ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of DEVELOPMENT RESEARCH

International Journal of Development Research
Vol. 5, Issue, 01, pp. 2976-2979, January, 2015

Full Length Research Article

SCREENING OF MULBERRY GERMPLASM FOR REACTION TO SUCKING PESTS

***Vasudha Prabhakar, K., Narayana Reddy, R., Harish Babu, S., Raksha Sharma, C. M. and Chethan Kumar, K.**

University of Agricultural Sciences, College of Agriculture, Department of Sericulture, Bangalore-65

ARTICLE INFO

Article History:
Received 12th October, 2014
Received in revised form
10th November, 2014
Accepted 27th December, 2014
Published online 26th January, 2015

Key words:
Genotypes,
Mulberry,
Pink mealy bug,
Sucking Pests and Thrips.

ABSTRACT

The experiment was conducted in the five years old mulberry germplasms maintained at Sericulture Department. The study was conducted in all three seasons of the year 2010-2011 *viz.*, pre monsoon (March-June), monsoon (July-Oct) and post–monsoon (November– February). The two sucking pests were selected for the study namely Pink mealy bug, *Meconellicoccus hirsutus* Green and Thrips, *Pseudodendro thrips mori* (NIWA). Score Index was followed to categorize the genotypes for various level of pest infestation. During pre-monsoon season (March – June), infestation of sucking pest, Pink mealy bug, *M. hirsutus* registered high incidence and occurred on 76 genotypes which were designated moderately susceptible (20.0 – 50.0 %) as compared to Thrips, During monsoon season (July – October), Pink mealy bug, *M. hirsutus* showed maximum incidence, 29 genotypes exhibited various levels of damage. However, 82 genotypes showed immunity to thrips. During post–monsoon season (November – February), maximum infestation on 28 genotypes was registered for Pink mealy bug, *M. hirsutus*. Whereas, minimum was for thrips, whereas 88 genotypes were pest free and exhibited immunity. In all three seasons Pink mealy bug, *Meconellicoccus hirsutus* Green infestation was maximum compared to thrips, *Pseudodendrothrips mori* (NIWA).

INTRODUCTION

Mulberry is an evergreen plant standing long-term in the garden, thus it is prone to depredation by diverse organisms in varying proportions either for space or food or both, because of prolific growth and green foliage throughout the year. About 300 insect and non-insect species of pests are known to infest mulberry during different stages of crop growth and seasons (Rama kant, 2010). Based on the type of injury inflicted to the mulberry crop, the pests are classified as sucking pests (sap feeders), defoliators (foliage feeders), root feeders and stem borers. The sucking pests infesting mulberry are Pink Mealy bug, *Meconellicoccus hirsutus* Green (19.21%), Thrips, *Pseudodendrothrips mori* (NIWA) (17.18%), Spiraling Whitefly, *Aleurodicus disperses* (Russel), (12.62%), Jassids, *Empoasca flavescens* F, (9.08 %), Scales, *Saissetia nigra* (Nietn.) (8.24%). The information on mulberry germplasms reaction to Sucking pests namely Pink mealy bug, *Meconellicoccus hirsutus* Green and thrips, *Pseudodendrothrips mori* (NIWA) was lacking, hence the study was undertaken to know the pest intensity (damage) level in all hundred genotypes.

****Corresponding author: Vasudha Prabhakar, K.,***
University of Agricultural Sciences, College of Agriculture, Department of Sericulture, Bangalore-65

MATERIALS AND METHODS

The Mulberry Germplasms selected for experiment in the present study comprised of hundred mulberry genotypes (Table 1) maintained at Sericulture Department, University of Agricultural Sciences, GKVK, Bengaluru. Each mulberry genotype was planted in one row with four plants maintained with spacing of 2.4 x 2.5 m established during 2006. The experiments were conducted during three seasons *viz.,* pre-monsoon, monsoon and post- monsoon of the year 2010-2011. All the normal cultural practices namely irrigation, weeding and fertilizer application were followed as per package of practices for rainfed mulberry (Anon, 2010). The pest incidence in all 100 accessions was recorded according to the damage level caused by insects to individual plant and were scored as per scale and the pest categorized based on Score Index. 0 %- Immune, 0.1- 5 %- Highly resistant, 5.1 %- 20 %- Moderately resistant, 20.1 %- 50 %- Moderately susceptible

and 50.1 %- 100 %- Highly susceptible has been adopted in the present study.

