

DISTRIBUTION OF BLACK LEAF STREAK DISEASE (*Mycosphaerella fijiensis* Morelet) IN MATO GROSSO, BRAZIL

DISTRIBUIÇÃO DE SIGATOKA NEGRA (*Mycosphaerella fijiensis* Morelet) EM MATO GROSSO, BRASIL

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ABSTRACT: Banana black leaf streak disease caused by the present quarantine pest *M. fijiensis* occurs in Mato Grosso State since 1999 and requires adoption of sanitation, including detection survey. The aim of this study was to evaluate the distribution of *M. fijiensis* in Mato Grosso State from 1999 to 2013, as well as how black leaf streak disease periodically was spread in all regions of Mato Grosso State according to the standards of the Ministry of Agriculture, Livestock and Food Supply. Considering the first outbreak year and the previous surveys (Table 1), it can be verified that *Mycosphaerella fijiensis* Morelet was introduced into Mato Grosso State in accordance with the following periods of times and counties: 2001 to 2003 - Nova Bandeirantes and Paranaíta; 2001 to 2004 - Barra do Bugres and Gaúcha do Norte; 2001 to 2005 - Paranatinga; 2002 to 2004 - Porto Estrela, Santo Afonso, and Tangará da Serra; 2002 to 2005 - Rosário Oeste; 2004 - Acorizal, Guarantã do Norte, and Sinop; 2004 to 2005 - Sapezal; 2005 - Campos de Júlio, Nova Maringá, Poxoréu, and Sorriso; 2005 to 2006 - Marcelândia and Matupá; 2007 - Água Boa, Barra do Garças, Campinápolis, General Carneiro, Novo São Joaquim, and Pedra Preta; 2013 - Canabrava do Norte, Confresa, Porto Alegre do Norte, and São José do Xingu. The dispersal of *M. fijiensis* throughout both time and space showed to be random in Mato Grosso State and its counties, except among some counties adjacent each other, which can be explained by the movement of infected banana seedlings.

KEYWORDS: Present quarantine pest. Banana. Dispersal. *Mycosphaerella fijiensis*.

INTRODUCTION

Black leaf streak disease is caused by plant-pathogenic fungus *M. fijiensis*. It is extremely severe after bunch production because plants do not produce leaves anymore after flowering, which may cause 100% of yield loss in susceptible cultivars (OROZCO-SANTOS, 1998). *M. fijiensis* is a regulated pathogen in Brazil as present quarantine pest and requires periodic surveys. This disease is distributed throughout the states of Acre, Amapá, Amazonas, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Paraná, Rio Grande do Sul, Tocantins, Maranhão, Rio de Janeiro, Rondônia, Roraima, Santa Catarina, and São Paulo (BRASIL, 2013).

Mycosphaerella fijiensis was introduced into Brazil through Amazonas State in 1998 (PEREIRA et al., 2000). In Mato Grosso State since the first detection of black leaf streak in 1999 up to 2004, the banana cultivated area reduced by 63% (IBGE, 1999 and 2004). This paper aimed to present

the distribution of black leaf streak (*M. fijiensis*) in Mato Grosso since its first outbreak until 2013.

MATERIAL AND METHODS

The distribution of this disease was monitored from 1999 to 2013 by the Mato Grosso State Institute of Agricultural and Livestock Defense, know as INDEA/MT. INDEA/MT surveyed black leaf streak according to the Ministry of Agriculture, Livestock, and Food Supply (BRASIL, 2002 and 2005). The surveys sampling and periodicity were the followings: (i) 1% of rural properties or urban squares at least once each 6 months, in area where the disease has not been detected; (ii) 2% of rural properties or urban squares at least once each 3 months, in area recognized as *M. fijiensis* free area by the Ministry of Agriculture, Livestock, and Food Supply; (iii) 5% of rural properties or urban squares at least once each 2 months, in adjacent area to probable expansion area and to area recognized as *M. fijiensis* free area by

