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Screening of Groundnut (*Arachis hypogaea* L.) Genotypes Against Spotted Pod Borer, *Maruca vitrata* (Geyer) During *Rabi* Season

T. Naresh[1*], A. Ramakrishna Rao[2] and T. Murali Krishna[2]

[1]Department of Entomology, S.V. Agricultural College,

[2]Department of Entomology, Regional Agricultural Research station, Tirupati

*Corresponding Author E-mail: t.naresh0099@gmail.com

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ABSTRACT

Screening of groundnut (Arachis hypogaea L.) genotypes against spotted pod borer, Maruca vitrata (Geyer) was conducted during rabi 2015-16 at dryland farm, S.V. Agricultural College, Tirupati. Twenty-five genotypes were screened against the spotted pod borer. Among these Percent infestation of M. vitrata was less in K-9, ICGV-86368, TCGS-1426, CS-19 genotypes and more in K-6, Dharani, Narayani and TCGV-1543. The experimental results indicated that spreading type and short stature groundnut cultivars were tolerant to the M. vitrata incidence. Chlorophyll content and Specific Leaf area, these plant physical parameters showed significant effect on incidence of M. vitrata in groundnut crop. Chlorophyll content was negatively correlated with (r =-0.48) with per cent infestation of M. vitrata at 60 DAS. Specific Leaf area was positively correlated with (r=0.43) with per cent infestation of M. vitrata at 60 DAS and also short stature plants groundnut cultivars were tolerant to M. vitrata incidence.

Key words: *Arachis hypogaea, Maruca vitrata, Percent infestation.*

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is a leading oilseed crop in India. Groundnut is an important oil seed crop of tropical and sub tropical regions of the world. India ranks first in groundnut cultivation in an area of 5.53 m ha and occupies second place in production (9.67 million tonnes) with productivity of 1750 kg ha^{-1}. In India, groundnut is mostly grown in five states *viz.*, Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra which accounts for 80 per cent of total area and 84 per cent of total production of groundnut. In Andhra Pradesh, groundnut is grown in an area of 13.86 lakh hectares with a total production of 7.48 lakh tonnes and productivity of 644 kg ha^{-1}[4].

Studies reveal that 15 - 20 per cent of the total oilseed production is lost directly or indirectly by the attack of insect and mite pests every year. In groundnut crop, some of the insect pests cause considerable yield losses. Among these insect pests, white grub cause yield losses up to 20-100 per cent, tobacco caterpillar causes yield losses up to 15-30 per cent, red hairy caterpillar causes yield losses up to 75 per cent, leaf miner causes yield losses up to 49 per cent, jassids causes yield losses up to 17 per cent, thrips causes yield losses up to 17 per cent[2].

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Spotted pod borer (*Maruca vitrata*, Geyer), which is a common pest of pulses is extending its incidence on groundnut in southern zone of Andhra Pradesh and causing damage up to 40 per cent to the terminal growing point during *rabi*. Presently study the screening of groundnut genotypes against *M. vitrata* by observing the incidence of *M. vitrata* constantly from 60 days of the crop to crop maturation. Not much work was done on screening of *M. vitrata* on groundnut. Hence the present studies were conducted at S.V. Agricultural College Farm, Tirupati during *rabi*, 2015-16.

MATERIAL AND METHODS

A screening trial was laid out during *rabi*, 2015-16 with 21genotypes and 4checks of groundnut against the spotted pod borer *(M. vitrata)* in a field of S.V. Agricultural College, Tirupati. The experimental location was situated at an altitude of 182.9 m above MSL on 79°36 N latitude and 13°37 E longitude in the Southern Agro-Ecological Zone of Andhra Pradesh. The experiment was laid out in a randomized block design with three replications.

The experimental material comprised of 21genotypes of groundnut *viz*., 21(TCGS-1535, TCGS-1538, TCGS-1539, TCGS-1542, TCGS-1543, TCGS-1544, TCGS-1545, TCGS-1546, TCGS-1398, TCGS-1426, IVK-II-2013-30, IVK-2013-35, IVK-2013-13, ICGV-91114, ICGV-86368, J-11, CS-19, K-1535, K1454, K-1800, K-1801) and 4 Checks like Kadiri-6, Kadiri-9, Dharani and Narayani of diverse origin, which was produced from RARS-Tirupati, ARS- Kadiri and ICRISAT. Each genotype was sown in the field in RBD design with three replications. Each entry was sown in two rows (each row with 5m length) with spacing of 22.5×10 cm.