Table 1. List of mulberry genotypes used in study

ME-12	MI-139	MI-66	MO-5
ME-08	MI-32	Lonavalli	T-2
ME-95	T-8	RFS-175	C-20
MI-07	MI-506	MI-143	V_1
ME-55	MI-178	MI-240	M-10
ME-67	T-12	S-1635	T-5
ME-86	MI-014	DD-1	China white
ME-18	MI-224	MI-04	T-4
ME-06	MI-517	MI-012	MI-491
ME-09	MI-515	S-54	MR-2
ME-107	T-11	ME-182	
Surat local	E-15	MI-17	
ME-01	MI-47	MI-79	
MI-018	T-9	*M.multicalis*	
ME-05	T-6	T-33	
S-13	MI-232	*M.lavigata*	
ME-84	MI-324	ME-143	
ME-03	MI-565	*M.alba*	
ME-65	T-31	MR-1	
C-776	T-7	M-5	
ME-27	ME-144	E-05	
ME-52	MI-516	C-763	
Srinagar local	S-34	S-34	
M. macrora	T-10	Mysore local	
ME-169	C-8	T-15	
Karanahalli	Assambola	*M. indica*	
T-1	T-3	S-41	
MI-11	MI-226	BC-259	
S-46	MI-238	S- 13	
S-36	MI-231	RFS-135	

RESULTS AND DISCUSSION

Pest attack in pre-monsoon season

The observations in all the genotypes recorded in pre-monsoon season revealed that five genotypes had immunity (0 %), three mulberry genotypes exhibited highly resistant (0.1 % - 5 %), fifteen genotypes showed moderately resistant (5.1 % - 20 %), seventy six exhibited moderately susceptible (20.1 % - 50 %) and highly susceptible (50.1 % - 100%) was recorded in only one genotype to Pink Mealy bug, *Meconellicoccus hirsutus* Green infestation (Table 2). Among all the genotypes studied, sixty two showed immunity (0 %), twenty exhibited highly resistant (0.1 % - 5 %), eighteen showed moderately resistant (5.1 % - 20 %) to thrips infestation in pre monsoon season (Table 2). The level of infestation by Pink mealy bug in pre-monsoon season was highest (26.18 %) compared to other two seasons *viz*., monsoon (6.02 %) and post-monsoon (7.17 %). The maximum number of seventy six genotypes was infested by Pink mealy bug in pre-monsoon season. These observations clearly indicate that infestation by Pink mealy bug was higher in pre-monsoon season (summer) followed by post-monsoon (winter) and monsoon (rainy). This might be due to prevailing higher temperature, low relative humidity and low rainfall (Abiotic factors), which are favourable for this pest multiplication. These results are in close conformity with the findings of Sathyaprasad (1994) and Hemalatha *et al. (*2008) who indicated that maximum infestation of Pink mealy bug was observed in pre-monsoon season. Similarly, the infestation of Pink mealy bugs was higher in summer season, which may be attributed to congenial environment prevailing in the season for proper framing of their secretions into protective layers by avoiding interruption in their feeding and breeding process. These results are similar to the findings of Sriharan *et al*. (1979) and Hemalatha *et al.* (2008).

Table 2. Pooled reaction of number of mulberry genotypes to sucking insect pests in pre-monsoon season

Category/ Score Index	Sucking pests	
	Mealy bug	Thrips
Immune (0%)	5	62
Highly resistant (0.1-5.0%)	3	20
Moderately resistant (5.1%-20.0%)	15	18
Moderately susceptible (20.0-50.0%)	76	0
Highly susceptible (50.1-100%)	1	0

The incidence of thrips was higher (11.25 %) in pre-monsoon compared to others seasons (monsoon, 3.75 % and post monsoon 3.00 %). Totally, thirty eight mulberry genotypes showed thrips infestation in pre-monsoon season. The maximum temperature (34.2°C), low relative humidity (84%) and low rainfall (34.2 mm) prevailing during pre-monsoon is attributed for peak incidence in thrips population. These results are in conformity with earlier findings (Kariyappa and Narasimhanna, 1978; Venugopalapillai and Krishnaswami, 1980a and 1983; Biradar, 1989; Sharma, 1989, Manjunath, 2001, Reddy, 2001) who indicated that maximum infestation of thrips was observed in pre-monsoon, which may be attributed high temperature, low relative humidity and low rainfall.