the Ministry of Agriculture, Livestock, and Food Supply; (iv) 3 adult plants in the pre-flowering stage per hectare at 50% of existing properties along road considered as risk route for the disease; and (v) 3 adult plants in the pre-flowering stage per hectare, in outbreak delimitation survey according to the following proportions: in 50% of all properties located at the radius up to 10 km from the outbreak; in 30% of all properties located at the radius from 10 to 30 km measured from the outbreak; and in 10% of all properties located at the radius from 30 to 70 km measured from the outbreak. In non-commercial urban and rural areas were inspected at least 3 adult plants in the pre-flowering stage per

hectare. In commercial production area were inspected at least 5 adult plants in the pre-flowering stage per hectare. Plants inspected which were suspected to be infected by this fungus were sampled and analyzed in laboratory accredited by Ministry of Agriculture, Livestock, and Food Supply.

RESULTS AND DISCUSSION

Black leaf streak was confirmed in 50 counties among 123 counties surveyed, involving all Mato Grosso State regions, through annual surveys which ranged from 1 to 12 in each county (Table 1).

Table 1. Demonstrative of black leaf streak surveys per county with disease occurrence, in Mato Grosso.

County	Year														
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Cuiabá						x									
Acorizal		o			o	x									
Água Boa	o	o	o		o	o	o	o	x						
Apiacás					x	x									
Aripuanã						x									
Barra do Bugres		o				x									
Barra do Garças	o	o			o	o	o	o	x						
Brasnorte						x									
Cáceres	x		o												
Campinápolis	o	o	o			o	o	o	x						
Campo Verde					o										
Campos de Júlio					o	o	x								
Canabrava do Norte	o	o	o			o		o	o	o	o	o	o	o	x
Castanheira						x									
Confresa	o	o	o			o		o	o	o	o	o	o	o	x
Cotriguaçu						x									
Diamantino						x									
Gaúcha do Norte	o	o				x	o								
General Carneiro					o	o	o	o	x						
Guarantã do Norte		o	o		o	x	o	x	x						
Itanhangá						x									
Juara						x									
Juína						x									
Juruena						x									
Marcelândia					o	o		x	o						
Matupá		o			o	o		x	o						
Nova Bandeirantes		o			x	x		x							
Nova Maringá						o	x								
Nova Monte Verde					x										
Nova Xavantina	o	o	o		o	o	o	o	x						
Novo Horizonte do Norte						x		x							
Novo Mundo		o	o		o	x									
Novo São Joaquim	o	o	o		o	o	o	o	x						
Paranaíta		o			x										
Paranatinga		o					x								
Pedra Preta		o			o	o	o	o	x	o	x	o	o	o	

Porto Alegre do Norte	o	o		o	o	o	o	o	o	o	o	o	x
Porto dos Gaúchos				x									
Porto Estrela	o	o		x									
Poxoréo	o		o	o	x								
Rosário Oeste	o	o			x								
Santo Afonso		o		x									
Santo Antônio do Leverger				x	x	x							
São José do Xingu	o	o						o	o	o	o	o	o
Sapezal				o	x								
Sinop	o		o	x									
Sorriso				o	x								
Tabaporã	x			x		o	x						
Tangará da Serra		o		x									
Tapurah				x									

X = Survey with outbreak detection O = Survey without outbreak detection

Considering the first outbreak year and the previous surveys (Table 1), it can be verified that *M. fijiensis* was introduced into Mato Grosso State according to the following times and counties: 2001 to 2003 - Nova Bandeirantes and Paranaita; 2001 to 2004 - Barra do Bugres and Gaúcha do Norte; 2001 to 2005 - Paranatinga; 2002 to 2004 - Porto Estrela, Santo Afonso, and Tangará da Serra; 2002 to 2005

- Rosário Oeste; 2004 - Acorizal, Guarantã do Norte, and Sinop; 2004 to 2005 - Sapezal; 2005 - Campos de Júlio, Nova Maringá, Poxoréo, and Sorriso; 2005 to 2006 - Marcelândia and Matupá; 2007 - Água Boa, Barra do Garças, Campinápolis, General Carneiro, Novo São Joaquim, and Pedra Preta; 2013 - Canabrava do Norte, Confresa, Porto Alegre do Norte, and São José do Xingu (Figure 1).