During the period of study, incidence of the spotted pod borer across different genotypes were recorded from tender leaf buds of groundnut plants. The data were recorded at weekly interval starting from 30 days after sowing up to harvesting stage of the groundnut.

The data was converted to per cent damage by using this formula

$$\text{Per cent damage} = \frac{\text{Total number of plants infested by spotted pod borer}}{\text{Total number of plants in each genotype}} \text{X} 100$$

RESULTS AND DISCUSSIONS

At 60 DAS, among all the 21 genotypes lowest percentage infestation of *M. vitrata* was found in ICGV - 86368 (2.62) followed by TCGS - 1426 (3.50), K- 9 (3.70) and CS -19 (3.78). Highest percentage infestation was found in Dharani (15.08) followed by K-6 (14.34), TCGS - 1543 (9.30) and Narayani (8.90). At 67 DAS, lowest percentage infestation was observed in ICGV-86368 (2.08) followed by TCGS -1426 (2.34), CS- 19 (2.95) and K- 9 (3.22) (significantly different). Highest percentage infestation was found in Dharani (13.17) followed by K-6 (12.66), TCGV-1543 (8.64) Narayani (7.68) showed significantly difference. At 74 DAS, lowest percentage infestation was observed in ICGV-86368 (1.84) followed by CS-19 (1.96) showed (not significantly difference) TCGV 1426 (2.34), and K-9 (2.69) (significantly different). Highest percentage infestation was found in K-6 (11.59) followed by Dharani (10.67), TCGS-1543 (7.74) and Narayani (7.02) showed not significantly difference. At 81 DAS, lowest percentage infestation was observed in ICGV-86368 (1.16) followed by CS-19 (1.50), K-9 (1.68) and TCGV-1426 (1.83), (significantly different). Highest percentage infestation was found in Dharani (10.03) followed by K-6 (9.74), TCGS-1543 (6.86) and Narayani (6.40) showed significantly difference. At 88 DAS, lowest percentage infestation was observed in ICGV-86368 (0.63) followed by TCGS-1426 (0.69), K-9 (0.85) (not significantly different) and CS-19 (0.93) (significantly different). Highest percentage infestation was found in K-6 (8.32) followed by Dharani (7.57), Narayani (5.33) and TCGV-1543 (4.92) showed significantly difference. At 95 DAS, lowest percentage infestation was observed in CS-19

(0.50) followed by ICGV-86368 (0.52) TCGS-1426 (0.55), K-9 (0.62) (not significantly different). Highest percentage infestation was found in K-6 (6.82) followed by Dharani (5.75) (not significantly different). Narayani (3.56) and TCGS-1543 (2.28) showed significantly difference (Table 1).

Percent infestation of *M. vitrata* was less in K-9, ICGV-86368, TCGS-1426, CS-19 genotypes and more in K-6, Dharani, Narayani and TCGV-1543. In spreading type and short stature groundnut cultivars were tolerant to the *M. vitrata* incidence.

The highest chlorophyll content was observed in low infested varieties, K-9 (48.00), IVK-II-13-35 (42.40) and IVK- II-13-30 (44.47). The lowest chlorophyll content was found in susceptible varieties, K-6 (37.67), Dharani (37.47), Narayani (36.80) and followed by TCGS-1543 (38.13) (Table 2). Chlorophyll content was negatively correlated with (r =-0.48) with per cent infestation of *M. vitrata* at 60 DAS. The highest leaf area was found in susceptible varieties K-6 (152, 155.32), Dharani (148.83), Narayani (150.62) followed by TCGS-1543 (145.38). The lowest leaf area was reported in resistant varieties CS-19 (111.04), TCGS-1426 (114.13), K-9 (116.97) (Table 3). Specific Leaf area was positively correlated with (r=0.43) with per cent infestation of *M. vitrata* at 60 DAS.

Chlorophyll content and Specific Leaf area, these plant physical parameters showed significant effect on incidence of *M. vitrata* and also incidence of *M. vitrata* was significantly affected by plant morphological characters like plant height, stem length, stem thickness and number of leaves per plant in groundnut crop.

