



INFLUENCE OF METEOROLOGICAL PARAMETERS ON THE TRAP CATCHES OF ICHNEUMONIDS AND BRACONID PARASITOIDS IN RICE ECOSYSTEM DURING NAVARAI, KURUVAI AND SAMBA SEASONS

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Abstract

The present investigation was carried out to find out the impact of solar powered light trap catches of two important parasitoids viz. Ichneumonids and Braconid parasitoids in rice ecosystem during *navarai*, *kuruvai* and *samba* seasons at Annamalai nagar during the year 2017 – 2019. The maximum population of ichneumonid and braconid adult trapped during 19th, 12th standard week respectively in *navarai* season. In *kuruvai* season, the maximum population of ichneumonid, braconid adult trapped during 29th standard week. The maximum population of Ichneumonid and Braconids, were recorded in 1st, 2nd, standard weeks respectively in *samba* season. For correlation of meteorological parameters, maximum temperature, minimum temperature, relative humidity, sunshine and rainfall were recorded on daily basis from the Meteorological observatory, Department of Agronomy, Faculty of Agriculture, Annamalai University.

Key words : Solar powered light trap, Ichneumonids and Braconid parasitoids, Seasonal incidence and Meteorological parameters.

Introduction

Solar powered light trap is a tool to collect valuable information on effect of meteorological factors on population dynamics, distribution and occurrence of major phototactic parasitic insect species of rice ecosystems. Therefore the present study was undertaken with following objectives, identification of parasitic species of insects collected in solar powered light trap and to find out the influence of meteorological parameters on solar powered light trap catches of parasitic species of insect during *Navarai*, *Kuruvai* and *Samba* seasons at Annamalai nagar.

Material and methods

The present study was carried out in the Department of Entomology, Faculty of Agriculture, Annamalai University during the year 2017 – 2019 (*Navarai* season - February to May, *Kuruvai* season - June to August and *Samba* season - October to January). The trap was setup in the garden land area of the Annamalai University

Experimental Farm. The farm is situated at an elevation of 5.79 M above the Mean Sea Level. The trap was placed three feet above the crop level at each stage of crop. The trap was operated continuously from 2017 to 2019, covering *navarai*, *kuruvai* and *samba* seasons.

Description of solar powered light trap

The Solar panel contained 32 small squares of solar powered cells, in these cells are generates electricity about 3 watts or (3W / 6 Volts). with a diameters of 30cm. The insect trapping system consisting battery about 6 volts/ 5A. and also contains two initiating light points of which one green in colour that indicated battery charging status, another red light was indicated the unit operation status, when the switch is ON. The trapping system battery gain charges from solar panel through connectivity cable wire. The capacity of the collection pan is 2 lit. This possessed one adjustable screw. It was used to drain the water and clean the pan every day. The stand is made up of highly compactable plastic material the funnel type stand which posses adjustable keys, this key was inserted into required height of the hole and turn to clockwise to lock the key

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(pushing the key in to the stand having hole then turn clockwise to lock) to installing the trap with in the field 2 to 3 feet above the crop level. Inserting the fisher in to the hole of foot rest gave stability to the trap unit.

Operation procedure

Switch ON the button to start the operation and keep the device under the direct sunlight location, never turn OFF switch while the device is in use , because light turns ON automatically when the sun set happen. When the device is not used for longer duration, switch OFF the device and keep it under safe. To keep minimum of 8 hrs on solar light charging every week long time switch OFF. To drain the water in the tub unscrew the bottom knob of the tub ,when water is fully drained and close the knob , and refill the tub with 2 lit of water mix with soap solution. (Soap solution is the preservative agent).

Identification of insect fauna

For the taxonomic documentation the light trap was operated every night (6.00 PM to 6.00 AM) and collection was observed on the next day morning, Observation were recorded everyday throughout the cropping season on the three seasons of experimentation. Insects were sorted out on the basis of specimens available in the Department of Entomology, Faculty of Agriculture, Annamalai University.

