 (13.87)	8.13 (15.76)	2	2.1 (1.61)
ICGV 00298	9.63 (18.06)	12.88 (20.99)	9.50 (17.73)	10.67 (18.93)	2	2.1 (1.61)
ICGV 00350	23.25 (28.81)	28.63 (32.33)	20.75 (27.08)	24.21 (29.41)	3	4.4 (2.21)
ICGV 00351	17.63 (24.80)	20.00 (26.55)	15.63 (23.27)	17.75 (24.87)	2	2.8 (1.82)
ICGV 06040	21.50 (27.61)	25.25 (30.14)	18.75 (25.64)	21.83 (27.80)	3	4.0 (2.12)
ICGV 02266	11.75 (20.01)	15.13 (22.86)	10.13 (18.53)	12.34 (20.47)	2	3.0 (1.87)
ICGV 86015	19.50 (26.18)	23.50 (28.98)	16.38 (23.85)	19.79 (26.34)	2	3.5 (2.00)
ICGV 93437	18.75 (25.65)	22.25 (28.13)	17.00 (24.33)	19.33 (26.04)	2	3.0 (1.87)
ICGV 93382	22.00 (27.96)	25.88 (30.56)	19.75 (26.36)	22.54 (28.29)	3	4.1 (2.14)
ICGV 10001	21.13 (27.35)	26.25 (30.81)	18.25 (25.28)	21.88 (27.81)	3	3.6 (2.02)
ICGV 10021	24.00 (29.32)	27.13 (31.37)	22.13 (28.04)	24.42 (29.58)	3	4.1 (2.14)
ICGV 15264	9.38 (17.82)	12.13 (20.37)	6.63 (14.83)	9.38 (17.68)	2	2.2 (1.64)
ICGV 15307	23.25 (28.81)	27.88 (31.85)	21.25 (27.42)	24.13 (29.36)	3	4.5 (2.24)
ICGV 87141	14.25 (22.16)	19.38 (26.07)	13.50 (21.54)	15.71 (23.26)	2	3.1 (1.90)
ICGV SM 90704	17.88 (24.98)	24.63 (29.73)	17.00 (24.33)	19.84 (26.35)	2	3.4 (1.97)
ICGV 90320	8.75 (17.18)	12.25 (20.48)	7.63 (15.94)	9.54 (17.87)	2	3.0 (1.87)
JCG 4798	20.50 (26.91)	24.25 (29.49)	18.00 (25.09)	20.92 (27.16)	2	3.4 (1.97)
JCG 5834	22.25 (28.13)	26.88 (31.21)	20.75 (27.09)	23.29 (28.81)	3	4.5 (2.24)
JCG 2141	14.88	19.75	14.63	16.42	2	3.2

	(22.67)	(26.36)	(22.45)	(23.83)		(1.92)
JCG 3341	21.50 (27.61)	26.75 (31.12)	20.25 (26.73)	22.83 (28.49)	3	4.7 (2.28)
K 6	25.50 (30.31)	29.50 (32.88)	21.25 (27.42)	25.42 (30.21)	3	4.6 (2.26)
K 9	15.38 (23.04)	19.25 (26.01)	12.13 (20.35)	15.59 (23.13)	2	3.1 (1.90)
KDG 128	20.25 (26.73)	25.13 (30.07)	17.25 (24.52)	20.88 (27.10)	2	3.4 (1.97)
DHARANI	20.50 (26.91)	26.13 (30.72)	18.38 (25.36)	21.67 (27.66)	3	3.6 (2.02)
ICGV 86031 (RC)	12.13 (20.36)	15.38 (23.07)	10.25 (18.66)	12.59 (20.70)	2	3.1 (1.90)
ICGV 91114 (SC)	23.13 (28.73)	26.00 (30.64)	21.13 (27.35)	23.42 (28.91)	3	4.4 (2.21)
MEAN	17.73 (24.89)	21.55 (27.64)	15.70 (23.33)	18.33 (25.29)	2	3.41 (1.98)
S.EM±	0.71	0.57	1.01	0.49		0.13
CD (P=0.05%)	2.04	1.64	2.89	1.36		0.38

RC- Resistant check, SC- Susceptible check

Figures in parenthesis indicates angular transformed values for per cent leaf damage.