Table 1: Percentage infestation of *Maruca vitrata* in different genotypes of groundnut

S. No.	Genotype	60 DAS (Feb16)	67 DAS (Feb 23)	74 DAS (Mar 1)	81 DAS (Mar 8)	88 DAS (Mar 15)	95DAS (Mar 22)
1	TCGS -1535	5.52 ^{i} (13.59)	4.43 ^{cdefg} (12.15)	4.17 ^{de} (11.78)	3.17 ^{defgh} (10.18)	2.51 ^{def} (8.91)	1.93 ^{def} (7.78)
2	TCGS-1538	4.32 ^{def} (12.00)	3.45 ^{defg} (10.70)	2.75 ^{c} (9.49)	2.50 ^{efgh} (9.07)	2.09 ^{de} (8.25)	1.69 ^{def} (7.33)
3	TCGS-1539	6.47 ^{ef} (12.53)	4.69 ^{cdefg} (12.51)	3.67 ^{d} (11.03)	3.25 ^{defg} (10.23)	2.62 ^{def} (8.99)	1.70 ^{def} (6.99)
4	TCGS-1542	5.08 ^{hi} (13.01)	4.56 ^{defg} (12.29)	3.84 ^{de} (11.27)	3.52 ^{defgh} (10.81)	2.77 ^{ef} (9.55)	2.05^{befg} (8.20)
5	TCGS- 1543	9.30 ^{k} (17.76)	8.64 ^{cdefg} (17.10)	7.74 ^{g} (16.14)	6.86 ^{defgh} (15.18)	4.92 ^{g} (12.80)	2.28 ^{efg} (8.59)
6	TCGS-1544	5.44 ^{hi} (13.49)	4.96 ^{defg} (12.86)	4.45 ^{e} (12.18)	3.44 ^{defgh} (10.63)	2.23 ^{de} (8.35)	1.90 ^{def} (7.72)
7	TCGS-1545	4.94 ^{ghi} (12.84)	4.34 ^{cdefg} (12.02)	3.83 ^{de} (11.28)	3.31 ^{defgh} (10.49)	2.42 ^{def} (8.93)	1.45 ^{def} (6.84)
8	TCGS- 1546	4.62 ^{def} (12.34)	4.46 cdefg (12.18)	4.13 ^{de} (11.72)	3.24 ^{defgh} (10.37)	2.55 ^{def} (9.19)	1.42 ^{def} (6.71)
9	TCGS-1398	4.70 ^{ef} (12.48)	2.92 ^{def} (9.83)	2.84 ^{c} (9.58)	1.95 ^{defg} (7.73)	0.95 ^{bc} (3.24)	0.88 ^{bc} (3.12)
10	TCGS- 1426	3.50 ^{c} (10.78)	2.34 ^{bcd} (8.80)	2.34 ^{bc} (8.78)	1.83 ^{bcde} (7.76)	0.69 ^{ba} (2.75)	0.55 ^{ab} (2.45)
11	ICGV-91114	0.00^{a} (0.00)	0.00 ^{ba} (0.00)	0.00 ^{a} (0.00)	0.00 ^{abc} (0.00)	0.00 ^{a} (0.00)	0.00 ^{a} (0.00)
12	ICGV-86368	2.62 ^{b} (9.31)	2.08 ^{abc} (8.27)	1.84 ^{b} (7.76)	1.16 ^{cdef} (5.96)	0.63 ^{ba} (2.64)	0.52 ^{ab} (2.39)
13	IVK-II- 2013-30	0.00 ^{a} (0.00)	0.00 ^{ba} (0.00)	0.00 ^{a} (0.00)	0.00 ^{ab} (0.00)	0.00 ^{a} (0.00)	0.00 ^{a} (0.00)
14	IVK-II-2013-35	0.00 ^{a} (0.00)	0.00 ^{a} (0.00)	0.00 ^{a} (0.00)	0.00 ^{a} (0.00)	0.00 ^{a} (0.00)	0.00 ^{a} (0.00)

