Plant Archives Volume 20 No. 1, 2020 pp. 3003-3006 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

REACTION OF GROUNDNUT GERMPLASM AGAINST LEAF CATERPILLAR, *SPODOPTERA LITURA* FAB. (NOCTUIDAE: LEPIDOPTERA)

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Abstract

Resistance potential of 210 groundnut accessions against leaf caterpillar, *Spodoptera litura* Fab. was evaluated during *Rabi*, 2018-2019 and *Kharif*, 2019 seasons at Thandavankulam village, Nagapattinam district of Tamil Nadu, India. Weekly observations on larval population and percent damage revealed a higher level of leaf caterpillar incidence and infestation during *Rabi*, 2018 than *Kharif*, 2019. Based on the standard scale, none of the accession was found immune during both the seasons. During *Rabi* season, 31 accessions were rated resistant while 40 accessions were moderately resistant. During *Kharif* season, 121 accessions were rated resistant because of lesser population of *S. litura*.

Key words : Groundnut, *Spodoptera litura*, germplasm.

Introduction

Groundnut, *Arachis hypogea* L., one of the most important oilseed crops is known as "King of oilseeds" (Doyle and Luckow, 2003; Heywood *et al.*, 2007). It is grown in many tropical and sub-tropical countries of the world under both rainfed and irrigation conditions. India holds the first rank in groundnut production contributing 41 percent of the total world production. It is majorly grown in the following Indian states *viz.*, Gujarat, Andhra Pradesh, Tamilnadu, Karnataka and Maharashtra (APEDA, 2018). Groundnut production is hampered by many biotic and abiotic factors. Insect pests including root feeders, sucking pests and defoliators are the major biotic constraints which cause up to 50 percent yield loss by direct damage as well as by vectoring diseases. In India, leaf caterpillar, *Spodoptera litura* (Fab.) is an important defoliator of groundnut which causes more than 30 percent yield loss (Sahayaraj and Raju, 2003; Atwal and Dhaliwal, 2008). Farmers rely on chemical pesticides for management of this pest but the improper and repeated application of insecticides may cause several problems such as disrupting natural enemy complexes, secondary pest outbreaks and environmental pollution. There is dire need to shift the practice of sole reliance on insecticides to alternative approaches to solve these problems. Using resistant crop varieties against insect pests is an important eco-friendly approach. Many attempts have been made to manage insect pests using the host plant resistance traits in many field and horticultural crops. Keeping the above in view, an experiment was conducted to evaluate the resistance level of 210 groundnut accessions against leaf caterpillar, *S.litura* under field conditions.

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Materials and Methods

Two hundred and ten groundnut accessions including landraces were collected from various sources such as Research Institutes, Universities, besides personal collection from various locations. These accessions were screened at Thandavankulam village, Nagappattinam district of Tamil Nadu, India, which is a hot spot location for *S.litura*. Field screening was done for two seasons *viz. Rabi* (December, 2018- April, 2019) and *Kharif*, 2019. Twenty plants per accession were sown in 30 cm row to row spacing and 20 cm plant to plant spacing. All the recommended agronomic practices were followed except plant protection measures. The larval population of *S. litura* on ten randomly selected plants per accession was recorded at weekly intervals. Observation on percent damage was made during 30, 45, 60 and 75 days after

Table 1: Resistance rating of groundnut accessions against *S.litura* during *Rabi*, 2018- *Kharif*, 2019.

