2003 BELTWIDE COTTON CONFERENCES, NASHVILLE, TN – JANUARY 6-10

SEVERITY OF LEAF DISEASES ON DELTAPINE ITA-90 AND DELTAOPAL COTTON CULTIVARS AND CHEMICAL CONTROL OF RAMULARIA LEAF SPOT IN BRAZIL

Marli F.S. Papa*, Mercia I. B. Celoto, and Andréia C. P. Rodrigues
Departamento de Fitossanidade, Engenharia Rural e Solos
São Paulo State University – UNESP
Ilha Solteira, SP – Brazil

Abstract

The foliar diseases caused by *Ramularia areola*, *Alternaria* sp., *Stemphylium* spp., *Cercospora* sp. and *Xanthomonas campestris* pv. *malvacearum* has increased in importance in Brazil. This has been attributed to the use of new cotton cultivars, which are susceptible to all these pathogens. The purpose of this test was to examine the severity of leaf diseases on Deltapine ITA-90 and DeltaOpal cultivars and chemical control of ramularia leaf spot on cotton in Brazil. Both cultivars were susceptible to the leaf diseases, but DeltaOpal was less affected by ramularia leaf spot (RLS) and bacterial blight. All the tested fungicides had reduced significantly the RLS severity in relation to the untreated. The fungicides Flint 500 WG + Tilt, Flint 500 WG + Folicur e Priori + Nimbus stood out, providing 100% of control of RLS after 3 applications.

Introduction

In Brazil, the foliar diseases caused by *Ramularia areola*, *Alternaria* spp., *Stemphylium solani* and *Cercospora* sp. were considered of secondary importance (Cia & Salgado, 1997) as it is also reported for the United States conditions (Kirkpatrick & Rothrok, 2001). However, with the introduction of new cultivars (which are probably susceptible to these foliar pathogens) and the expansion of the crop to several others regions in Brazil, the importance of these foliar diseases has increased dramatically (Araújo, 2000).

From the mid 90's, the incidence of foliar diseases on cotton has been detected causing a premature defoliation, often leading to reduced yields and lower fiber quality (Metha, 1996). The bacterial blight (BB) (*Xanthomonas campestris* pv. *malvacearum*) also been increasing the occurrence, due to your wide dissemination, survival in infected plant debris for long periods and high variability of the pathogen (Cassetari Neto & Machado, 2000). The chemical control and the selection of resistant varieties has been sought as the main disease management strategies. However, little information is available in Brazil concerning the reaction of the cotton cultivars to foliar pathogens and the effectiveness of chemical compounds controlling the disease.

The purpose of this test was to examine the severity of leaf diseases on Deltapine ITA-90 and DeltaOpal cultivar and the chemical control of ramularia leaf spot (RLS) on cotton in Brazil.

Materials and Methods

The experiments were carried out at UNESP Teaching and Research Facilities Farm, in Selvíria, Mato Grosso do Sul State, Brazil, during 2001/2002 growing season. The seeds were sowed spaced by 0.90 m between rows, with 10 plants/m of final density. All plots were maintained with standard production practices recommended for cotton in Brazil.

Trial 1: The severity of naturally occurring leaf diseases was determined in an experimental area of both Deltapine ITA-90 and DeltaOpal cotton cultivars. The evaluation was done 90 days after planting. Fifty plants of each cultivar were analyzed determining the percentage of diseased leaves (for each particular leaf spot) and attributing grades based on diagrams scales that reflect the severity of RLS (Cia et al., 1999), leaf blight (Cassetari Neto & Machado, 2000) and bacterial blight (Cassetari Neto & Machado, 2000).

Trial 2: The chemical control test was conducted using the DeltaOpal cultivar. The experimental design was a randomized complete block with four replications. Plots consisted of nine rows 7,5 m long with 10 plants/m of final density. The treatments are presented on Table 1. The fungicide sprays started 60 days after planting, totaling three applications (with a 15-day interval between applications), using portable sprayer, and total spray solution of 250 L/ha.

The evaluations were done in the first day of spray, and with 7-day interval until seven days after the last application. Fifteen plants chosen at random from the three central rows of each plot were evaluated considering the number of healthy and diseased leaves, and based on a severity level for the Ramularia leaf spot using a scale from 1 to 5 (Cia et al, 1999).

The data were analyzed by ANOVA, and the means (normalized by square root of (x + 0.5) transformation) were compared by Tukey test at 0.05

Results and Discussion

Both DeltaOpal and Deltapine ITA-90 cotton cultivars had shown symptoms of Ramularia leaf spot, leaf blight and bacterial blight (Table 2). Although both cultivars were susceptible to the diseases, DeltaOpal was less affected by RLS and by BB. As LB, the susceptibility of two cultivars was similar. The use of resistance cultivars is the most efficient method of cotton diseases control (Cia & Machado, 1997). In the choice of cultivar the grower should know the genetically resistant cultivar to the diseases that occurs in the region.

All the used fungicides reduced the RLS severity significantly in the cotton plants in relation to the untreated (Table 3). The treatments that were shown more efficient were Flint 500 WG + Tilt, Flint 500 WG + Folicur and Priori + Nimbus, which provided 100% of control of RLS after 3 applications of the fungicides.

In function of the occurrence of several pathogens at the same time in the cotton crop, the use of mixtures of fungicides can increase of the efficiency of the diseases control. The increase of the intensity of cotton leaf diseases has been taking the growers to accomplish from one to three fungicides applications, during the cycle of the crop. (Cia & Fuzatto, 2000).