Figures in parenthesis indicates square root transformed $\sqrt{(x+0.5)}$ values for thrips per terminal bud

All the forty germplasm lines were classified based on per cent damage as Damage Rating (DR) 2 (1 to 20 per cent damage) and DR 3 (21 to 30 per cent).

Germplasm	Damage Rating (DR)
ICGV 181011, 15083, 15426, 171015, 16679, 03043, 07222, 13200, 15423, 15264, 93468, 99195, 00298, 00351, 02266, 87141, 90320, 86031, JCG 2141, K 9, ICGV SM 90704, KDG 128, DHARANI	2
ICGV 181052, 06424, 13189, 00350, 06040, 86015, 93437, 93382, 10001, 10021, 15307, 91114, JCG 4798, 5834, 3341, K 6	3

B. Physical (Morphological Characters)

Various morphological parameters *viz*., plant height, growth habit, number of branches per plant, trichomes on leaf lamina, leaf midrib and petiole, main stem thickness, stem were recorded to know the morphological basis of resistance/susceptibility in forty germplasm lines of groundnut (Table 3).

When leaf damage is considered, it indicated very weak positive correlation (non-significant) to plant height and no. of branches per plant and negatively correlated to main stem thickness (non-significant), trichome density on lamina (significant), trichome density on midrib (significant) and trichome density on petiole (significant) (Table 4).

With respect to number of thrips per terminal bud, the correlation studies indicated very weak positive correlation (non-significant) with plant height and negative correlation with number of branches per plant (non-significant), main stem thickness (non-significant), trichome density on lamina (significant), trichome density on midrib (non-significant) and trichome density on petiole (non-significant) (Table 5).

Our present investigations are in confirmation with Krishnaiah (2011) who reported significant negative correlation between trichome density on leaf lamina with thrips leaf damage and thrips population and weak positive correlation between plant height and thrips leaf damage. Khalil *et al.*, (2017) reported that thrips population were positively correlated with hair density on leaf midrib, thickness of leaf lamina and plant height. Sonawane *et al*. (2019) reported negative and significant association between thrips incidence and trichome frequency in groundnut. Similar results were reported by Dwivedi *et al.*, (1986) on close association between resistance to thrips and dark green leaf colour, hairy characters (trichomes) in peanut cultivar ICGV-86031.

C. Biochemical characters

About thirteen germplasm lines were selected for biochemical parameters *viz*., total sugars, proteins, phenols and tannins estimation. The total sugars, proteins, phenols and tannins ranged from 2.24 (ICGV 93468) to 6.82 mg/g (JCG 4798), 2.14 (ICGV 93468) to 2.98 mg/g (ICGV 10021), 0.67 (ICGV 91114) to 0.97 mg/g (ICGV 86031) and 0.0022 (ICGV 10021) to 0.0050 mg/g (ICGV 93468) of leaf sample, respectively in the selected germplasm lines (Table 6).

There was positive correlation between thrips population and leaf damage with total sugars (non-significant) and proteins (significant) and significant negative correlation with phenols and tannins (Table 7).

Table 3: Morphological characters of 40 germplasm lines of groundnut.

