A PRELIMINARY STUDY ON MITE DAMAGE ASSESSMENT IN MULBERRY

Mohd Yaqoob Dar*, G. K. Ramegowda**, Vishal Mittal**, Irfan Illahi**, Anil Dhar** and O. P. Agrawal*

* SOS in Zoology, Jiwaji University Gwalior- 474011, Madhya Pradesh, INDIA. E-mail: yaqoobdar2008@gmail.com
** Central Sericultural Research and Training Institute, Central Silk Board Pampore-192 121 Jammu & Kashmir, INDIA.

ABSTRACT: Jammu and Kashmir is the only state in India which enjoys the salubrious climate for bivoltine silk production and is the fourth major state in India. Lot of efforts are being pumped in to introduce a second crop in the state to explore the hidden potential available. Incidence of diseases and insect pests are the major bottlenecks in producing quality mulberry leaves for a second crop and the problem is intensified with addition of *Tetranychys* sp. and *Panonychus* sp. mites in to the pest list of mulberry, which are impairing the quality of mulberry leaves and adversely affecting the biological and economic parameters of silkworm and resultant cocoons. In this background an effort has been made to develop a simple field level damage assessment system for mite injury in mulberry at Central Sericultural Research and Training Institute, Pampore, Jammu and Kashmir, India during 2010 cropping season. A modified method of diseases assessment in mulberry was used to record the mite injury. Mite infestation and percent damage indices were computed following standard procedure and correlated with few metrological parameters. Mite infestation started with 25 percent in the beginning of the study to reach 62 percent during August end from which started declining to reach a low of 18 percent by October end which coincided with initiation of leaf senescence. The percent damage index too followed the similar trend. All the climatic factors influenced positively and significantly in majority on the mite infestation and damage.

KEY WORDS: Mulberry, mites, leaf damage assessment.

Jammu and Kashmir is the only state in India which enjoys the salubrious climate in line with China and Japan who are the world leaders of bivoltine mulberry silk production at present and past, respectively. Even with this advantage tag, Jammu and Kashmir stands fourth after Tamil Nadu, Karnataka and Andhra Pradesh (Anon., 2011). There exists a large yield gap in the field production and productivity from the potential which may be attributed for subsidiary nature of sericulture in the state besides huge competition from cash rich horticultural and agricultural crops. Monocropping nature of silkworm rearing and lack of backward and forward linkages are equally limiting the state from harvesting the hidden potential. Lot of efforts are being pumped in to introduce a second crop in the state with a summer crop in Kashmir valley and an autumn crop in Jammu region in addition to the ruling spring crop (Malik et al., 2010; Khan et al., 2010; Raina et al., 2011; Rajat Mohan et al., 2011).

Incidence of leaf spot (*Cercospora moricola* Cooke (Capnodiales: Mycospharellaceae)) and powdery mildew (*Phyllactinia corylea* (Pers.) Karst (Erysiphales: Erysiphaceae)) throughout the state and mulberry leaf webber ((*Glyphodes pyloalis* Wlk. (Lepidoptera: Pyralidae)) in Kashmir valley and mealybug ((*Maconellicoccus hirsutus* (Green) (Homoptera: Pseudococcidae)) in Jammu region are the major bottlenecks in producing quality mulberry leaves in

state especially for a second crop (Khan et al., 2004; Illahi et al. 2011). Added to the above a recent study in Kashmir valley revealed the threat from two mite species *viz., Tetranychys* sp. and *Panonychus* sp. (Acari: Tetranychidae) which are impairing the quality of mulberry leaves and adversely affecting the biological and economic parameters of silkworm and resultant cocoon fed with mite infested leaves (Dar et al., 2011a,b). The damage by a mite on mulberry leaves can be identified with the presence of characteristic speck (minute pinhead sized transparent lesion) (Puttaswamy et al., 1980; Chauhan et al., 2002) which can be distinguished more precisely upon looking through a bright background. These specks will coalesce under severe infestation leading to yellowing and premature dropping. Heavy infestation in the young leaves leads to curling, crinkling and development of rough leathery texture. In this background an effort has been made to develop a simple field level damage assessment system for mite injury in mulberry at Central Sericultural Research and Training Institute, Pampore, Jammu and Kashmir, India during 2010 cropping season.

MATERIAL AND METHODS

Fortnightly observations were made from popular mulberry variety Goshoerami, maintained as a dwarf plantation for summer silkworm rearing at Central Sericultural Research and Training Institute, Pampore located at 33° 59' 50" N latitude and 74° 55' 5" E longitude at an altitude of 1574 m above mean sea level, Jammu and Kashmir, India from June to October 2010. Based on the characteristic specks on the leaf lamina, the mite injury was measured from twenty leaves on two branches each from twenty five randomly selected plants excluding the border plants. A modified method of diseases assessment in mulberry (Gunasekhar and Govindaih, 1994) was used to record the mite injury (Plate 1.). Mite infestation (MI) and percent damage indices (PDI) were computed following standard procedure (FAO, 1967). Few metrological parameters *viz.,* maximum and minimum temperatures, morning relative humidity and rainfall experienced during the study period were obtained from the observatory at the institute and their influence on the mite incidence and percent damage index was studied using MSTATC software.

