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STUDIES ON INSECT PESTS AND THEIR NATURAL ENEMIES ON TAMARIND IN BASTAR TRIBAL BELT OF CHHATTISGARH, INDIA

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ABSTRACT

The experiment was conducted at Shaheed Gundadhoor College of Agriculture and Research Station, Jagdalpur, Bastar during 2014-15. During the course of study, six insect pest species were noticed causing damage at various growth stages of tamarind and four predators and one parasitoid were observed feeding upon different insect pests on tamarind. Spiders *Oxyopes* sp, *Plexippus* sp, and *Olios* sp were observed as major bio-agents against scale insects and tree hoppers whereas lace wing and praying mantid were the next major predators of scale insects and hoppers, respectively. They were active during the months of December and September, respectively. Besides the predators, late larval parasitoid, *Charops* sp. was found parasitizing upon tamarind fruit borer and active during the month of August. A highly significantly positive relationship was found between fruit borer and Ichneumonid wasp and scale insect and lace wing, with the correlation coefficient value (r) of 0.876 and 0.596, respectively. Scale insect and tree hopper were significantly positive correlated with spider with the correlation coefficient value (r) of 0.500 and 0.515, respectively. Scale insect, hopper and tree hopper were significantly positively correlated with the population of praying mantid (correlation coefficient values (r) of 0.494, 0.524 and 0.506 correlation values, respectively).

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INTRODUCTION

Tamarind (*Tamarindus indica* L.) is an important tree of semi arid tropical conditions. Tamarind belongs to dicotyledonous family leguminaceae sub family caesalpiniaceae which has multipurpose use (Anon., 2013). Forty insect pests are found causing damage in tamarind among which fruit borer and mealy bug are of major importance. However, tamarind fruit borer has been reported to be an important pest of macadamia, litchi, and longan fruit in Asia, Australia and Hawaii (Jones, 1995). The females of *Cryptophlebia ombrodelta* lay eggs on the fruits surface and larvae bore into the fruit (Singh, 2014). *The C. ombrodelta* was reared satisfactorily on an artificial medium (Sinclair, 1974). Among natural enemies preying mantid and spider are reported on tamarind (Patil, 2005). The pest successions affected by their ambient environment (Mandal and Roy, 2010; Nirala et al., 2015). The objective of this work is to know the incidence of different insect pests and their natural enemies fauna along with the correlation between them.

MATERIALS AND METHODS

For the study of different insect pest associated with tamarind, two blocks of Bastar district namely Jagdalpur and Tokapal were selected. In each block, two villages were selected where ten trees per village were tagged randomly. For the present investigation, area of one square meter and one square feet (30 cm²) was marked in all four directions in each selected tree. Fortnightly observation on insect pests population with their predators and parasites were observed on randomly selected trees during the cropping season i.e. July to March. Fruit borer infestation was recorded fortnightly from one square meter area in all directions of selected trees randomly on the basis of total number of fruits and number of fruit borer infested fruits. The population of other insect pests and their natural enemies was counted from one square feet (30 cm²) area in all directions of ten randomly selected trees. Insect pests and natural enemy population was subjected to simple correlation.

RESULTS AND DISCUSSION

Natural enemies of tamarind insect pests

Tamarind was mainly infested by fruit borer, mealy bug, hopper, scale insects, tree hopper and hairy caterpillars at different stages of the crop. The natural enemies were observed on same plants at the time of recording insect pests population at fortnightly intervals. List of natural enemies found associated with different insect pests of tamarind is presented in Table 1, Table 2 and Fig. 2. The detailed descriptions of natural enemies are as given below:

Spider

Three species of spiders, *Oxyopes* sp, *Plexippus* sp, and *Olios* sp were recorded as major bio agent. They made their first appearance on the tree in the first week of July with 0.30 spiders / tree. They were observed feeding on the nymphs and adults of tree hopper and scale insects. Their activity continued till the third week of



Figure 2: Illustration of natural enemies of tamarind insect pests: 1. *Oxyopes* sp, 2. *Plexippus* sp, 3. *Mantis religiosa*, 4. Egg of *Chrysoperla carnea*, 5. Pupa of *Charops* sp, 6. *Charops* sp, 7. *Xanthopimplasp*, 8. *Ortherium sabina* 9. *Pseudagrion microcephalum*

