



Trade Science Inc.

ISSN : 0974 - 7532

Volume 5 Issue 4

Research & Reviews in

BioSciences

Short Communication

RRBS, 5(4), 2011 [153-155]

Development of a grading system to assess the mealybug infestation in jatropha (*Jatropha curcas* L.) based on the natural incidence

P.Pretheep Kumar*, M.Tilak, K.T.Parthiban, P.Durairasu

Forest College and Research Institute, Tamil Nadu Agricultural University, Mettupalayam – 641 301, Tamil Nadu, (INDIA)

E-mail : pretheepkumar_phd@yahoo.co.in

Received: 7th September, 2011 ; Accepted: 7th October, 2011

ABSTRACT

Periodical survey and monitoring of jatropha (*Jatropha curcas* L.) plantations in Coimbatore district of Tamil Nadu State, India, revealed that the papaya mealybug, *Paracoccus marginatus* Williams and Granara de Willink was found to be the most prevalent mealybug species. The striped mealybug, *Ferrisia virgata* Cockerell was also observed to infest jatropha in a very negligible manner. A grading system specific to assess mealybug infestation in jatropha plantation was developed and it would surely ease the process of taking observations for the incidence and infestation of mealybugs. © 2011 Trade Science Inc. - INDIA

KEYWORDS

Jatropha curcas;
Biodiesel;
Mealybugs;
Infestation;
Grading system.

INTRODUCTION

The biofuels industry is growing rapidly as a result of high petroleum prices and increasing concerns about global climate change. *Jatropha curcas* L. (jatropha) is considered to be one of the most viable candidate for biodiesel feedstock mostly due to its adaptability to semi-arid lands^[1]. Cultivation of jatropha has been widely promoted by private enterprises, non-governmental organizations and development agencies in India. The multiple benefits of jatropha production such as a petroleum product substitute, greenhouse gas mitigation and rural development stress the need to take up cultivation of jatropha on a large scale. The biofuel industry is interested in jatropha production because it is expected to be a less expensive feedstock.

Mealybugs (Pseudococcidae: Hemiptera) are one of the biggest threat to many of the agricultural, horticultural and tree crops of high economic importance.

Different species of mealybugs caused significant damage to field crops, fruits, vegetables and ornamentals^[4]. Mealybugs feed on all parts of a plant, particularly on growing tips or on leaves that join stems or along leaf veins. The crawlers (nymphs) disperse from the ovisac by way of walking or dispersal through wind and ants. The nymphs feed and develop into adults in approximately 30 days. The insect has a life cycle of 24 to 30 days. The female mealybug produces 10-15 generations per year in colonies of 500-600 eggs^[2]. Mealybugs, cause serious damage considering their reproductive potential, invasive power and facilitation by the phoretic ants. About 5,000 species of mealybugs have been recorded from 246 families of plants throughout the world.

The papaya mealybug, *Paracoccus marginatus* Williams and Granara de Willink (Pseudococcidae: Hemiptera) has become quite alarming in Tamil Nadu, challenging the pesticides or other Integrated Pest

Short Communication

Management measures. Persistent increase in the population of this mealybug and its invasive nature on weed and wild hosts serving as statutory inoculum would be a major threat to the economical production of *Jatropha* unless effective precautionary measures are taken. Development of concepts and methodology of monitoring of insect pests is the need of the hour, hence, efforts were taken in this study to evolve an user-friendly grading system to assess mealybug infestation in *jatropha* plantations.

MATERIALS AND METHODS

The following features are taken into consideration in developing the grading system to assess mealybug infestation in *jatropha*:

- (1) Number of crawlers and adult mealybugs
- (2) Location of mealybug infestation
- (3) Movement of ants (attraction towards honeydew)
- (4) Development of sooty mould in leaves
- (5) Physical features of the plant prone to damage:
 - a. yellowing, crinkling, curling, drying and withering of leaves
 - b. Severity of sucking the sap by mealybugs result in shredding of barks in branches and stem
 - c. Stunted growth of whole plant

A survey was conducted during 2010-11 in the *jatropha* plantations of Forest College and Research Institute, Mettupalayam, Tamil Nadu State, India, to assess the incidence and intensity of infestation caused by mealybugs. 100 plants were randomly selected for recording the grade (based on the developed grading system) and per cent infestation of mealybugs (both crawlers and adults). The observations pertaining to grade and per cent infestation were recorded at monthly intervals.

RESULTS AND DISCUSSION

Taking into consideration of the various factors as described in the materials and methods section the following easy to adopt grading system was developed specifically to assess mealybug infestation in *jatropha*.