Resistant Category	List of groundnut accessions	
	Rabi, **2018**	*Kharif*, **2019**
Immune	——Nil——	——Nil——
Resistant	ICG-862, ICG-7153, ICG-6888, ICG-6667, ICG-12370, ICG-12276, ICG-11219, ICG-11322, ICG-11426, ICG-11457, ICG-10185, ICG-2772, ICG-2925, ICG-3102, ICG-4156, ICG-4412, ICG-4746, ICG-4750, ICG-6764, ICG-799, ICG-1602, ICG-156, TLG-45, TAG-24, Odisa local-3,GG-6, GJG-32, GG-5, GG-HPS-2, GG-190, ICGV-86564	ICG-862, ICG-7153, ICG-6888, ICG-6667, ICG-12370, ICG-12276, ICG-11219, ICG-11322, ICG-11426, ICG-11457, ICG-10185, ICG-2772, ICG-2925, ICG-3102, ICG-4156, ICG-4412, ICG-4746, ICG-4750, ICG-6764, ICG-799, ICG-1602, ICG-156, TLG-45, TAG-24, Odisa local-3, GG-6, GJG-32, GG-5, GG-HPS-2, GG-190, ICGV-86564, ICG-6993, ICG-6766, ICG-6646, ICG-6407, ICG-334, ICG-442, ICG-532, ICG-6402 ,ICG-6201, ICG-111, ICG-12672, ICG-12625, ICG-11855, ICG-11109 ,ICG-10036, ICG-2773 ,ICG-2857, ICG-5475, ICG-3053 ,ICG-3992, ICG-5609, ICG-5286, ICG-5195, ICG-9777, ICG-9842, ICG-9905, ICG-9507, ICG-13603, ICG-13856, ICG-2741, ICG-13941, ICG-15419, TVG-10342, Uttarkant Local, Thiruvannamalai Local-1, TPG-41,TG-37A,SB-XI, GJG-9, ICG-11515, ICG-8285, ICG-8567 ,ICG-7969, ICG-7181 ,ICG-7000 ,ICG-6813 ,ICG-6913, ICG-6654, ICG-434, ICG-1137, ICG-875 , ICG-513 , ICG-163, ICG-188, ICG-1399 ,ICG-12921, ICG-13099, ICG-13491, ICG-11687, ICG-11862, ICG-12189, ICG-2106 , ICG-2511 ,ICG-10890, ICG-11088, ICG-11144, ICG-10554, ICG-2777, ICG-3027 ,ICG-3584, ICG-4527 ,ICG-4343 ,ICG-5327, ICG-5494, ICG-4598, ICG-4955, ICG-5016, ICG-9666, ICG-9418, ICG-9157, ICG-2711, ICG-6317, ICG-14482, ICG-13942, ICG-15309, Odisa local-2,Thiruvannamalai Local-2, Salem Local, GG-15, GG-2, TG-26, GG-7, KDG-128, JB-FDR-65, ICG-1973
Moderately Resistant	ICG-6993, ICG-6766, ICG-6646, ICG-6407, ICG-334, ICG-442, ICG-532, ICG-6402 ,ICG-6201, ICG-111, ICG-12672, ICG-12625, ICG-11855, ICG-11109, ICG-10036, ICG-2773 ,ICG-2857, ICG-5475, ICG-3053, ICG-3992, ICG-5609, ICG-5286, ICG-5195, ICG-9777, ICG-9842, ICG-9905, ICG-9507, ICG-13603, ICG-13856, ICG-2741, ICG-13941, ICG-15419, TVG-10342, Uttarkant Local, Thiruvannamalai Local-1, TPG-41, TG-37A, SB-XI, GJG-9, ICG-11515	ICG-1711, ICG-3240, ICG-6057, ICG-118, ICG-332, ICG-81, ICG-1668, ICG-1274, ICG-4389, ICG-5662, ICG-5236, ICG-5051, ICG-5221, ICG-5779, ICG-4538, ICG-4543, ICG-4729, ICG-4684, ICG-4911, ICG-9809, ICG-9315, ICG-9249, ICG-10474, ICG-10566, ICG-12879, ICG- 12682, ICG-12000, ICG-13858, ICG-14127, ICG-14466, ICG-7803, ICG-1697, ICG-2306, ICG-14630, ICG-14710, ICG-15190, CJG-22, GJG-33, GAUG-10, R-2001-2, ICG-10384, ICG-397, ICG-8490, ICG-8760, ICG-9037, ICG-6892, ICG-6703, ICG-6375, ICG-6263 ,ICG-297,ICG-1415, ICG-1142 ,ICG-11651 ,ICG-2019, ICG-10092, ICG-297, ICG-3421, ICG-3746, ICG-3681, ICG-14008, ICG-14475, ICG-14118, ICG-7881, ICG-5042, ICG-5240, ICG-2738, KDG-123, R-8808, JL-501, KAUSHAL, ICG-721, ICG-5745, ICG-5663, ICG-5827, ICG-6022 ,ICG-36 , ICG-76, ICG-115, ICG-12697, ICG-3343, ICG-15287, GG-14, ICG-14106, ICG-7404, ICG-13982