Genotype	Plant height (cm)	No. of branches	Main stem thickness (cm)	Trichome density (No. of trichomes / 0.25 cm^2)			Growth habit	Stem pigmentation	Leaflet colour
				Leaf lamina	Midrib	Petiole			
ICGV 15083	12.68	7.50	2.55	34.25	54.15	63.55	Semi erect	Green	Dark green
ICGV 181052	15.83	7.40	2.25	30.96	55.13	65.78	Prostrate	Green	Dark green
ICGV 181011	16.73	5.80	2.43	35.25	66.33	76.00	Erect	Green	Dark green
ICGV 171015	26.60	5.80	2.51	54.56	60.01	59.37	Semi erect	Green	Dark green
ICGV 16679	18.00	5.60	2.88	34.85	68.59	76.60	Erect	Green	Dark green
ICGV 03043	21.70	5.60	2.45	40.85	63.66	78.86	Erect	Green	Dark green
ICGV 07222	16.82	7.80	2.58	44.65	73.22	80.55	Erect	Green	Dark green
ICGV 06424	21.75	8.00	2.54	31.95	38.25	52.10	Semi erect	Green	Dark green
ICGV 13189	24.10	4.80	2.22	30.89	62.55	68.55	Erect	Green	Light green
ICGV 13200	18.30	4.30	2.31	27.12	56.96	62.58	Erect	Green	Green
ICGV 14421	16.31	6.00	2.28	33.88	59.65	73.99	Erect	Green	Light green
ICGV 15423	22.88	5.80	2.19	27.67	48.54	64.20	Erect	Green	Green
ICGV 15426	18.15	4.60	2.42	31.39	48.56	65.23	Erect	Green	Green
ICGV 93468	13.15	4.50	2.94	47.56	68.26	84.75	Erect	Green + Purple	Dark green
ICGV 99195	22.70	5.60	2.54	47.35	66.89	71.64	Erect	Green	Green
ICGV 00298	21.89	4.80	2.43	30.93	61.50	70.25	Erect	Green	Green
ICGV 00350	16.43	5.00	2.38	33.96	60.36	68.95	Erect	Green	Green
ICGV 00351	16.57	5.20	2.31	38.23	44.15	61.96	Erect	Green + Purple	Green
ICGV 06040	18.71	5.00	2.07	34.37	48.70	62.58	Semi erect	Green	Dark green
ICGV 02266	14.97	5.00	3.12	45.66	78.55	83.55	Erect	Green + Purple	Dark green
ICGV 86015	18.18	4.80	2.45	27.57	62.55	94.84	Erect	Green	Dark green
ICGV 93437	21.25	7.50	2.47	34.25	40.66	57.97	Erect	Green	Light green
ICGV 93382	20.85	7.00	2.55	31.17	66.95	73.84	Erect	Green	Green
ICGV 10001	26.16	5.50	2.36	29.54	53.98	69.31	Erect	Green + Purple	Green
ICGV 10021	22.90	4.20	2.35	31.56	40.56	61.11	Erect	Green	Light green
ICGV 15264	19.65	4.50	2.28	32.25	63.56	77.17	Erect	Green + Purple	Light green
ICGV 15307	18.40	4.40	2.51	29.58	55.89	66.31	Erect	Green + Purple	Dark green
ICGV 87141	21.90	4.60	2.29	41.56	51.65	71.38	Erect	Green	Dark green
ICGV SM 90704	20.00	5.40	2.18	36.25	70.65	86.17	Erect	Green	Dark green
ICGV 90320	21.40	4.50	2.56	38.65	72.68	87.31	Erect	Green	Green
JCG 4798	19.45	4.30	2.34	42.56	53.65	61.91	Erect	Green + Purple	Light green
JCG 5834	25.60	4.30	2.43	36.90	66.95	80.33	Erect	Green	Light green
JCG 2141	20.45	5.20	2.49	43.65	59.69	66.85	Erect	Green	Dark green
JCG 3341	20.65	5.20	2.33	30.65	66.94	87.97	Semi erect	Green	Dark green
K 6	23.65	4.20	2.37	25.68	50.65	56.87	Erect	Green	Light green
K 9	18.10	5.60	2.45	44.25	71.25	81.56	Erect	Green	Dark green
KDG 128	13.37	5.20	2.51	34.68	76.43	87.25	Erect	Green + Purple	Dark green
Dharani	16.35	4.50	2.92	32.56	63.89	73.55	Semi erect	Green + Purple	Green
ICGV 86031 (RC)	22.45	4.60	3.33	48.65	96.01	102.87	Erect	Green + Purple	Dark green
ICGV 91114 (SC)	27.90	4.40	2.88	33.26	57.56	63.37	Erect	Green	Light green
Mean	19.82	5.35	2.49	36.03	60.65	72.47			

Table 4: Relationship between morphological characters of germplasm lines and leaf damage (%) due to thrips.

Sr. No.	Parameters	Correlation Coefficient	Regression Equation
1.	PLANT HEIGHT (X) VS LEAF DAMAGE (Y)	0.0404	Y = 17.2547 + 0.0551 X
2.	NO. OF BRANCHES (X) VS LEAF DAMAGE (Y)	0.0293	Y = 17.6041 + 0.1383 X
3.	MAIN STEM THICKNESS (X) VS LEAF DAMAGE (Y)	-0.2965*	Y = 32.6507 – 5.7529 X
4.	TRICHOME DENSITY ON LAMINA (X) VS LEAF DAMAGE (Y)	-0.6324**	Y = 37.1768 - 0.4670 X
5.	TRICHOME DENSITY ON MIDRIB (X) VS LEAF DAMAGE (Y)	-0.4076**	Y = 29.9875 - 0.1852 X
6.	TRICHOME DENSITY ON PETIOLE (X) VS LEAF DAMAGE (Y)	-0.3362*	Y = 29.3142 - 0.1513 X

*****Significant at 0.05 level; ** Significant at 0.01 level

Table 5: Relationship between morphological characters of germplasm lines and thrips population.