RESULTS AND DISCUSSION

Mite infestation followed a typical bell shaped curve which started with 25 percent in the beginning of the study to reach 62 percent during August end from which started declining to reach a low of 18 percent by October end which coincided with initiation of leaf senescence (Fig. 1). The PDI too followed the similar trend but ended little higher than the beginning owing cumulative effect of mite infestation and consequent damage. The effort of measuring leaf damage by mites in mulberry is first of its kind and is at infancy. This study in mulberry needs to be fine tuned along with the mite population measurement and correlating the same to damage level as the damage is having a greater economical impact on the performance of silkworm.

There existed a significant correlation between the pest incidence and percent damage index with the weather parameters. Maximum temperature of same fortnight and minimum temperature of one fortnight prior to observations showed a positive correlation with both MI and PDI. Relative humidity of same fortnight showed a significant correlation with both MI and PDI, but relative humidity of one fortnight prior to observations shown a non significant

correlation with MI and significant correlation with PDI. Significant correlation existed between the MI and PDI with rain fall of one fortnight prior to observations. All the climatic factors influenced positively on the mite infestation and damage. The present findings borrows the support from the findings of Rajalakshmi et al. (2009) who has reported that the average maximum temperature of 24-25 $^\circ$C and above with a relative humidity of 70 percent and above, favoured the multiplication of mites.

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LITERATURE CITED

Anonymous. 2011. Annual Report 2010-11. Central Silk Board, Bangalore, Karnataka, India, pp. 95.

Chauhan, T. P. S., Narayan, S. P. & Kumar, V. 2002. *Polyphagotarsonemus latus* (Banks): A new pest of mulberry. Indian Journal of Forestry, 25 (2): 171-176.

Dar, M. Y., Illahi, I., Agrawala, O. P., Mittal, V. & Ramegowda, G. K. 2011a. Impact of mite infestation on mulberry leaf biochemical composition and silkworm, *Bombyx mori* L. Indian Journal of Entomology, 73: (In press).

Dar, M. Y., Illahi, I., Agrawala, O. P., Mittal, V. & Ramegowda, G. K. 2011b. Preliminary studies on the mulberry mite diversity and dynamics in Kashmir, India. Indian Journal of Entomology, 73: (In press).

FAO 1967. Crop losses due to Diseases and Pests. Food and Agriculture Organization, Rome.

Gunasekhar, V. & Govindaiah. 1994. Disease assessment key for three major diseases of Mulberry. Indian Journal of Sericulture, 48 (2): 178-190.

Illahi, I., Mittal, V., Ramegowda, G. K., Dhar, A. & Khan, M. A. 2011. Occurrence of Major Foliar Diseases of Mulberry under Temperate Climatic conditions of Kashmir, India. International Journal of Science and Nature, 2: 51-55.

Khan, M. A., Dhar, A., Zeya, S. B. & Trag, A. R. 2004. Pest and diseases of mulberry and their management. Bishen Singh Mahendra Pal Singh, Dehradun, India, 68 p.

Khan, M. A., Dhar, A. & Mir, N. A. 2010. Constraints and strategies for multiple cocoon crops in Jammu and Kashmir State. Proceedings of the workshop on multiple cocoon crops for sustainable sericulture in Jammu and Kashmir state. 18th October 2010, Srinagar, Kashmir, India, pp. 4-8.

Malik, M. A., Kamili, A. S., Sofi, A. M., Malik, G. N., Sabhat, A., Ahmad, S. & Malik, F. A. 2010. Second Commercial Silkworm Rearing in Kashmir- A Ray of Hope. Indian Silk, 48 (9): 10-11.

Mohan, R., Dhar, A., Tayal, M. K., Chauhan, T. P. S., Raina, S. K. & Khan, M. A. 2011. Pruning technology – A tool for Introduction of third crop in Jammu Region. Proceedings of the workshop on Recent trends in development of Sericulture in Jammu and Kashmir. 29th October 2011, Department of Sericulture, Government of Jammu and Kashmir, Srinagar, Kashmir, India, pp. 40-44.

Puttaswammy, Channabasavanna, G. P., Govindan, R. & Devaiah, M. C. 1980. Studies in life history of *Tetranychus ludeni* Zacher (Acari: Tetranychidae) occurring on mulberry. Proceedings of Sericulture Symposium, Tamil Nadu Agriculture University, 1980, Coimbatore, Tamil Nadu, India.