Table 1 Continue...

Continue Table 1 ...

Moderately Susceptible	ICG-8285, ICG-8567 ,ICG-7969 ,ICG-7181 ,ICG-7000, ICG-6813 ,ICG-6913, ICG-6654 , ICG-434, ICG-1137, ICG-875 , ICG-513 , ICG-163, ICG-188, ICG-1399, ICG-12921, ICG-13099, ICG-13491, ICG-11687, ICG-11862, ICG-12189, ICG-2106 , ICG-2511 ,ICG-10890, ICG-11088, ICG-11144, ICG-10554, ICG-2777, ICG-3027 ,ICG-3584, ICG-4527 ,ICG-4343 ,ICG-5327, ICG-5494, ICG-4598, ICG-4955, ICG-5016, ICG-9666, ICG-9418, ICG-9157, ICG-2711, ICG-6317, ICG-14482, ICG-13942, ICG-15309, Odisa local-2,Thiruvannamalai Local-2, Salem Local, GG-15, GG-2, TG-26, GG-7, KDG-128, JB-FDR-65	———Nil———
Susceptible	ICG-1973, ICG-1711, ICG-3240, ICG-6057, ICG-118, ICG-332, ICG-81, ICG-1668, ICG-1274, ICG-4389, ICG-5662, ICG-5236, ICG-5051, ICG-5221, ICG-5779, ICG-4538, ICG-4543, ICG-4729, ICG-4684, ICG-4911, ICG-9809, ICG-9315, ICG-9249, ICG-10474, ICG-10566, ICG-12879, ICG- 12682, ICG-12000, ICG-13858, ICG-14127, ICG-14466, ICG-7803, ICG-1697, ICG-2306, ICG-14630, ICG-14710, ICG-15190, CJG-22, GJG-33, GAUG-10, R-2001-2, ICG-10384.	———Nil———
Highly Susceptible	ICG-397, ICG-8490, ICG-8760, ICG-9037, ICG-6892, ICG-6703, ICG-6375, ICG-6263 ,ICG-297,ICG-1415, ICG-1142 ,ICG-11651 ,ICG-2019, ICG-10092, ICG-297, ICG-3421, ICG-3746, ICG-3681, ICG-14008, ICG-14475, ICG-14118, ICG-7881, ICG-5042, ICG-5240, ICG-2738, KDG-123, R-8808, JL-501, KAUSHAL, ICG-721, ICG-5745, ICG-5663, ICG-5827, ICG-6022 ,ICG-36 , ICG-76, ICG-115, ICG-12697, ICG-3343, ICG-15287, GG-14, ICG-14106, ICG-7404, ICG-13982	——Nil———

sowing. Accessions were categorized based on the score derived from the percent damage data using 0-9 scale (Ranga Rao and Wightman, 1997).