Mealybug incidence was assessed based on the grading system developed categorizing from 0 to 4 and the periodical monitoring revealed that the mean mea-

Grading system developed for assessment of damage by mealybugs based on natural infestation

Grade	Description
0	Absence of mealybugs
1	Presence of crawlers and adult mealybugs in very sparse numbers and no significant damage symptom in plant
2	Presence of crawlers and adult mealybugs in considerable numbers in only one branch of the plant
3	Presence of a significant mealybug population of both crawlers and adults in more than one branch of the plant; slight yellowing and crinkling of leaves with mild sooty mould growth
4	Severe mealybug infestation in the entire plant; Presence of sooty mould accompanied with movement of ants; Prominent Yellowing, crinkling and dropping of leaves; Shredding of barks in stem and branches

lybug grade (*P. marginatus*) ranged between 0.12 and 3.73 during 2010-2011 in *jatropha* plantations of Forest College & Research Institute, Mettupalayam taluk of Coimbatore district, Tamil Nadu State, India (TABLE 1). Among the two species observed, the papaya mealybug, *P. marginatus* was noticed to a greater extent and the striped mealybug, *Ferrisia virgata* Cockerell was in very negligible numbers. Infestation of papaya mealybug on papaya, *jatropha* and various associated plants in the neighbourhood was observed in Tamil Nadu^[3].

Mean per cent infestation of papaya mealybugs in *jatropha* varied from 1.00 to 84.00 per cent during the study period (Figure 1). Observations on the other mealybug species, *F. virgata* was not tabulated as the number of crawlers and adults of the particular species was very negligible.

The infestation was found to decline during the second half of the study period and the reduction in infestation could be due to the rainfall pattern and self perpetuation of the papaya mealybug parasitoid, *Acerophagus papayae* (Encyrtidae: Hymenoptera). Increase in rainfall during the second half of the study period could have resulted in washing off the mealybugs from the plant. Further, the papaya mealybug parasitoid would have effectively controlled both the crawlers and adult mealybugs very effectively.

This sort of grading system will help in the rapid assessment of mealybug infestation in *jatropha* planta-

Short Communication

Degree of parameters with their respective grade

Parameters	GRADE				
	0	1	2	3	4
Number of mealybugs	Zero	Negligible	Few	More	Enormous
Severity of infestation	No	Mild	Moderate	Severe	Very Severe
Impact on output / yield reduction	No	Negligible	Slight	Significant	Very Significant
Control measures	Not necessary	Not necessary but periodical monitoring required	Regular monitoring essential and Initiate control measures if necessary	Undertake control measures and monitor continuously. Repeat control measures if essential.	Under take control measures and monitor continuously. Repeat control measures if essential.

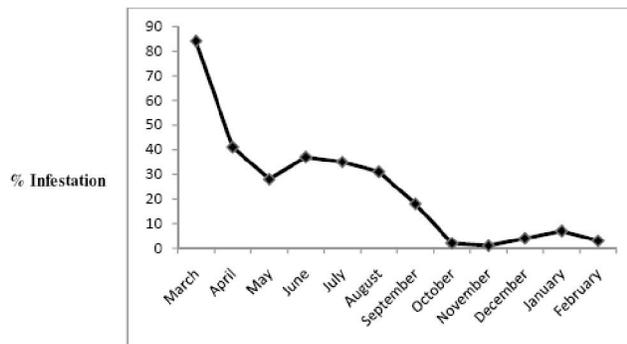


Figure 1 : Infestation of the papaya mealybug, *Paracoccus marginatus* in jatropha (2010-11)

TABLE 1 : Incidence and per cent infestation of the papaya mealybug, *Paracoccus marginatus* in jatropha plantations of Mettupalayam taluk, Coimbatore district, Tamil Nadu State, India (2010-2011)

Month	Mealybug Grade*	Per cent Infestation*
March	3.73	84.0
April	3.26	41.0
May	1.49	28.0
June	1.84	37.0
July	1.77	35.0
August	1.67	31.0
September	1.23	18.0
October	0.17	2.0
November	0.12	1.0
December	0.25	4.0
January	0.43	7.0
February	0.21	3.0
Mean	1.35	24.25

*values are the mean of 100 observations.

tions raised in an extensive scale. The developed grading system is simplistic to make it adaptable for assessing the intensity of infestation by various species of mealybugs in jatropha.

REFERENCES

- [1] P.Maundu, B.Tengnas; Useful Trees and Shrubs for Kenya; Technical Handbook No. 35, International Centre for Research in Agroforestry (ICRAF), ICRAF-ECA, Nairobi. 269 (2005).
- [2] D.R.Miller, G.L.Miller; Taxonomic Information on *Paracoccus marginatus*; 'Technical Meeting and Workshop for the Biological Control of the Papaya Mealybug, *Paracoccus marginatus*, in the Caribbean', St. Kitts, West Indies, 25-26 July (2000).
- [3] A.Regupathy, R.Ayyasamy; Need and Scope for the Development of Ecofriendly Pest Management Strategy for Jatropha Plantations; 'National Conference on Organic Waste Utilization and Eco-Friendly Technologies for Crop Protection', Plant Protection Association of India, Hyderabad, 15-17 March, 67-70 (2007).
- [4] R.K.Tanwar, P.Jeyakumar, D.Monga; Mealybugs and their Management; National Centre for Integrated Pest Management, New Delhi (2007).