Raina, S. K., Chauhan, T. P. S., Tayal, M. K., Pandey, R. K. & Mohan, R. 2011. Multiple Silkworm Cocoon Cropping in Jammu Division. Proceedings of the workshop on Recent trends in

development of Sericulture in Jammu and Kashmir. 29th October 2011, Department of Sericulture, Government of Jammu and Kashmir, Srinagar, Kashmir, India, pp. 63-67.

Rajalakshmi, E., Sankaranarayanan & Pandya, R. K. 2009. The Yellow Mite, *Polyphagous tarsonemus* Latus a serious pest of mulberry under Nilgiris hill conditions. Indian Journal of Sericulture, 48 (2): 187- 190.
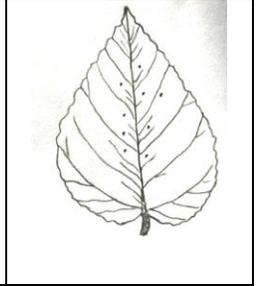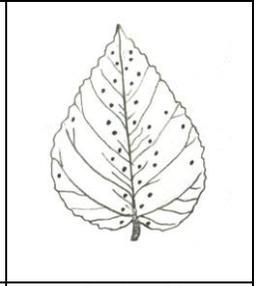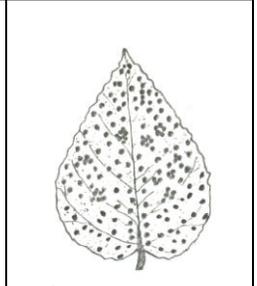
Grade - 0	Grade – I	Grade - II
Grade – III	Grade – IV	Grade - V
Grade – VI	Grade – VII	Grade – VIII

Grade - 0	No infestation
Grade – I	< 0.1% leaf lamina with specks (mite injury)
Grade – II	0.2% - 1% leaf lamina with specks
Grade – III	2% - 5% leaf lamina with specks
Grade – IV	6% - 10% leaf lamina with specks
Grade – V	11% - 20% leaf lamina with specks
Grade – VI	21% - 30% leaf lamina with specks
Grade - VII	31% - 50% leaf lamina with specks
Grade – VIII	50% - above leaf lamina with specks

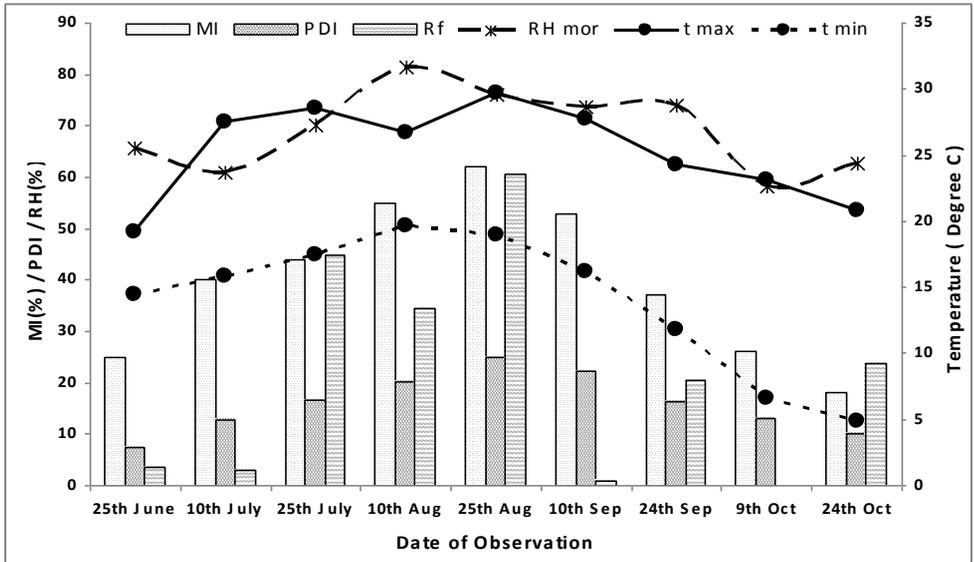Plate 1. Pictorial representation of field damage assessment grades used for measuring mite incidence.

Figure 1. Fortnightly mite infestation and percent damage index on Goshoerami variety of mulberry during June to October 2010 along with selected weather parameters.

Table 1. Correlation coefficients of mite incidence and damage index with weather parameters of same fortnight and one fortnight prior to observations.

MI and PDI \ Weather	Same fortnight		One fortnight prior	
	MI (%)	PDI	MI (%)	PDI
Maximum Temperature (°C)	0.883**	0.844**	0.580	0.715*
Minimum Temperature (°C)	0.858**	0.628	0.949**	0.893**
Relative humidity (%, Morning)	0.784*	0.757*	0.590	0.664*
Rain fall (mm)	0.534	0.552	0.706*	0.769*

*= Significant at p = 0.05   **= Significant at P= 0.01