Sr. No.	Parameters	Correlation Coefficient	Regression Equation
1.	PLANT HEIGHT (X) VS NO./PLANT (Y)	0.1800	Y = 2.6997 + 0.0358 X
2.	NO. OF BRANCHES (X) VS NO./PLANT (Y)	-0.1393	Y = 3.9260 - 0.0960 X
3.	MAIN STEM THICKNESS (X) VS NO./PLANT (Y)	-0.1921	Y = 4.7620 - 0.5438 X
4.	TRICHOME DENSITY ON LAMINA (X) VS NO./PLANT (Y)	-0.5260**	Y = 5.4526 - 0.0567 X
5.	TRICHOME DENSITY ON MIDRIB (X) VS NO./PLANT (Y)	-0.1862	Y = 4.1861 - 0.0123 X
6.	TRICHOME DENSITY ON PETIOLE (X) VS NO./PLANT (Y)	-0.1465	Y = 4.1075 - 0.0096 X

** Significant at 0.01 level

Table 6: Biochemical characters of selected germplasm lines.

Sr. No.	Germplasm Lines	Total Sugars (Mg)	Proteins (Mg)	Phenols (Mg)	Tannins (Mg)
1.	ICGV 15083	2.67	2.57	0.94	0.0026
2.	ICGV 181011	4.90	2.39	0.82	0.0030
3.	ICGV 13189	5.91	2.58	0.76	0.0028
4.	ICGV 93382	2.50	2.89	0.68	0.0023
5.	ICGV 10001	3.54	2.92	0.78	0.0032
6.	ICGV 10021	4.81	2.98	0.64	0.0022
7.	ICGV 02266	4.10	2.36	0.73	0.0040
8.	ICGV 00298	3.15	2.35	0.90	0.0047
9.	ICGV 93468	2.24	2.14	0.92	0.0050
10.	K 6	3.85	2.52	0.75	0.0032
11.	JCG 4798	6.82	2.82	0.81	0.0035
12.	ICGV 86031 (R)	2.53	2.23	0.97	0.0045
13.	ICGV 91114 (S)	4.86	2.94	0.61	0.0024

Table 7: Relationship between biochemical characters of selected germplasm lines and thrips infestation and incidence.

Biochemical Characters	Thrips ('R' Value)	
	Thrips Population	Leaf Damage (%)
Total Sugars	0.436	0.423
Proteins	0.672**	0.801**
Phenols	-0.683**	-0.650*
Tannins	-0.801**	-0.832**

*Significant at 0.05 level; ** Significant at 0.01 level

The results are in conformation with the studies of Sonawane *et al*. (2019) who reported that the total sugar content showed positive correlation with thrips population (r = 0.520), highest quantities being noticed in susceptible genotypes. Naik (2005) reported that thrips population and phenol content were strongly associated showing significant and negative (-0.500) relationship. Kandakoor *et al.* (2014) revealed that phenols and tannins showed significant negative relationship with number and damage of thrips. Total sugar, amino acids and reducing sugars showed positive relationship with number of thrips and their per cent damage. Rao *et al.* (2015) reported that resistance in groundnut genotype was due to phenol content and these genotypes might be used as source of resistance to thrips in groundnut.

CONCLUSION

Twenty-five germplasm lines including the resistant check (ICGV 86031) had a damage rating of 2 I. e 1 to 20 per cent, while the remaining 15 lines had DR of 3 (21-30%) against thrips. The 5 germplasm lines *viz*., ICGV 171015 (10.30%), ICGV 03043 (12.67%), ICGV 93468 (11.50%), ICGV 00298 (10.97%) and ICGV 02266 (12.34%) were on par with the resistant check (12.59%) and were significantly different from the susceptible check (23.42%). Resistance to thrips in germplasm lines was due to significantly higher trichome density on leaf lamina, higher phenol and tannin content.

FUTURE SCOPE

The identified germplasm lines and their important physico-chemical characters for resistance to thrips in the present study can be subjected to one or more seasons of screening for use in the future breeding programmes to develop resistant cultivars.

