Plant Archives Vol. 18 No. 1, 2018 pp. 734-736 *ISSN 0972-5210*

SCREENING OF THE COTTON GENOTYPES AGAINST *RAMULARIA AREOLA* ATK. UNDER FIELD CONDITION

Poonam P. Shete*, Yuvraj G. Kasal and R. R. Perane[1]

Lovely Professional University, Phagwara (Punjab), India.
[1]Department of Plant Pathology, College of Agriculture, Dhule - 424 004 (Maharashtra), India.

Abstract

Cotton, "King of Fibers" enjoys a pre-eminent status among all cash crops in the country, being the principal raw material for a flourishing textile industry. It provides livelihood to about sixty million peoples and is an important agricultural commodity providing remunerative income to millions of farmers both in developed and developing countries. Among the various diseases occurring on cotton, the foliar disease grey mildew caused by *R. areola* is gaining more importance in recent years because of its increasing incidence. These have been known to occur on all the various cultivated and wild species of cotton in Maharashtra, since many years, in an epiphytotic form on commercially grown varieties, which leads to severe defoliation and substantial yield loss. The present investigation included the screening of cultivated cotton genotypes and wild species for grey mildew diseases of resistant and susceptible cotton genotypes. The results obtained are summarized below. Among the 108 cultivated genotypes screened for resistance against grey mildew disease under field conditions, 64 genotypes showed immune reaction. Further, 07 genotypes were resistant, 03 genotypes were moderately resistant, 04 genotypes were susceptible and 03 showed the highly susceptible reaction to *R. areola*. Out of twenty seven wild species 13 were disease free, 04 were resistant, 04 were moderately resistant, 02 were susceptible and 04 species showed the highly susceptible reaction to *R. areola*.

Key words :

Introduction

Cotton (*Gossypium* spp.) is the most important cash crop cultivated in over 60 countries in the World and also important renewable natural textile fiber and sixth largest source of vegetable oil in world. It is often called "White gold" and considered as "King of apparel fiber". Cotton belongs to the genus *Gossypium* from the family Malvaceae. Moreover, cotton plays vital role in India's economy, by providing livelihood for more than 60 million people through cotton production, processing, textiles and related activities. It contributes nearly 75 per cent of total raw material needs of textile industry in our country.

India is the third largest producer of cotton in the world next to China and USA. However, the production potential of the crop has not been fully exploited due to several biotic and abiotic factors.

There are many reasons for low productivity of cotton in India. Besides dependency on 70 per cent cotton production varies on monsoon, diverse ecological and soil conditions, constant threat from pests and diseases are considered a major biological challenges to successful cotton productivity. However, the major threats of diseases have not studied so as to develop resistance to improve the productivity of cotton in the country. The crop suffers from many fungal diseases, of which foliar diseases take a heavy roll. Among the diseases, grey mildew (*Ramularia areola*), alternaria blight (*Alternaria macrospora*) and bacterial blight (*Xanthomonas axonopodis* pv. *malvacearum*) cause the yield losses up to 30 per cent (Chidambaram and Kannan, 1989), 26 per cent (Chattannavar *et al*., 2006), 30 per cent, respectively are important diseases which appear almost every year and have seriously threatened cotton production in certain areas and reduce the yield significantly.

The cotton crop is known to suffer from number of diseases caused by fungal, bacterial and viral origins such as *Fusarium* wilt, Bacterial blight, *Alternaria* leaf blight, Root rot and Grey mildew. During the last two decades,

a change in the relative importance of the different diseases was found to affect cotton in India. These changes may be due to change over from the cultivation of Asiatic or desi (*G. herbeceum* and *G. arboreum*) to American cotton (*G. hirsutum*) and hybrids most of them, even though high yielding ones were susceptible to diseases (Shivankar and Wangikar, 1992). Pest and disease attack is considered as one of the most important factor for affecting yield levels. The loss due to them is to the tune of 13 to 15 per cent. Among the fungal diseases grey mildew is the predominant one causing considerable economic loss to the crop.