Pest attack in monsoon season

The observation in all the genotypes recorded in monsoon season revealed that seventy four genotypes showed immunity (0 %), twelve exhibited highly resistant (0.1 % - 5 %), five showed moderately resistant (5.1 % - 20 %) and three exhibited moderately susceptible (20.1 % - 50 %). Whereas, none among hundred showed highly susceptible to Pink mealy bug, *M. hirsutus* infestation (Table 3). It was observed that eighty two genotypes showed immunity (0 %), ten were highly resistant (0.1 % - 5 %), three exhibited moderately resistant (5.1 % - 20 %) and five showed moderate susceptibility (20.1 % - 50 %). Whereas, none were highly susceptible among the hundred genotypes to thrips infestation (Table 3). The infestation of Pink mealy bugs declined significantly during rainy season. This may be due to washing off of Pink mealy bugs by initial rains received during June (95.4 mm) and July (142.2 mm) months. The present results are in tune with the findings of Hemalatha *et al.* (2008) who observed decline in the Pink mealy bug population after initial onset of rains. The infestation of thrips declined in monsoon season, due to high relative humidity (94%), low temperature (19.2°C) and high rainfall (158.8mm), which contributes to the least incidence of thrips in monsoon season. These results are in conformity with earlier findings (Venugopalapillai and Krishnaswami, 1980a

and 1983; Biradar, 1989; Sharma, 1989, Manjunath, 2001, Reddy, 2001) who indicated infestation of thrips declined from pre-monsoon to monsoon, which favours their establishment.

Table 3. Pooled reaction of number of mulberry genotypes to sucking insect pests in monsoon season

Category/Score Index	Sucking pests	
	Mealy bug	Thrips
Immune (0 %)	74	82
Highly resistant (0.1 %- 5 %)	12	10
Moderately resistant (5.1% - 20.0%)	5	03
Moderately susceptible (20.1%- 50.0%)	3	5
Highly susceptible (50.1-100%).	0	0

Pest attack in the post-monsoon season

Among all the genotypes, seventy two genotypes showed immunity (0 %), twenty were highly resistant (0.1 % - 5 %), eight showed moderate resistant (5.1 % - 20 %), whereas none showed moderate (20.1% - 50.0%) and high (50.1 % - 100 %) susceptibility among genotypes to Pink mealy bug, *M. hirsutus* infestation (Table 4). Eighty eight genotypes registered immunity (0 %), eight were highly resistant (0.1 % - 5 %), two showed moderate resistance (5.1 % - 20 %), two showed moderate susceptibility (20.1 % - 50 %), whereas none were highly susceptible to thrips (Table: 4). The infestation of Pink mealy bugs declined significantly during winter season compared to rainy season due to washing off of mealy bug population in the rainy season. The present results are supported by the findings of Hemalatha *et al.* (2008). The incidence of thrips in post-monsoon season was very low compared to other seasons. This may be due to environmental conditions prevailing in season, low temperature (25.7 ^{0}C) and maximum sunshine (9.1) which leads to less infestation. These results are in conformity with earlier findings (Manjunath, 2001and Reddy, 2001).

Table 4. Pooled reaction of number of mulberry genotypes to sucking insect pests in post-monsoon season

Category/Score Index	Sucking pests	
	Mealy bug	Thrips
Immune (0%)	72	88
Highly resistant (0.1%-5.0%)	20	8
Moderately resistant (5.1% - 20.0%)	8	2
Moderately susceptible (20.1% - 50.0%)	0	2
High susceptible (50.1 % - 100%)	0	0

