Indian Streams Research Journal
Vol - I , ISSUE - IV May 2011 : Other **ISSN:-2230-7850**

Article : SPIRALLING WHITE FLY, ALEURODICUS DISPERSUS RUSSELA : NEW MAJOR PEST OF MULBERRY : Sericulture

Author : N.Vijaya Kumari[S.P. Mahila University, Tirupati]

INTRODUCTION :

Mulberry the sole food source of Silkworm Bombyx mori L, is subjected to damage by various pests. These pests are always a limiting factor for successful silkworm cocoon crop production. Mulberry pests are mainly categorized in to two types 1. Sap suckers 2. Defoliators. Among sap suckers the important pests are mealy bugs,thrips,jassids,scale insects and white flies, which cause a considerable damage to mulberry leaf production and thereby loss in silkworm cocoon crop.

Nearly 30 species were observed to inflict damage to mulberry leaves by sap sucking. Among these sap suckers mealy bugs, thrips, Jassids, and white flies and scale insects cause significant damage. Among the sap sucking pests Spiralling white fly Aleurodicus dispersus Russel was considered as a minor pest in mulberry because its occurrence was occasional and damage was less. But in recent days it has become a major pest causing extensive damage to mulberry in south India. In West Bengal Dialeuropora decempuncta and Aleuroclava pentatuberculata are the major types of white flies which are reported in 1999. The damage caused by the whiteflies Dialeuropora decempuncta (Quaintance & Baker, 1913), Aleurodicus dispersus Russell, and Aleuroclava sp. to mulberry plants is extensive and they cause a huge economic loss in silkworm rearing. whiteflies feeding on nutrients of plants affect the plants physiological process ultimately causing leaf shedding and reduced growth rate.Chlorotic spots appear at feeding sites on leaf surfaces. Vast amount of honey dew produced by nymphs leads to mould development on leaves and adversely affects photosynthesis (Sundararaj etal.2000) All the life stages of whiteflies are hard to control with conventional insecticides because of rapid multiplication their preferred habitat on the under surface of leaves, thereby not being easily targeted by direct hit of spraying insecticides (Sood et al 2003).The infestation of white fly was found to be very high on guava, mulberry,jackfruit

,and pomegranate . In mulberry this pest pose a serious threat where guava, custard apple, hibiscus crops are grown near mulberry garden. The whiteflies are present throughout the year in south India, with high populations in summer (March—June) and low in winter (October—January). The population is positively correlated with temperature and negatively correlated with humidity. Chemical control is the quick solution to minimize the pest population. However, the indiscriminate and large-scale use of highly poisonous synthetic chemical pesticides has resulted in ecological imbalance, in addition to their toxic effects on living organisms, including human beings.

The studies done on spiralling whitefly infestation on mulberry are very scarce and the pest is also becoming a major threat to mulberry because once it attacks the mulberry, the leaves are depleted in nutritive values and become unsuitable for silkworm feeding and also the plant growth is stunted. No studies were conducted on the loss of leaf yield due to spiralling whitefly infestation since it was neglected as minor pest and its incidence was not severe. But in the recent past its occurrence has become severe and loss is more in various fruit crops and also in mulberry. The incidence of the whitefly was found to be very high on guava, cotton, pomegranate, papaya, custard apple, mulberry, moderate on Acalypha, Plumeria, Canna, pupil tree, banyan, fig, mahogany, rose, hibiscus and low on banana and tomato.

The purpose of this communication is to facilitate the recognition of Aleurodicus dispersus as a major pest and its nature of damage. A review on its management also presented in this paper.Aleurodicus dispersus belong to the family Aleyrodidae and order Homoptera has a wide host range among which Mulberry also became major host. Aleurodicus dispersus is a highly polyphagous species. Its wide host range includes many vegetable, ornamental and fruit crops, as well as numerous trees and shrubs. Among its host plants, the following crops can be mentioned: Capsicum, Citrus, Cocos nucifera (coconut), Euphorbia pulcherrima (poinsettia Glycine max (soybean), Hibiscus, Lycopersicon esculentum (tomato), Mangifera indica (mango), Musa (banana), Persea americana (avocado), Prunus spp., Psidium guajava (guava), Solanum melongena (aubergine).