Materials and Methods

Screening of the genotypes against the Grey mildew one hundred eight Bt and non Bt cotton hybrids/ varieties/ genotypes and wild species were screened under field conditions during *kharif* 2014-15 at Cotton Improvement Project, MPKV, Rahuri. These cotton genotypes screened against *Ramularia areola* to identify the source of resistance and susceptible under field condition.

The genotypes were sprayed during evening hrs with inoculum of pathogen *Ramularia areola* at 60 and 80 days after sowing. The spore suspension was prepared in laboratory on Richards agar broth from isolated culture. Also, the freshly infected leaves were collected from susceptible genotypes. Infected leaves were washed in water and suspension containing conidia was used for spraying. The spore suspension was also prepared in laboratory by using the broth subsequently. The eight days old culture after conidial formation was used for spraying.

Observation on the intensity of Grey mildew on each cotton genotypes/varieties/hybrids was recorded at 90 and 120 DAS. The five plants in each genotype were randomly selected for recording disease intensity. The disease intensity was recorded in 0 to 4 scale given by Sheo Raj (1988).

Results and Discussion

Screening of cotton genotypes for *Ramularia areola* Atk.

One hundred eight genotypes from various *Gossypium* species were screened by spraying the genotypes with spore suspension of pathogen in field condition during *kharif* 2013-14 (Table 1). The intensity of the pathogen *Ramularia areola* disease was recorded on 90 and 120 days after sowing by using 0-4 scale (Sheo Raj, 1988). In these eighty one cultivated hybrids, varieties and breeding lines were screened in field condition and observed that sixty four genotypes showed disease free reaction and seven genotypes showed resistant reaction to grey mildew disease.

Further, three genotypes showed moderately resistant reaction and four genotypes showed susceptible reaction. While three genotypes showed highly susceptible reaction to *Ramularia areola*.

Twenty-seven wild species/ races from various *Gossypium* species were screened in the field condition to *Ramularia* during *kharif* 2013-14 (table 2). The intensity of the pathogen *Ramularia areola* disease was recorded on 90 and 120 days after sowing. Out of these, 13 species *viz*., *G. arboreum bangalense*, *G. punctatum*, *G. triphyllum*, *G. darbasonum, G. anomumalum, G. Africanum, G. stocksii Mast ex Hook, G. richmondii, G. aridum, G. sinense, G. raimondii, G. trilobum* and *G. punctatum* were totally disease free to grey mildew. Further four species *viz*., *G. tetanse, G. arboreum race rozi*, *G. arboretum race kudaikkotai, G. longicalyx*

Table 1 : Screening of cotton genotypes under field condition against grey mildew (*R. areola* Atk.)

S. no.	Grade	Caterory	Name of genotypes (81)
1.	0 grade	Disease free	RHH-622, RHH-1112, RHH-1125, RHH-1014, RHH-1007, RHH-1015, RHH-0917, RHH-O707, RHH-1215, RHH-1121, Phule 492, Ankur 651, RHB-1123, RHB-0812, RHB-0708, Phule 688, RHC-807, RHC-9115, RHC-911, RHC-818, RHC-815, RHC-822, RHC-811, RHC-825, RHC-1222, RHC-716, RHC-717, G-135-49, RHH-0707, G-135-49, JK 97-621 RHC-1222,RHH-1125, Malika, Ankur 3028, MRC-7918, RHB-1226, RHCh-011, JLA 505, RHB-1216, RHB-1202, RHB-1011, Malini, RHB-1123, MRC-7377, Ankur 3244, RHB-1008, Suvarna, RHB-713, RHB-711, Phule 388, MRC-7347, Bhakti, RHC-0717, RHH-914, Ajeet 199, MRC-7333, RHH-1121 , RHH-1224, RHH-1215, MRC-7351, RCH-135, Ajeet 155 and Phule Anmol. (64)
2.	1 grade	Resistant	AC-24, AC-631, DP-498, DCH-32, PSCHB 901, AKH 24 and Desi 1.(07)
3.	2 grade	Moderately resistant	ARBHA 35, H-4 and JLA 794.(03)
4.	3 grade	Susceptible	DCH-37, MCU-5, Bunny Bt and RCH-2 Bt.(04)
5.	4 grade	Highly susceptible	Jayadhar, AKH-4 and LRA 5166.(03)

Table 2 : Screening of wild species of cotton against grey mildew (*Ramularia areola* Atk.).