Cumulative incidence throughout the year

The sucking pests namely Pink mealy bug, *M. hirsutus* and Thrips, infestation occurred throughout the year. The results are presented in Table 5. The infestation levels varied monthly due to abiotic factors like temperature, relative humidity, rainfall and sunshine (Appendix 1), due to seasonal effect, seasonal nature of pests and also due to availability of foliage. The infestation of Mealy bug was higher in summer season followed by rainy and winter season. The current research reveals high incidence of mealy bug in March, which is reduced in August. The incidence was least in December. The incidence had direct relationship with temperature. These results are in agreement with the findings of Sriharan *et al.* (1979), Hemalatha *et al.* (2008), and Sathyaprasad *et al.* (1994) who indicated that maximum infestation of Pink mealy bug was observed in pre-monsoon season. Similarly, the infestation of Pink mealy bug was higher in summer season, which may be attributed to congenial environment prevailing in the season for proper framing of their secretions into protective layers by avoiding interruption in their feeding and breeding process. The infestation of thrips was higher in pre-monsoon season and it has a positive correlation with temperature. The peak incidence was observed during March followed by May and February 2010-2011. (Kariyappa and Narasimhanna, 1978; Venugopalapillai and Krishnaswami, 1980a and 1983; Biradar, 1989; Sharma, 1989, (Manjunath, 2001, Reddy, 2001), who indicated that maximum infestation of thrips was observed in pre-monsoon, which may be attributed by congenial environment of high temperature, low relative humidity and low rainfall, which favours their better establishment. The pest incidence in different months were lower than economic threshold level. The present result has close conformity with the findings of Rama Kant and Bhatt (2010) who indicated sucking pests Pink mealy bug and Thrips had not reached economic threshold level (Table 4).

Table 5. Average incidence (%) of pests in mulberry germplasm

Months	Mealy bug	Thrips
March 2010	11.18	11.25
April	22.50	3.75
May	26.18	11.25
June	11.00	2.25
July	6.02	3.75
August	3.67	3.75
September	3.75	3.75
October	1.58	2.25
November	6.01	3.00
December	3.83	1.50
January 2011	3.84	1.50
February	7.17	3.00
F test	*	*
SEm ±	0.69	0.13
CD (p=0.05)	2.02	0.38
CV (%)	13.43	5.45

Conclusion

In the present study it was noticed that in all three seasons (pre monsoon, monsoon and post monsoon), Pink mealy bug, *M. hirsutus* incidence was observed in maximum number of genotypes compared Thrips *Pseudodendrothrips mori* (NIWA)

REFERENCES

Anonymous, 2010. *www.csb.in*

Biradar, N., 1989. Faunastic study of Arthropods infesting mulberry and biology of *Eupractis fraterna* Moore (Lepidoptera : Lymantridae). *M.Sc. (Seri.) Thesis*, Univ. Agric. Sci., Bangalore, pp.81.

Hemalatha and Shree, M.P., 2008. Analysis of the trend of infestation by sap suckers in mulberry (*Morus spp*) crop system. *Indian J. Seric*., 47 (1): 130-132.

Kariappa, B.K. and Narasimhanna, M.N. 1978. Effect of insecticides in controlling mulberry thrips and their effect on rearing silkworm. *Indian J. Seric,* 17 (1): 7-14.

Manjunatha, D.V., Jayaramaiah, M., Reddy, D.N.R., Narayanswamy, K.C., Seenappa, K. and Jagadish, K.S., 2001. Species composition of thrips and their seasonal incidence on mulberry. *Natl. Sem. Mulb. Seri. Res*., India, pp.26-28.

Rama Kant and Bhat, M.M., 2010. Mulberry foliar fungal diseases and insect pests calendar in Uttarakand. *Indian Silk*, 45: 10-13.

Reddy, D.N.R. and Narayanswamy, K.C., 2001. Morphological basis of resistance to thrips in some mulberry genotypes. *Natl. Sem. Mulb. Seri. Res*. India., pp.26-28.

Sathya Prasad, K., Sujatha, C.R., Manjunath, D. and Datta. R.K., 1994. Screening of popular mulberry varieties for tukra infestation. *Advances in Indian Sericulture Research.*

Sharma, P., 1989. Insect pests of sericulture and their control. *Pesticides*, 23 (12): 19-23.

Sriharan, T.P., Samson, M.V. and Krishnaswami. S., 1979. Studies of the tukra diseases of mulberry, *Ind. J. Seri..,* 18: 78-80.

Venugopalapillai, S. and Krishnaswami, S., 1983. Population of mulberry thrips, *Pseudodendrothrips mori* (Nawa) in relation to weather parameters. *Indian J. Seric.*, 22: 46-52.

Venugopalapillai, S. and Krishnaswami, S., 1980. Population of mulberry thrips *Pseudodendrothrips mori* (Nawa) in relation to weather factors. *Proc. Seric. Sym. Semi.* (Ed., Muthukrishnan, T.S. and Sree Rangaswamy, S.R.), TNAU, Coimbatore, pp. 186-189.

****