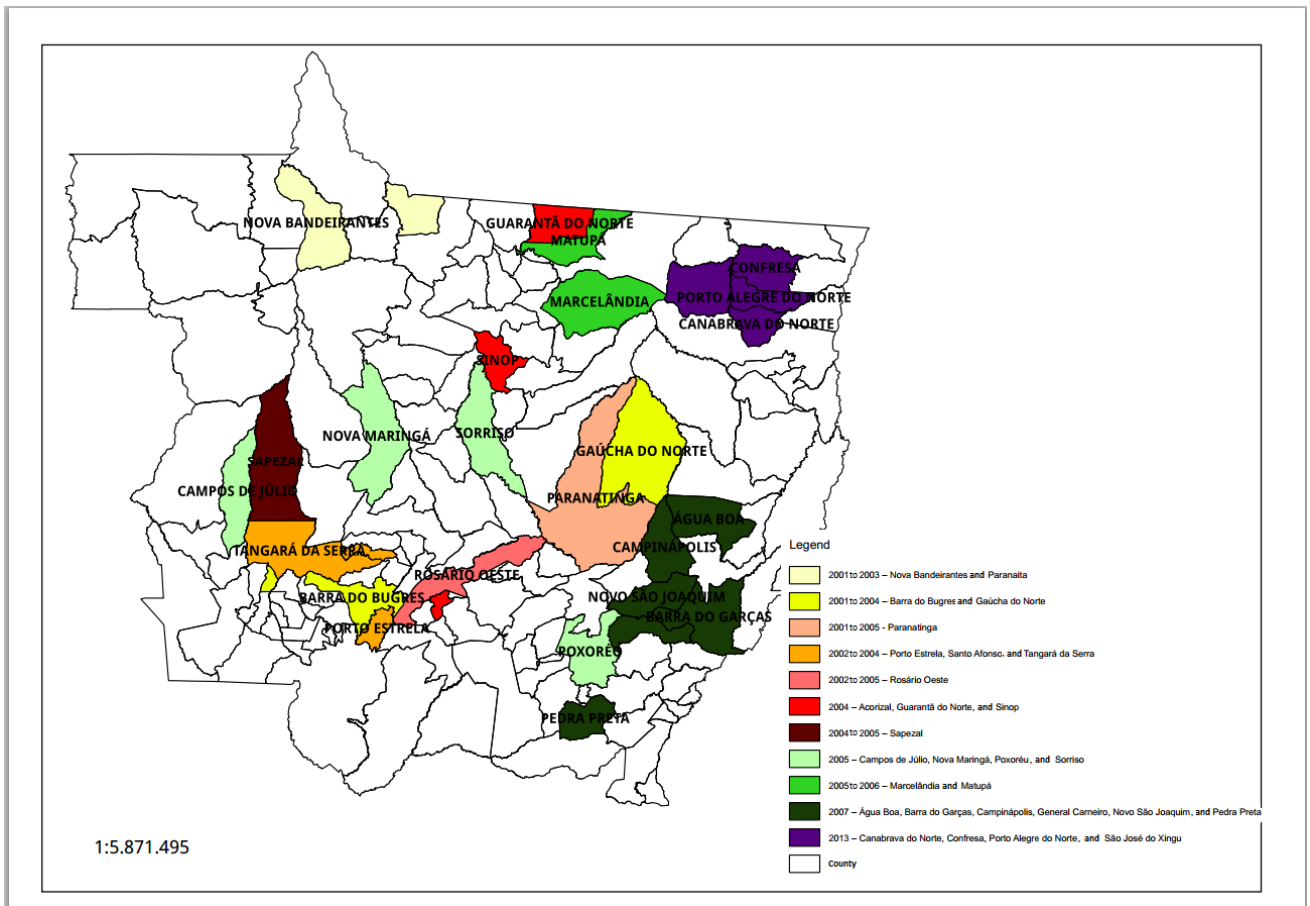


Figure 1. Dispersal of black leaf streak in Mato Grosso State.