Life cycle of Alerodicus dispersus :

In the temperature range of 20°C to 39°C development from egg to adult takes 34 to 38 days (eggs 9-11 days, 1st instar (stage) larvae 6-7 days, 2nd instar 4-5 days, 3rd instar 5-7 days and 4th instar larva (pupa) 10-11 days). Under laboratory conditions the adult can live for up to 39 days. The adult female lays its eggs in a typical spiral pattern just under the lower leaf surface. As with other Aleyrodidae, damage is caused by the immature stages, which feed by sucking plant sap. Feeding by the larvae reduces plant vigor and predisposes plants to attack by other insects. The larvae also produce a sugary excretum called honeydew, which encourages growth of black sooty moulds on leaf surfaces. This is unsightly and also reduces the ability of the plant to photosynthesize. The appearance of the plants is further marred by the appearance of the insects: both eggs and larvae are covered by an unsightly white waxy material. No studies have been carried out to quantify economic losses due to the pest but this can potentially be high. Besides the waxy nature, several reasons like wide host range, damage potential and rapid dispersal enables the whitefly to maintain its status as a severe pest on a wide variety of plants. Hence, for a successful management strategy to be developed, one should be aware of the biology and host range of spiralling whitefly, so as to find out the vulnerable period during the lifecycle and also the perennial sources of infestation. Spiralling whitefly is a small sap sucking insect which is related to mealy bugs and aphids. To the naked eye, the adults look like a very small moth and have a body length of about 2 mm. The wings of the adults are plain white or occasionally have pale or dark spots on the forewings. Eggs are elliptical and yellow to tan in colour, 0.3 mm long and are laid singly at right angles to the leaf veins and associated with irregularly spiraling deposits of white flocculent wax. This spiralling effect is usually on the underside of leaves but in heavy infestations the spirals may also be seen on the upper surface of leaves as well as fruit and non plant material. The first stage of the larva is mobile but the later immature stages are sedentary and have an oval disc shaped soft body that is light green in colour. The final immature stage is the pupa and is about 1 mm in length. The sedentary larvae have characteristic waxy tufts and the final larval stage (pupa) has glass like rods of wax along the sides of the body.

Symptoms and damage :

Spiralling whitefly attacks a large range of plants including vegetables, fruit trees, ornamentals, native plants and weeds Mulberry and ground orchids. Spiraling whitefly will deposit eggs on non hosts plants. These whiteflies produce honeydew and this may provide a substrate for the growth of sooty mould which interferes with photosynthesis. White fly cause direct feeding damage by sucking plant sap, which can cause premature leaf fall. Indirect damage is due to the heavy production of honeydew and white, waxy material produced by the insect. Sooty mould develops on honeydew and decreases photosynthetic activity. Plants are also disfigured and may be unsuitable for feeding the silkworm.In heavy infestations, feeding damage may cause leaf drop or reduced yield in crops. The wet season weather is less favorable to the whiteflies and they will generally be in low populations. Higher populations are more common during the favorable weather conditions of the dry season.

Observations made :

A Survey was conducted for one year from January 2009to April2010 at Tirupati surrounding villages viz.Gollapalli, Gangudu palli,Mangapuram,Mamandur on the infestation of spiraling white fly on mulberry. Severe infestation of spiralling white fly was observed on mulberry plants where at least one of these crops viz. Guava, jackfruit and pongamia were also grown near mulberry gardens. The infestation was moderate to severe from January to April. During March the infestation was found very severe not only in mulberry but also Guava. All the life stages of spiraling whitefly were undertaken by observing under the phase contrast microscope.

All white fly stages were observed on the lower surface of the leaves. Adult flies are small (1-2 mm) fly like insects. They lay eggs in spirals which are covered with white waxy material secreted by the flies.Eggs (0.3mm)long and are tiny , spindle shaped. The active and motile stage called crawler move actively for feeding sap.These crawler and other nymphl stages are oval, flattened and white in colour. The four nymphl stages are identified by differences in their sizes .The third nymphal body consists the glass tubular out growths from their body the

fourth instar contains white flocculent waxy material on the surface o the body .Pupa is about 1mm in length and the body consists the white shrubby flocculent structure on the surface of the body all the three stages are immotile. And adults look like a very small moth and have a body of about (2mm) length it consists of two orange colored eyes and two white to light yellow colored wings. Severely infested leaf become brittle with less moisture content because of sap sucking nature of the white fly and the leaf turn yellow resulting in reduction leaf yield. In this observations on the severely infested leaf several parasites also living together with whiteflies.

But the actual percentage of leaf loss in mulberry was not studied. In this study only mulberry trees which were planted as avenue trees were found to be infested so, the observations were made on mulberry trees. From each selected plant ten leaves on an average were selected and observed for the spiraling white fly. The number of flies on each leaf and number of egg spirals were noted . This observation was made not only on mulberry but also Guava, Custard apple, mango and papaya, jackfruit and pongamia. Depending on the density of the flies and eggs the infestation was considered as moderate, mild and severe infestation. In this study it was observed that the density of flies vary from 19.7. to 41.0 and the number of spirals varied from 5.7-10.6. When the number of flies were above 25 the infestation was taken as severe and if it is less than 25 and up to 5 it was taken as moderate and if it is less than 5 it was considered as mild infestation.

And the different infestation levels of the crops are carried out and given in a tabular form below by taking the number of spirals 5-15 several counting of eggs, first instar to fourth instar nymphs and also the the number of adults .