15	IVK-II-2013-13		0.00 [a] (0.00)	0.00 [a] (0.00)	0.00 [a] (0.00)	0.00 [a] (0.00)	0.00 [a] (0.00)	0.00 [a] (0.00)
16	K-1535		7.98 [j] (16.40)	6.92 [cdef] (15.23)	5.96 [f] (14.13)	5.06 [defg] (12.97)	4.12 [fg] (11.61)	2.67 [fg] (9.14)
17	K-1454		3.95 [cdef] (11.44)	3.40 [cdefg] (10.62)	2.92 [c] (9.80)	2.03 [defgh] (7.98)	1.08 [bc] (3.46)	0.94 [bc] (3.22)
18	K-1800		4.75 [efg] (12.58)	4.37 [cdefg] (12.07)	3.71 [d] (11.10)	3.10 [defg] (10.11)	2.27 [de] (8.49)	1.49 [def] (6.47)
19	K-1801		4.75 [fgh] (12.59)	3.45 [cdef] (10.69)	2.85[c] (9.70)	2.14 [defg] (8.30)	1.38 [cd] (6.44)	1.34 [de] (6.35)
20	J-11		4.31 [def] (11.99)	3.65 [def] (11.02)	2.87 [c] (9.71)	1.99 [cdef] (7.90)	1.76 [de] (7.40)	1.11 [cd] (5.77)
21	CS-19		3.78 [cde] (11.22)	2.95 [def] (9.86)	1.96 [b] (7.86)	1.50 [bcde] (6.59)	0.93 [bc] (3.21)	0.50 [ab] (2.34)
22	K-6		14.34 [l] (22.25)	12.66 [efg] (20.84)	11.59 [h] (19.90)	9.74 [fgh] (18.14)	8.32 [i] (16.75)	6.82 [h] (15.13)
23	K-9		3.70 [cd] (11.08)	3.22 [defg] (10.34)	2.69 [c] (9.43)	1.68 [efgh] (7.25)	0.85 [ba] (3.06)	0.62 [ab] (2.61)
24	DHARANI		15.08 [l] (22.84)	13.17 [fg] (21.27)	10.67 [h] (19.06)	10.03 [gh] (18.46)	7.57 [hi] (15.91)	5.75 [h] (13.81)
25	NARAYANI		8.90k (17.36)	7.68 [g] (16.09)	7.02 [g] (15.35)	6.40 [h] (14.62)	5.33 [gh] (13.26)	3.56 [g] (10.52)
	SEM		0.33	0.28	0.37	0.56	1.12	0.99
	CD	at 0.05	0.95	0.81	1.07	1.67	3.18	2.83
		at 0.01	1.27	1.09	1.43	2.15	4.24	3.77

Values in parenthesis are arc sine transformed values
Values having the same alphabet are not significantly different as per DMRT

Table 2: Performance of groundnut genotypes with respect to chlorophyll content (SCMR) during *rabi*, 2015-16

S.No.	Treatment	60 DAS
1.	TCGS-1535	43.07
2.	TCGS-1538	38.37
3.	TCGS-1539	41.67
4.	TCGS-1542	39.43
5.	TCGS- 1543	38.13
6.	TCGA-1544	40.90
7.	TCGS-1545	38.95
8.	TCGS- 1546	45.20
9.	TCGS-1398	41.27
10.	TCGS-1426	41.70
11.	ICGV-91114	42.50
12.	ICGV-86368	41.47
13.	IVK-II-2013-30	44.47
14.	IVK-II-2013-35	42.40
15.	IVK-II-2013-13	42.37
16.	K-1535	39.03
17.	K-1454	40.57
18.	K-1800	40.70
19.	K-1801	43.10
20.	J-11	40.87
21.	CS-19	45.30
22.	K-6	37.67
23.	K-9	48.00
24.	DHARANI	37.47
25.	NARAYANI	36.80
	SEm	1.18
	CD @ 5%	3.4

Table 3: Specific leaf area (SLA) readings of groundnut genotypes during *rabi*, 2015-16

S.No.	Treatment	60 DAS
1.	TCGS-1535	141.42
2.	TCGS-1538	130.11
3.	TCGS-1539	140.30
4.	TCGS-1542	133.70
5.	TCGS- 1543	145.38
6.	TCGA-1544	132.54
7.	TCGS-1545	141.12
8.	TCGS- 1546	139.93
9.	TCGS-1398	129.92
10.	TCGS-1426	114.13
11.	ICGV-91114	144.87
12.	ICGV-86368	128.68
13.	IVK-II-2013-30	138.79
14.	IVK-II-2013-35	139.72
15.	IVK-II-2013-13	137.31
16.	K-1535	134.41
17.	K-1454	137.13
18.	K-1800	141.32
19.	K-1801	129.22
20.	J-11	134.77
21.	CS-19	111.04
22.	K-6	152.79
23.	K-9	116.97
24.	DHARANI	148.83
25.	NARAYANI	150.62
	SEm	4.003
	CD @ 5%	11.4

CONCLUSION

Chlorophyll content negatively correlated and Specific Leaf area positively correlated incidence of *M. vitrata*, these plant physical parameters showed significant effect on incidence of *M. vitrata* and also incidence of *M. vitrata* was significantly affected by plant morphological characters like plant height, stem length, stem thickness and number of leaves per plant in groundnut crop.

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