

Varietal Screening of Some *Musa* Cultivars for Susceptibility to the Banana Borer Weevil

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ABSTRACT

In field trials a total of 52 varieties of *Musaceae* were tested for banana borer weevil (*Cosmopolites sordidus*) damage by assessing the corm for galleries. Of the varieties tested, AAB plantains as a group showed the highest susceptibility, AAA bananas generally escaped attack. The susceptibility of varieties belonging to more unusual subgroups tended to be midway between these two extremes.

KEYWORDS

Cosmopolites sordidus, *Musaceae*, varieties, susceptibility to infection, infestation, testing.

Criblage variétal de quelques cultivars de Musacées pour leur sensibilité au charançon des bananiers.

RÉSUMÉ

Une expérimentation a été conduite en plein champ sur 52 cultivars de Musacées en vue d'étudier leur comportement vis-à-vis du charançon noir des bananiers (*Cosmopolites sordidus*). L'observation des galeries dans le bulbe a mis en évidence un niveau de sensibilité plus élevé pour les plantains AAB que pour les AAA qui étaient généralement très faiblement attaqués. Les cultivars appartenant à des sous groupes peu communs ont montré des degrés de sensibilité intermédiaires entre les deux extrêmes.

MOTS CLÉS

Cosmopolites sordidus, *Musaceae*, variété, sensibilité aux maladies, infestation, testage.

Clasificación por variedades de algunas razas de Musáceas según su sensibilidad al gorgojo de los plátanos tropicales.

RESUMEN

Se condujo una experimentación en campo raso sobre 52 variedades de Musáceas con miras a estudiar su comportamiento frente al gorgojo negro de los plátanos tropicales (*Cosmopolites sordidus*). La observación de las galerías del bulbo puso de manifiesto un nivel de sensibilidad más elevado en los plátanos AAB que en los AAA los cuales eran, por lo general, atacados levemente. Las variedades pertenecientes a sub-grupos poco comunes revelaron grados de sensibilidad intermedios entre los dos extremos.

PALABRAS CLAVES

Cosmopolites sordidus, *Musaceae*, variedades, susceptibilidad a infecciones, infestacion, ensayo.

● ● ● ● introduction

In *Musa*, the search for tolerance and resistance to the banana borer weevil, *Cosmopolites sordidus* (GERMAR, 1824), is a priority for controlling and managing this pest, particularly in the context of low input/resource poor agriculture (INIBAP, 1988). Such research must consider both the varieties grown in a region and possible geographical differences between weevil populations. The Centre Regional Bananiers et Plantains at Njombe, Cameroon, has one of the world's major collections of *Musa*, particularly AAB plantains for which western Africa is noted (INIBAP/IBPGR, 1990). Following extensive reorganization of the collection, fifty accessions were able to furnish sufficient material (suckers) for experimental purposes in addition to the readily available AAA Cavendish varieties Poyo and Grande Naine. Two field trials were set up to assess varietal differences between these varieties in their resistance and tolerance to *C. sordidus*.

● ● ● ● materials and methods

This work was conducted at the (former) I.R.A. Njombe Station, Littoral Province, Cameroon (humid lowland tropical zone) in an area of rich volcanic soil that had been planted with Poyo banana (AAA Cavendish) for four years previously and was naturally infested with *C. sordidus*. For ease of management, two identical trials (trials 1 and 2) were set up, each consisting of 27 varieties, 25 varieties plus Poyo and Grande Naine as reference varieties.

Each trial was set up with planting in a randomized complete block design of eight replicates, with each plot consisting of a single plant, and each variety representing a treatment. Planting was in rows 3.2 m x 1.55 m and a single outside border of Poyo surrounded the trial area.

Test plants were set out in April 1989. No nematicides or insecticides were applied, aerial spraying against black Sigatoka

(*Mycosphaerella fijiensis*) was carried out as necessary. Limited irrigation was supplied during the dry season.

In November 1990, the test plants were examined for weevil attack. Assessment was carried out according to the system of VILARDEBO (1973). For each plot (variety), a single corm of a mature or recently harvested stem was examined and the borer coefficient (the "note d'infestation" of VILARDEBO) was obtained; if no stem fulfilling this criterion was available, a missing value was recorded.