White fly infestation on different crops :

 ISSN:-2230-7850

S.No	Name of the crop	No. of spirals	No.of eggs/ spiral	1st Instar nymphs	11nd Instar	111rd Instar	No.of Pupae	No. of flies	Degree of infestation
1.	Mulberry	8.9	58.9	173	168	169	141	35.0	Severe infestation
2.	Guava	10.6	68.4	248	190	233	185	41.0	Severe infestation
3.	Jack Fruit	5.7	50.0	55	59	76	35	20.8	Moderate infestation
4.	Pongamia	6.0	52.0	37	34	19	22	19.7	Moderate infestation

In the present study it was observed that the intensity of the whiteflies were severe in

In the present study it was observed that the intensity of the whiteflies were severe in guava as well as mulberry comparing to the other crops and moderate infestations were observed in the jackfruit and pongamia.

Since Spiraling white fly is becoming a major pest to mulberry it is necessary to know and follow appropriate management techniques before it becomes a major threat to sericulture industry. In this view a brief report on available management techniques were discussed.

Mangement of Spiralling white fly :

Physical methods:

Collection and Destruction of mulberry leaves containing egg masses, nymphs and adults of spiraling white fly. Regular weed removing to avoid availability of alternate hosts Monitoring the pest occurrence on the alternate cultivated crop hosts to prevent attack on mulberry. Fish oil insecticidal soap at 2.5 per cent also deter the adults of the spiralling whitefly

Chemical methods: The pest can be effectively managed by applying triazophos 40EC at 0.06 per cent, dimethoate 30 EC at 0.05 per cent and biomite, and profenofos. Neem oil and cotton seed oil at 0.01 per cent were also found to cause considerable mortality of the different stages of the pest.

Natural enemies: Several exotic parasitoids have been found to be highly effective, including two aphelinid parasitoids Encarsia haitiensis Dozier and E. meritoria Gahan. These are most promising and are reported to minimize the fly pest population

Parasites of spiralling white fly

Aphelinidae : Encarsia guadeloupae , Encarsia haitiensis Dozier, Encarsia meritoria Gahan

predators

Coccinellidae :Anegleis cardoni, Anegleis perrotteti Mulsant, Cryptolaemus montrouzieriiMulsant,Scymnuscoccivora

Cecidomyiidae - Triommata coccidivora Felt

PATHOGENS :

Deuteromycetes

Moniliales : Paecilomyces farinosus (Holm.) Brown & Smith

Since spiraling white fly cause severe damage to mulberry employing suitable management is necessary All the life stages of whiteflies are hard to control with conventional insecticides because of rapid multiplication their preferred habitat on the under surface of leaves, thereby not being easily targeted by direct hit of spraying insecticides.Further with the growing evidence of the adverse effects of conventional pesticides on health and environment, the need for safer methods of pest management has become inevitable. So, the review on natural enemies help in

choosing the appropriate natural enemy for effective control of spiralling whitefly.

Spiralling white fly infestation on mulberry

Guava

 ISSN:-2230-7850

Pongamia

Jack fruit

Encarsia spp.(Natural enemy of Spiralling white fly)

REFERENCES :

1. Anonymous (1998).Annual report 1997-98,Project Directorate of biological Control.Bangalore,pp.1-172

2. Anonymous (2000) Canary Islands results. EWSN Newsletter, no. 3, p 2.

3. Anonymous (2000) Management of spiralling whiteflies. SPC Agricultural News,8(2), p 12.

4. Anonymous (2001) Balance fitosanitario de los cultivos españoles durante el año 2000. Phytoma-España no. 127 & 128, 18-46 &.26-51.

5. Cherry,R.H.(1980).Host plant prefence of the white fly, Aleurodicus dispersus (Russell). Florida Entamologist,63,222-225

6. David,B.V.,Regu,K.,(1995) Aleurodicus dispersus (Russell). (Aleurodidae: Homoptera),a white fly pest,New to India .Pestology,19,5-7

7. Ganeshan, S. (2000) Global news: Mauritius - First occurrence of Aleurodicus dispersus (Russell). EWSN Newsletter, no.6, p 4.

8. Geetha Bai, B.Marimadaiah,K.C. Narayanaswamy &T.Ramegowda (2001).The spiraling whitefly,Aleurodicus disperses Russel (Homoptera: Aleurodidae), a pest of mulberry in Karnataka.Vol.41(1)pp.121-127.

9. Mani, M.; Krishnamoorthy, A. (1996) Spiralling whitefly and its natural enemies on guava in Karnataka. Insect Environment, 2(1), 12-13. (abst.)

10. Mani, M.; Krishnamoorthy, A. (1997) Discovery of Australian ladybird beetle (Cryptolaemus montrouzieri) on spiralling whitefly (Aleurodicus dispersus) in India. Insect Environment, 3(1), 5-6. (abst.)

11.Prathapan,K.D.(1996).Out break of the spiraling whitefly,Aleurodicus disperses Russel(Aleurodidae: Homoptera), in Kerala. Insect Environment,2,36-38