Due to the intensity of diseases that is occurring in the crop, the employment of the integrated control of plant diseases, through the choice of cultivar with resistance level, the choice of the planting area, the use of seeds healthy or treated, the use of appropriated planting techniques and the use of chemical products in a rational and safe way are constituted in the best alternative to guarantee the viable cotton production.

References

Araújo, A.E. 2000. Doenças da cultura do algodoeiro no cerrado. In: CONGRESSO INTERNATIONAL DO AGRONEGÓCIO DO ALGODÃO, SEMINÁRIO ESTADUAL DA CULTURA DO ALGODÃO, V. Cuiabá, Anais ... Cuiabá: Fundação MT. P.189-195.

Cassetari Neto, D. & Machado, A.Q. 2000. **Doenças do algodoeiro: diagnose e controle**. Cuiabá: Faculdade de Agronomia e Medicina Veterinária (UFMT). 47p.

Cia, E. & Salgado, C.L. 1997. Doenças do algodoeiro (*Gossypium* spp.). In: KIMATI, H. et al. **Manual de Fitopatologia,** v.2. Doenças de plantas cultivadas. Ceres, São Paulo, p.33-48.

Cia, E.; Fuzatto, M.G.; Chiavegato, E.J.; Farias, F.J.C.; Araujo, A.E. 1999. Desempenho de cultivares e linhagens de algodoeiro diante da incidência de *Ramularia.* In: CONGRESSO BRASILEIRO DE ALGODÃO, 2, 1999, Ribeirão Preto, Anais ... Campina Grande: EMBRAPA – CNPA. p. 468-470.

Kirkpatrick, T.L. & Rothrock, C.S. (Ed.) . 2001. **Compendium of cotton diseases**. St. Paul, MN, APS Press.77 p.

Metha, Y.R. 1998. Severe outbreak of Stemphylium leaf blight, a new disease of cotton in Brazil. **Plant Disease**, v. 82, p.333-336.

* Financial Support: Fundunesp/Proc. 00777/02-DFP.

Table 1. Treatments, formulations, active ingredients and rates used in a field trial of chemical control of ramularia leaf spot of cotton.

Treatment	Rate (mL or g c.p./ha)	Formulation / Active ingredient / Rate
Control	-	-
Derosal SC	1000	Suspension concentrate / carbendazin/ 500g/L
Flint 500 WG + Tilt	150 + 300	Water dispersible granule/ trifloxystrobin/ 500 g/kg + Emulsifiable concentrate / propiconazole/ 250 g/ L
Derosal SC + Brestanid	500 + 500	Suspension concentrate / carbendazim / 500 g/L + Suspension concentrate / fentin hydroxyde / 500g/L
Flint 500 WG + Folicur 200 CE	150 + 500	Water dispersible granule/ trifloxystrobin/ 500 g/kg + Emulsifiable concentrate / tebuconazole / 200g/L
Flint 500 WG + Palisade PM + Attach	150 + 250+ 250	Water dispersible granule/ trifloxystrobin / 500 g/L + Wettable powder / fluquinconazole / 250 g/kg + Emulsifiable concentrate / mineral oil / 750g/L
Folicur 200 CE + Sportak	500 + 750	Emulsifiable concentrate / tebuconazole / 200g/ L + Emulsifiable concentrate / prochloraz / 450 g/ L
Priori + Nimbus	200 + 250	Suspension concentrate / azoxystrobin / 250 g/ L + Emulsifiable concentrate / mineral oil / 428 g/L

Table 2. Reaction of the cotton cultivars DeltaOpal and Deltapine ITA-90 to ramularia leaf spot, leaf blight and bacterial blight, 90 days after planting. Brazil, 2002.

	Ramularia leaf spot		Leaf blight		Bacterial blight	
Treatment	% DL[a]	PDI[b]	% LD	PDI	% LD	PDI
DeltaOpal	16,93	1,92	40,13	3,07	31,29	3,27
Deltapine ITA-90	41,72	3,42	49,87	4,32	61,61	4,98

[a] % diseased leaf per plant

[b] Plant disease index on a scale of 1-5.

Table 3. Effects of fungicides controling ramularia spot leaf on cotton. Mean plant disease severity index per treatment, in each evaluation period. Brazil, 2002.

Treatment	Rate mL or g p.c./ha	First evaluation	7 d. after 1st. aplic.	15 d. after 1st. aplic.	7 d. after 2nd aplic.	15 d. after 2nd aplic.	7 d. after 3rd. aplic.
Control	-	1,50* a	1,30 a**	1,77 a	2,07 a	1,92 a	1,98 a
Derosal SC	1000	1,05 a	1,27 a	1,12 ab	0,87 b	0,70 b	0,47 b
Flint 500 WG + Tilt	150 + 300	1,50 a	0,43 b	0,40 bc	0,17 cd	0,03 d	0,00 c
Derosal SC + Brestanid	500 + 500	1,17 a	0,62 ab	1,10 abc	0,57 bc	0,50 bc	0,40 bc
Flint 500 WG + Folicur 200 CE	150 + 500	0,87 a	0,17 b	0,23 c	0,00 d	0,00 d	0,00 c
Flint 500 WG + Palisade PM + Attach	150 + 250 + 250	1,24 a	0,54 ab	0,40 bc	0,10 cd	0,10 cd	0,03 bc
Folicur 200 CE + Sportak	500 + 750	1,27 a	0,44 b	0,33 bc	0,17 cd	0,03 d	0,13 bc
Priori + Nimbus	200 + 250	1,43 a	0,67 ab	0,33 bc	0,27 cd	0,07 d	0,00 c
CV (%)		10,99	13,11	14,87	12,20	10,72	11,89

* Disease index varying from 1 to 5.

** Mean of four replications. Means followed by the same letter in the same column are not significantly different according to the Tukey test (5%).