Results and Discussion

Incidence and infestation of leaf caterpillar were higher during *Rabi*, 2018 whereas it was very less during *Kharif*, 2019. In *Rabi*, 2018, larval population was observed from 15 DAS onwards which peaked during 36 to 43 DAS and declined thereafter. No larval population was observed from 64 DAS to 92 DAS (Fig. 1). It may be due to high temperature during the beginning of summer as reported earlier by Harish *et al.,* (2015). All the accessions recorded varying levels of leaflet damage and none of the accession was categorized under immune category (0 percent leaflet damage). Thirty-one accessions recorded 1-20% foliage damage and were rated under resistant category (R), whereas 40 accessions were moderately resistant (MR) with 21-30% foliage damage. In contrast to this, 54 accessions were rated as moderately susceptible (MS) and 41 accessions were susceptible (S). Forty-four accessions with up to 51- 70% of foliage damage fell under the highly susceptible category (HS) (Table 1). There was no accession recording more than seventy percent field damage. Similarly, earlier workers who screened the groundnut accessions

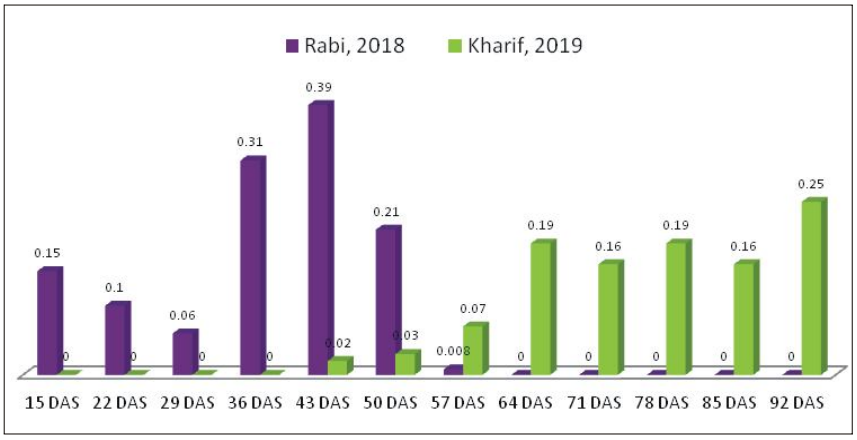

Fig. 1: Incidence of *S,. litura* larvae during *Rabi*, 2018 and *kharif*, 2019.

Leaf caterpillar damage rating scale (Ranga Rao and Wightman, 1997).

Pest score	Percent damage	Resistant Category
0	No damage	Immune
1	1-20	Resistant
2	21-30	Moderately Resistant
3	31-40	Moderately Susceptible
4	41-50	Susceptible
5	51-60	Highly Susceptible
6	61-70	
7	71-80	
8	81-90	
9	91-100	

against *S. litura* under natural field infestation reported that there was no groundnut accession recorded as immune whereas the maximum leaflet damage never exceeded 70 % (Dharne and Patel, 2000; Prasad *et al.*, 2000; Rashmi, 2010). During *Kharif*, 2019, larval infestation started on 43 DAS after the rainfall and increased in subsequent weeks. Many researchers reported that adult emergence was coinciding with the onset of rainfall and multiplication occurred in subsequent days (Monobrullah *et al.*, 2007; Harish *et al.*, 2015). Increment in mean larval population was noted from 64 DAS onwards up to 92 DAS. Ahir *et al.*, (2017) recorded the initiation of tobacco caterpillar during second week of September and its incidence up to the third week of November (Fig. 1). During *Kharif* 2019, 122 accessions were rated as resistant (R) whereas 88 accessions were moderately resistant (MR). The accessions which were grouped as moderately susceptible (MS), susceptible (S) and highly susceptible (HS) during *Rabi*, 2018 were rated as resistant (R) in *Kharif*, 2019. This variation could be attributed to the absence of larvae during the earlier stages of the crop when the leaflet numbers were lesser than the later stage. Hence, further studies are needed to confirm the resistance potential of these selected accessions and it is imperative to evaluate the various biophysical and biochemical factors contributing to the resistance in the promising accessions.

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