Conflict of interest: None

REFERENCES

Baig, F., Ayyaz, M., & Javed, H. (2015). Screening of different groundnut, *Aarachis hypogaea* L. (Fabaceae: Fabales) cultivars against red hairy caterpillar, *Amsacta albistriga* W. (Arctiidae: Lepidoptera) population in relation to leaf infestation, physico-morphic characters, abiotic factors and yield. *Pakistan journal of Zoology*, *47*(6): 1697-1698.

Baskaran, R. K., & Rajavel, D. S. (2013). Yield loss by major insect pests in groundnut. *Annals of Plant Protection Sciences*, *21*(1): 189-190.

Bhatti, M. A., Saeed, M., Chatta, N., & Iqbal, S. (1976, April). Host plant resistance and importance to insect population suppression in cotton crop. In *Proc. Cott. Prod. Seminar, ESSO, Pak. Fertilizer Co. Ltd*: 132-142.

Cobb, W. Y., & Johnson, B. R. (1973). Physicochemical properties of peanuts. *Peanuts—Cultures and Uses*: 209-263.

Dwivedi, S. L., Amin, P. W., Nigam, S. N., Nagabhushanam, G. V. S., Rao, V. R. and Gibbons, R. W., (1986). Genetic analysis of trichome characters associated with resistance to jassid (*Empoasca kerri* Pruthi) in peanut. *Peanut science*, *13*(1): 15-18.

Gadad, H., Hegde, M., & Balikai, R. A. (2014). Screening and biochemical analysis for resistance against groundnut thrips. *Biochemical and Cellular Archives Journal*, *14*(1): 145-149.

Indiastat. (2019-20). https://www.indiastat.com/table/agriculture-data/2/stats.aspx

Kandakoor, S. B., Khan, H. K., Chakravarthy, A. K., Kumar, C. A., & Venkataravana, P. (2014). Biochemical constituents influencing thrips resistance in groundnut germplasm. *Journal of environmental biology*, *35*(4): 675.

Khalil, H., Raza, A. B. M., Afzal, M., Aqueel, M. A., Khalil, M. S., & Mansoor, M. M. (2017). Effects of plant morphology on the incidence of sucking insect pests complex in few genotypes of cotton. *Journal of the Saudi Society of Agricultural Sciences*, *16*(4): 344-349.

Krishnaiah, M. (2011). Screening of promising groundnut genotypes to insect pest complex and their management with certain insecticides. *M.Sc. (Agri). Thesis, ANGRAU.*

Naik, O. S. (2005). Studies on sucking insect pests of groundnut. *M.Sc. (Agri.) Thesis*.

Praveena, Y. V., Kotikal, Y. K., Awaknavar, J. S., & Kenchangoudar, P. V. (2011). Screening of groundnut varieties against leaf miner *Aproaerema modicella* Deventer. *Karnataka Journal of Agricultural Sciences*, *24*(4): 561-563.

Rao, A. R. K., Krishna, T. M., John, K., Sudhakar, P., Devaki, K., & Prasad, P. R. (2015). Influence of morphological traits on resistance of groundnut genotypes for thrips. *African Journal of Agricultural Research*, *10*(4): 250-263.

Ranga Rao, G. V., & Wightman, J. A. (1997). Techniques for screening groundnut genotypes for resistance to pests, *Spodoptera litura* (F.) in India. In *Proceedings of The National Scientists Forum on Spodoptera litura ICRISAT, Patancharu*: 68-75.

Savage, G. P., & Keenan, J. I. (1994). The composition and nutritive value of groundnut kernels. In *The groundnut crop*, Springer, Dordrecht: 173-213.

Sonawane, V. G. Misal A. M., Tavadare, P. L., Gawali, R. G., & Tathe, R. G. (2019). Phenotypic and Biochemical Mechanism of Resistance in Groundnut Genotype against Thrips. *Int. J. Curr. Microbiol. App. Sci*., *8*(10): 1587-1594.

Thomas, M. and Waage, J., (1994). Integration of biological control and host plant resistance breeding. *CAB International*: 5.

How to cite this article: Shaik Moizur Rahman*, K. Vijayalakshmi and Ch V. Durga Rani (2022). Screening and Physico-Chemical Bases of Resistance in Groundnut Germplasm Lines against Thrips. *Biological Forum – An International Journal*, *14*(1): 1241-1247.