The test data were assessed with an analysis of variance using GENSTAT (GENSTAT, 1987) and Duncan's multiple range test (DMR).

● ● ● ● results

The results are presented in Tables 1 and 2. The mean borer coefficient values (MBC) varied widely between varieties, from 0 indicating no observed corm damage to 32.3 for variety Corne #5 and 28.4 for Obel, the varieties showing the highest degree of infestation in trials 1 and 2 respectively. There were statistically significant differences between individual varieties and the DMR test classified the results in broad groups. All AAB plantain varieties showed susceptibility, as measured by MBC, and of the 10 most attacked varieties in each trial 7 varieties in Trial 1 and 9 in Trial 2 were AAB plantain varieties. By contrast, AAA banana varieties, including the commercially grown Cavendish varieties tested, generally escaped attack, thus indicating a degree of resistance.

● ● ● ● discussion

The major feature of these results was the high susceptibility of AAB plantains to *C. sordidus*. This agrees with field experience (SIMMONDS, 1966), and the present results confirmed these long held opinions in a statistically rigorous manner. The range of MBC values recorded for AAB plantains in this study closely corre-

sponded to the results of a previous study in Côte d'Ivoire (KEHE, 1988).

Other published work describes the genomic variability existing within *Musa* varieties to *C. sordidus*, although this is believed to be the first study carried out on this scale in Africa. IRIZZARY *et al.* (1988) found five AAB Laknao clones to be significantly less susceptible to *C. sordidus* than two commercially grown Horn-type plantain cultivars in a study carried out in Puerto Rico. Our results showed the variety Laknao to be less susceptible to *C. sordidus* than most of the closely related AAB plantain varieties screened, although considerably more susceptible than many of the other varieties evaluated. In Brazil, MESQUITA and CALDAS (1986) found the AAB French plantain variety Terra to be a better host for *C. sordidus* than some AAB Pome varieties examined. In the present study, the AAB Pome variety Foconah was one of only two AAB varieties to escape weevil attack, the other being the Indian AAB variety Rajapuri India.

In the present study, the ABB Bluggoe varieties evaluated were less attacked than the AABs tested. A similar situation has been reported by HADDAD *et al.* (1980) in Venezuela. By contrast, in India, VISWANATH (1981) found the ABB varieties screened to be better hosts to *C. sordidus* than the AAB varieties he used. The ABB group is predominately Indian or Asian and geographical variations in weevil populations and host preferences as well as host genomic variability could partially explain these differences.

The AAA Bananas screened generally showed low susceptibility to *C. sordidus*, which closely agrees with both the results of HADDAD *et al.* (1980) and the host ranking given by VISWANATH (1981). Within the AAAs, the East-Central African Cooking Bananas of the Mutika-Lujugira subgroup showed susceptibility (Table 1). Interestingly, SIKORA *et al.* (1989), from the results of a limited study conducted during survey work in Tanzania, suggested that the Cooking varieties examined showed greater susceptibility to *C. sordidus* than Brewing and Dessert types, but no varietal identifications were given. The *Musa* species included in the trials gener-

Table 1
Mean Borer Coefficient estimates for a range of *Musa* species and varieties: Field Trial 1. Njombe, Cameroon, 1990.

Variety	subgroup	genome	MBC	DMR
Corne #5	Plantain (FH)	AAB	32.3	a
Popoulou	Popoulou	AAB	26.1	a b
French Sombre	Plantain (F)	AAB	25.6	a b
Figue Pomme Adju	Mutika-Lujugira	AAA	23.7	a b c
Ebang	Plantain (FH)	AAB	22.0	a b c d e
Madre del Platano	Plantain (F)	AAB	11.6	b c d e
French Clair	Plantain (F)	AAB	11.3	b c d e
Laknao	Laknao	AAB	9.0	b c d e
Poyo	Cavendish	AAA	5.0	c d e
Mujuba	Mutika-Lujugira	AAA	5.0	c d e
Corne Type	Plantain (FH)	AAB	4.8	c d e
Bluggoe I	Bluggoe	ABB	4.4	c d e
Pelipita	Pelipita	ABB	3.1	d e
Batard	Plantain (FH)	AAB	3.1	d e
<i>M. basjoo</i>			2.9	d e
Americani	Cavendish	AAA	1.9	e
Grande Naine	Cavendish	AAA	1.9	e
<i>M. laterita</i>			1.0	e
<i>M. coccinia</i>			0.2	e
<i>M. balbisiana</i> (Cameroon)		0.0		e
<i>M. acuminata</i> Type II			0.0	e
<i>M. textilis</i>			0.0	e
Gros Michel	Gros Michel	AAA	0.0	e
Yangambi Km. 17	Ibota	AAA	0.0	e
1877		AAAA	0.0	e
Figue Sucrée		AA	0.0	e
Rajapuri India	Nendra Paclaththi	AAB	0.0	e