These results showed that black leaf streak did not have homogeneous distribution in Mato Grosso State and not even inside the counties. This fact can be explained by transit of infected seedlings. Silva (2013) confirmed that all properties which received seedlings from Agriculture Secretariat of Confresa County, Mato Grosso State, were contaminated by black leaf streak. That author concluded that probably the disease must have been vehiculated through infected seedlings because the official epidemiological survey showed that all contaminated properties received seedlings both from properties located in Confresa county, Mato Grosso State, and from Mato Grosso State Secretariat of Agriculture. It was possible to

conclude that actually infected seedlings distributed in the *M. fijiensis* free area were responsible for the introduction of this fungus into Canabrava do Norte, Confresa, Porto Alegre do Norte, and São José do Xingu, assuming that: (i) these counties composed a *M. fijiensis* free area recognized by the Ministry of Agriculture, Livestock, and Food Supply in 2008; (ii) these counties were surveyed each three months, but they became contaminated by *M. fijiensis* in 2013, simultaneously; and (iii) Silva (2013) recorded that in Confresa county black leaf streak dispersal occurred from the outbreak to properties until the radius of 30 km and the major concentration of dispersal was verified at the radius of 10 km from the outbreak (Figure 3).



Figure 2. Banana leaf infected by *Mycosphaerella fijiensis*.

CONCLUSION

The dispersal of *M. fijiensis* throughout both time and space showed to be random in Mato

Grosso State and its counties, except among some counties adjacent each other, which can be explained by the movement of infected banana seedlings.

RESUMO: O fungo *Micosphaerella fijiensis*, agente causal da Sigatoka Negra, é uma praga quarentenária presente, que ocorre no estado de Mato Grosso, desde 1999, e exige adoção de medidas fitossanitárias, inclusive levantamentos de detecção. O objetivo deste trabalho foi avaliar a disseminação de *M. fijiensis*, em Mato Grosso, durante o período de 1999 a 2013, já que a Sigatoka Negra foi levantada em todas as regiões de Mato Grosso, periodicamente, conforme as normas do Ministério da Agricultura, Pecuária e Abastecimento. Determinou-se o ano ou o período em que o fungo *M. fijiensis* foi introduzido nos municípios, considerando-se o ano de detecção do primeiro foco e o levantamento anterior, resultando na seguinte constatação: (2001 a 2003 – Nova Bandeirantes e Paranaíta); (2001 a 2004 – Barra do Bugres e Gaúcha do Norte); (2001 a 2005 – Paranatinga); (2002 a 2004 – Porto Estrela, Santo Afonso e Tangará da Serra); (2002 a 2005 – Rosário Oeste); (2004 – Acorizal, Guarantã do Norte e Sinop); (2004 a 2005 – Sapezal); (2005 – Campos de Júlio, Nova Maringá, Poxoréu e Sorriso); (2005 a 2006 – Marcelândia e Matupá); (2007 – Água Boa, Barra do Garças, Campinápolis, General Carneiro, Novo São Joaquim e Pedra Preta); (2013 – Canabrava do Norte, Confresa, Porto Alegre do Norte e São José do Xingu). A dispersão desta praga, no tempo e no espaço, mostrou-se aleatória, exceto entre alguns municípios adjacentes entre si, fato que pode ser explicado pelo trânsito de mudas de bananeira contaminadas.

PALAVRAS-CHAVE: Praga quarentenária presente. Banana. Disseminação. *Mycosphaerella fijiensis*.

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