S. no.	Scale	Category	Name of wild species
1.	0 grade	Immune	*G.arboreum bangalense, G. punctatum, G. triphyllum, G. darbasonum, G. anomumalum, G. Africanum, G. stocksii Mast ex Hook, G. richmondii, G. aridum, G. sinense, G. raimondii, G. trilobum, G. punctatum*.
2.	1 grade	Resistant	*G. tetanse, G.arboreum race rozi, G. arboretum race kudaikkotai, G. longicalyx Hutch* and *Lee.*
3.	2 grade	Moderately resistant	*G. thurberi, Mex, Exotic- 3, G. devidsonii kell.*
4.	3 grade	Susceptible	*G. palmiri, G. thurberi.*
5.	4 grade	Highly susceptible	JLH 168, *G. arboretum race Punaspatti, G. turab* and *G. armourianum*

Table 3 : Screening of cotton species in glasshouse by artificial inoculation to the (*Ramularia areola* atk.).

S. no.	Scale	Name of genotypes
1.	0 grade	RHH-622, RHH-1112, RHH-1125, RHH-1014, RHH1007, RHH-1015, RHH-0917, RHH-O707, RHH-1215, RHH-1121, Phule-492, Ankur 651, RHB-1123, RHB-0812, RHB-0708, Phule-688, RHC-807, RHC-9115, RHC-911, RHC-818, RHC-815, RHC-822, RHC-811, RHC-825, RHC-1222, RHC-716, RHC-717, Phule Anmol, G-135-49 and RHH-0707
2.	1 grade	AC-24, AC-631, DP-498, DCH-32, PSCHB 901, AKH 24 and Desi 1
3.	2 grade	ARBHA 35, H-4 , JLA 794
4.	3 grade	DCH-37, MCU-5, Bunny Bt and RCH-2 Bt
5.	4 grade	Jayadhar, AKH-4, LRA 5166, *G. armorianum*, Punaspatti and Turab

Hutch and *Lee* were found screened resistant reaction. While, four species *viz*., *G. turab, Mex, Exotic- 3, G. devidsonii kell* showed moderately resistant reaction. Two species *viz*., *G. palmiri, G. thurberi* showed susceptible reaction and four species *viz*., JLH 168, *G. arboretum race Punaspatti*, *G. thurberi* and *G. armourianum* was highly susceptible to the *Ramularia areola* disease.

Out of these one hundred eight genotypes fifty cultivated and wild genotypes from various species of *Gossypium* were screened in glasshouse condition by artificial inoculation method (table 3). The incidence of *Ramularia* (Grey mildew) was recorded. Thirty showed immune reaction *viz*., RHH-622, RHH-1112, RHH-1125, RHH-1014, RHH1007, RHH-1015, RHH-0917, RHH-O707, RHH-1215, RHH-1121, Phule-492, Ankur 651, RHB-1123, RHB-0812, RHB-0708, Phule-688, RHC-807, RHC-9115, RHC-911, RHC-818, RHC-815, RHC-822, RHC-811, RHC-825, RHC-1222, RHC-716, RHC-717, Phule Anmol, G-135-49 and RHH-0707. Seven genotypes showed resistant reaction to grey mildew disease *viz*., AC-24, AC-631, DP-498, DCH-32, PSCHB 901, AKH 24 and Desi 1. Three genotypes *viz*., ARBHA 35, H-4, JLA 794 showed moderately resistant reaction. While, four genotypes showed susceptible reaction *viz*., DCH-37, MCU-5, Bunny Bt and RCH-2 Bt. and six genotypes viz., Jayadhar, AKH-4, LRA 5166, *G. armorianum*, Punaspatti and Turab were highly susceptible to *R. areola* disease.

Acknowledgements

Authors are thankful to Head, Department of Plant Pathology and Agriculture Microbiology, PGI, MPKV, Rahuri and Head, Cotton Improvement Project, MPKV, Rahuri, Ahmednagar, Maharashtra (India) for their constant encouragement.

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