Statistical method

The method given by Panse and Sukhatme (1957) was followed for statistical analysis to study the effects of meteorological parameters and seasons on insect incidence. Following statistical analysis was worked out the correlation coefficient between various insect trap catches and meteorological parameters

$$F_{xy} = \frac{xy - (S_x)(S_y)/n}{\sqrt{((S_x^2 - (S_x)^2/n)((S_y^2 - (S_y)^2/n))}}$$

Where,

F (xy) - Correlation coefficient between insect and a particular meteorological parameter

x - Particular meteorological parameter (Standard week), y - Insect Catches

Results and Discussion

Ichneumonidae

The mean populations of Ichneumonids adult during navarai, kuruvai and samba seasons are 14.87, 11.9 & 14.56 respectively. The peak population was observed in 1st standard week (31 adults). Different meteorological parameters are correlated with Ichneumonids population during

navarai, kuruvai and samba seasons, maximum temperature had significant positive correlation in navarai season and negative correlation in kuruvai and samba seasons, minimum temperature had positive correlation in navarai an kuruvai seasons however it negative correlation in samba seasons, the relative humidity and sun shine had negative correlation in navarai, kuruvai and samba seasons and the sunshine showed that the positive correlation in navarai and samba seasons.

In similar to the present findings, Browning and Oatman (2005) and Yeargan *et al.*, (1981) reported that the Ichneumonid population was significantly negative correlation with maximum temperature and rainfall. In higher rainfall result in reducing the longevity of Ichneumonid populations. On the other hand, Sharma *et al.*, (2015) reported that the abiotic factor likes temperature and rainfall plays a major role in species abundance of Ichneumonids in rice ecosystem (Tables 1, 2 & 3).

Braconidae

The mean collection of Braconid adult was carried out during navarai, kuruvai and samba seasons they were 11.25, 10.25 & 11.4 respectively. The Braconid adults catch were correlated with different meteorological parameters, the maximum temperature had significant positive correlation in samba season and negative correlation in kuruvai and navarai seasons, minimum temperature had positive correction in kuruvai and samba seasons however it showed that the negative correlation in navarai season, rainfall showed the negative correlation in kuruvai, navarai and samba seasons, the relative humidity had positive correlation in navarai season and negatively correlated in kuruvai and samba seasons and the sunshine had positive correlation in navarai and samba seasons however it showed that negative correlation in kuruvai season. The peak population was observed in 10th standard week during March month.

Similarly, Khan (1983) reported that Braconids were most active in March and April and they reducing the population level at rainy season, so he concluded that, the population of Braconids have negative correlated with maximum temperature and rainfall. Saju Singh *et al.*,

Table 1: Correlation of meteorological parameters with the trap catches of Ichneumonids and Braconids, collected during navarai season.

Parasitoids	Maximum temperature C ^o	Minimum temperature C ^o	Relative humidity %	Sun shine (hours)	Rainfall (mm)
Ichneumonids	0.537*	0.303	-0.701*	0.230	-0.456
Braconids	-0.551	-0.571*	0.138	0.316	-0.300

Level of significance (at 5 %)

Table 2: Correlation of meteorological parameters with the trap catches of Ichneumonids and Braconids, collected during kuruvai season.

Parasitoids	Maximum temperature C ^o	Minimum temperature C ^o	Relative humidity %	Sun shine (hours)	Rainfall (mm)
Ichneumonids	-0.448	0.138	-0.214	-0.547	-0.546
Braconids	-0.296	0.276	-0.027*	-0.399	-0.511

Level of significance (at 5 %)

Table 3: Correlation of meteorological parameters with the trap catches of Ichneumonids and Braconids, collected during samba season.

Parasitoids	Maximum temperature C ^o	Minimum temperature C ^o	Relative humidity %	Sun shine (hours)	Rainfall (mm)
Ichneumonids	-0.178	-0.291	-0.451	0.282	-0.556*
Braconids	0.178	0.006**	-0.251	0.023	-0.203

Level of significance (at 5 %)

(2018) also reported that the Braconid population was positive correlation with minimum temperature and relative humidity and negative correlation with rainfall and maximum temperature (Tables 1, 2 & 3).

Conclusion

It can be concluded that population dynamics of Ichneumonids and Braconid parasitoids in rice ecosystem through solar powered light trap collections are essential not only to understand the peak populations in given season, but also helpful to know the changing trend and

relative importance of these parasitoids over a period of time in the rice ecosystem.

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