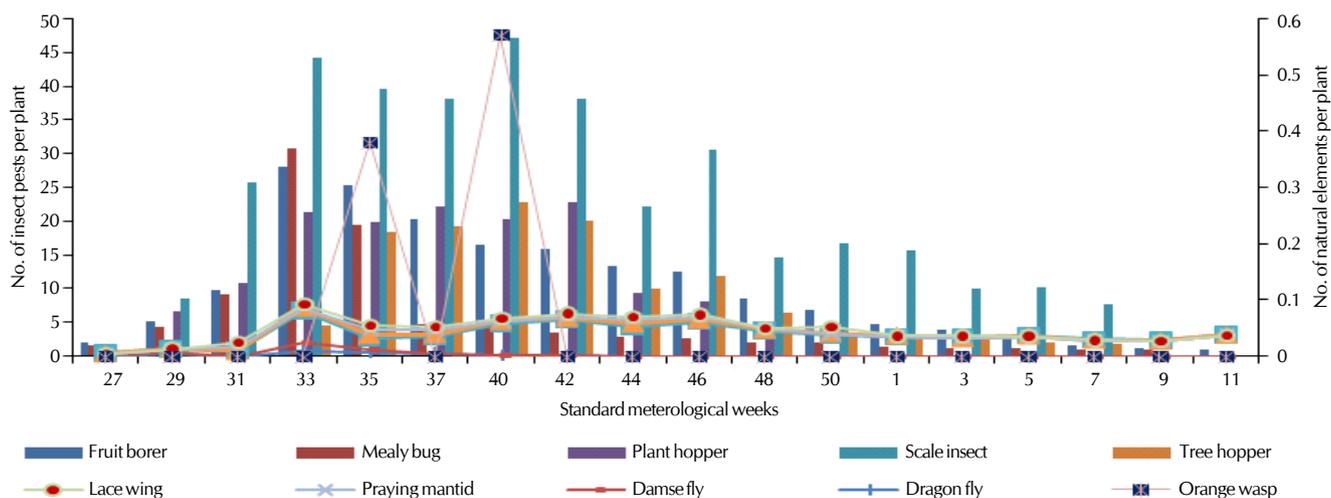


Figure 1: Seasonal incidence of major insect pests on tamarind and their natural enemies during 2014-15

Table 1: List of natural enemy of tamarind insect pests during 2014-15

S.N.	Common name	Systematic Position	Period of activity	Stage of host insect	Population range/tree	Status of peak activity
1	Spider	<i>Oxyopes</i> sp, <i>Plexippus</i> sp & <i>Olios</i> sp Class: Arachnida	Throughout year	Nymph and adult of tree hopper and scale insect	0.30 – 5.38	3 rd week of October
2	Lace wing	<i>Chrysoperla</i> sp Chrysopidae: Neuroptera	Jul – Jan	Nymph and adult of mealy bug and scale insect	0.02 – 0.95	3 rd week of December
3	Preying mantid	<i>Mantis religiosa</i> Mantidae: Dictyoptera	Aug – Dec	Caterpillar, nymph and adult of scale insect, hopper & tree hopper	0.28 – 0.84	1 st week of September
4	Ichneumonid wasp	<i>Charops</i> sp Ichneumonidae: Hymenoptera	Aug – Jan	Late larval stage of fruit borer	0.19 – 0.46	3 rd week of August
5	Dragon fly	<i>Orthetrum sabina</i> Aeshnidae: Odonata	Jul – Nov	Nymph and adult of mealy bug	Traces	-
6	Damsel fly	<i>Pseudagrion microcephalum</i> Rambur Coenagrionidae: Odonata	Jul – Sept	Nymph and adult of mealy bug	Traces	-
7	Orange wasp	<i>Xanthopimpla</i> sp Ichneumonidae: Hymenoptera	Sept – Oct	Larva of fruit borer	Traces	-

Table 2: Fortnightly population of insect pests with associated natural enemies on tamarind during, 2014 – 15

Date of observation	Mean population per plant								
	Fruit borer (per m ²)	Mealy bug (30cm ²)	Scale insect (30 cm ²)	Hopper (30cm ²)	Tree hopper (30 cm ²)	Spider (30cm ²)	Lace wing (30cm ²)	Praying mantid (30 cm ²)	Ichneu monid wasp (30 cm ²)
01/07/2014	2.05	1.60	0.57	1.08	0.00	0.30	0.00	0.00	0.00
15/07/2014	5.24	4.35	8.55	6.70	0.00	0.50	0.02	0.00	0.00
01/08/2014	9.90	9.16	25.65	10.90	0.00	0.81	0.59	0.70	0.00
15/08/2014	27.95	30.81	44.18	21.44	4.56	4.63	0.57	0.00	0.46
01/09/2014	25.39	19.41	39.54	19.94	18.38	1.83	0.51	0.84	0.40
15/09/2014	20.24	4.69	38.12	22.94	19.19	2.44	0.42	0.77	0.32
01/10/2014	16.61	4.72	47.03	20.25	22.81	4.63	0.36	0.00	0.38
15/10/2014	15.81	3.59	38.12	22.94	20.00	5.38	0.40	0.28	0.19
01/11/2014	13.47	2.84	22.09	9.56	10.00	4.44	0.29	0.70	0.38
15/11/2014	12.46	2.69	30.64	8.13	12.00	5.13	0.21	0.56	0.30
01/12/2014	8.50	2.09	14.61	3.44	6.50	3.75	0.00	0.29	0.23
15/12/2014	6.96	2.06	16.74	0.75	3.50	3.25	0.95	0.00	0.19
01/01/2015	4.88	1.41	15.68	0.06	2.63	2.88	0.00	0.00	0.19
15/01/2015	3.90	1.13	9.98	0.00	2.75	2.69	0.38	0.00	0.00
01/02/2015	2.71	1.28	10.33	0.00	2.13	3.06	0.00	0.00	0.00
15/02/2015	1.67	1.09	7.84	0.00	1.94	2.44	0.00	0.00	0.00
01/03/2015	1.27	0.94	0.00	0.00	0.00	2.31	0.00	0.00	0.00
15/03/2015	1.05	0.16	0.00	0.00	0.00	3.19	0.00	0.00	0.00
Seasonal mean	10.00	5.22	20.54	8.71	7.02	2.98	0.26	0.23	0.17
Correlation coefficient (r)				Fruit borer -	-	-	-	0.876**	-
				Mealy bug	0.089	0.464	0.228	-	-
				Scale insect	0.500*	0.596**	0.494*	-	-
				Hopper	0.335	-	0.524*	-	-
				Tree hopper	0.515*	-	0.506*	-	-