L.S.D. (5%) = 16.5

MBC = mean borer coefficient. Numbers followed by the same letter are not significantly different according to Duncan's multiple range test (DMR). For AAB plantains: F = French, FH = False Horn, H = Horn.

Table 2

Mean Borer Coefficient estimates for a range of *Musa* species and varieties: Field Trial 2. Njombe, Cameroon, 1990.

Variety	subgroup	genome	MBC	DMR
Obel	Plantain (F)	AAB	28.4	a
1-hand Planty	Plantain (H)	AAB	24.4	a b
Guyod		AA	21.8	a b c
Plantain #2	Plantain (F)	AAB	21.1	a b c d
Big Ebanga	Plantain (FH)	AAB	15.6	a b c d
Mouhouroukou #3	Plantain (FH)	AAB	14.2	a b c d
Esang	Plantain (FH)	AAB	11.2	a b c d
Mbotoko	Plantain (F)	AAB	11.1	a b c d
Psi-Psi	Plantain (F)	AAB	7.3	a b c d
Plantain #17	Plantain (FH)	AAB	5.0	b c d
Kedong Kekang	Plantain (F)	AAB	1.3	c d
Pisang Kelat	Pisang Kelat	AAB	1.2	c d
Lacatan	Cavendish	AAA	0.6	c d
Figue Rose	Red	AAA	0.0	d
Maneah	Cavendish	AAA	0.0	d
Williams	Cavendish	AAA	0.0	d
Pisang Papan	Undetermined	AAA	0.0	d
Pisang Trimulin		AA	0.0	d
Thong Dok Mak		AA	0.0	d
Foconah	Pome	AAB	0.0	d
<i>A. burmanica</i>	Type Calcutta 4		0.0	d
Christine	Bluggoe	ABB	0.0	d
Cachaco	Bluggoe	ABB	0.0	d
Safet Velchi		AB	0.0	d
Figue Pomme d'Ekona	Silk	AAB	0.0	d
Grande Naine	Cavendish	AAA	0.0	d
Poyo	Cavendish	AAA	0.0	d

L.S.D. (5%) = 18.0

MBC = mean borer coefficient. Numbers followed by the same letter are not significantly different according to Duncan's multiple range test (DMR). For AAB plantains: F = French, FH = False Horn, H = Horn.

ally escaped pest attack, even from *M. acuminata* and *M. balbisiana* (Table 1), which conflicts with observations reported by SIMMONDS (1966) and reflected in the results of VISWANATH (1981), where *acuminata* was susceptible and *balbisiana* resistant to *C. sordidus*.

A shortcoming of the present study is the lack of information on the field population of weevils, as would be obtained by trapping adults for instance. VILARDEBO (1973) describes the relationship between trapping data and MBC and results published by HADDAD *et al.* (1980) provide similar indications. Such relationships would doubtless vary with the variety grown, possible geographic differences in weevil populations and ecological and cultural conditions. ZEM *et al.* (1978), in screening 19 *Musa* cultivars against *C. sordidus*, found few significant inter-varietal differences and no differences between *Musa* sub-groups. Most of the MBC values they reported are much higher than those presented here. Possibly higher weevil populations and greater pathogen pressure were swamping and obscuring potential differences. We suggest that in any coordinated programme of variety testing, a certified system for evaluating weevil populations, such as a standard pseudostem trapping technique using a common certified variety, be implemented to allow comparisons between results. ●

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