* Significant at 5% level of significance (Table Value = 0.468 at 16 d. f.) ** Significant at 1% level of significance (Table Value = 0.590 at 16 d. f.)

March. Peak activity of the predatory spiders was observed in the third week of October with 5.38 spiders / tree with the seasonal mean of 2.98 spiders / tree.

Lace wing, *Chrysoperla* sp

Lace wing was recorded preying upon nymphs and adults of scale insects. The population of *Chrysoperla* sp was counted on the basis of stalked eggs on tamarind pods, the mean was tabulated per tree. Lace wing made its first appearance on the tree in the third week of July with 0.02 eggs / tree. The population of lace wing varied from 0.02 to 0.95 eggs / tree with the seasonal mean of 0.26 lace eggs / tree. The peak activity period was recorded in the third week of December with 0.95 eggs / tree.

Preying mantid, *Mantis religiosa*

Preying mantid was made its first appearance on the tree in

the first week of August with 0.70 mantid / tree. Praying mantid was observed feeding on the nymphs and adults of hopper, tree hopper and scale insects. The population of praying mantid was varied from 0.28 to 0.84 mantid / tree. Peak activity period of the preying mantid was recorded in the first week of September with 0.84 mantid / tree with seasonal mean of 0.23 mantid / tree.

Ichneumonid wasp, *Charops* sp

Besides above predators, a parasitic wasp, *Charops* sp was noticed parasitizing the larval stage of fruit borer. First appearance of this Ichneumonid wasp was made on the tree in third week of August with 0.46 wasp/tree. Their population was varied from 0.19 to 0.46 wasp/tree with seasonal mean of 0.17 wasps/tree. Their population was on peak during third week of August with 0.46 wasps/tree.

Other natural enemies

Besides the above natural enemies, dragon fly, *Ortherium sabina*, damsel fly, *Pseudoagrion microcephalum* and parasitic wasp, *Xanthopimpla* sp was observed during the time of observation. Dragon fly and damsel fly were noticed during third week of August whereas; parasitic wasp was traced during the first week of October. However, their population was less. In the present investigation, four predators and one parasitoid were observed feeding upon different insect pests on tamarind. Spiders, *Oxyopes* sp, *Plexippus* sp, and *Olios* sp were observed as major bio agents against scale insects and tree hoppers whereas, lace wing and preying mantid were the next major predators preying upon scale insects and hoppers, respectively. They were active during the month of December and September, respectively. Besides the predators, late larval parasitoid, *Charops* sp was parasitizing upon tamarind fruit borer and active during the month of August.

Correlation studies

To observe the effect of bio agents on the activity of the insect pests, the population of fruit borer, mealy bug, scale insect and tree hopper was correlated with spider, lace wing, preying mantid and Ichneumonid wasp (Table 2) which revealed a highly significantly positive relationship between fruit borer and Ichneumonid wasp with the correlation coefficient value (r) of 0.876. Scale insect and tree hopper were significantly positive correlated with spider with the correlation coefficient value (r) of 0.500 and 0.515, respectively. Similarly, scale insect, hopper and tree hopper were significantly positively correlated with the population of preying mantid (correlation coefficient values (r) of 0.494, 0.524 and 0.506, respectively). Highly significantly positive relationship between scale insect and lace wing recorded with correlation coefficient value (r) of 0.596. Similar studies were undertaken by Patil (2005) who reported the spider and preying mantid were preying upon different insect pests and were active during the month of September and October. These findings are in agreement with

present one. Dhanapati and Varatharajan (2013) also reported the Ichneumonid parasitoids parasitizing the several lepidopteran larvae.

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