and Gowen (1995) studied the pathogenicity for maize and plantain of four isolates of *R. similis* from Africa and Asia. The CMS maize cultivar used was found to be an excellent host for this nematode. However, the number of the CMS maize used was not specified.
The nematode counts also showed the existence of significant populations of *Meloidogyne* spp. in the roots of the plantains. It would be desirable to examine the impact of the species on plantain accessions and define the nuisance threshold.

Conclusions

This study performed on plantain cropping cycle showed the economic benefit of combining the cultivation of CMS 8704 hybrid maize and 'French Sombre' plantain (EAR>1). With regard to plant health, it is noted that maize does not seem to be a host for the nematode *R. similis*. These results obtained for only one plant cycle must be confirmed since small quantities of the nematode were observed in maize roots after three months of vegetative growth of plantain. The behaviour of this hybrid maize with regard to *R. similis* should also be investigated by growing it in infested soil where the risk of root infestation is greater. The study did not reveal a significant effect of the presence of maize on plantain yield. With regard to the density of the two crops, it was observed that the sowing of two rows of maize between plantains planted at the classic spacing of 3m x 2m in the early stage of the vegetative growth of the latter gives the highest productivity with an equivalent area ratio of 1.74. Increasing plantain spacing to enhance the growth of maize results in a low return for the farmer even though it is possible to grow more than two maize crops between the rows of plantain. These results should nevertheless be confirmed by subsequent studies on different maize varieties and on more than one cycle of plantain using healthy plant material (grown using *in vitro* culture) on cleansed soil (fallow).

Acknowledgements

The author thanks Dr R. Fogain, head of the CRBP nematology/entomology laboratory for performing the nematological analyses. ■

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A gold star for FHIA-01

Agronomic evaluation and Fusarium wilt resistance of the hybrids FHIA-01 and FHIA-03 in Burundi

Ndungo Vigheri

Introduced in Burundi within the framework of the International *Musa* Testing Programme (IMTP I), the tetraploid hybrids FHIA-01 et FHIA-03 confirmed their partial resistance to black Sigatoka (*Mycosphaerella fijiensis*) in a varietal trial at Mageyo at an elevation of 1,250m.

According to the results obtained in Honduras and Australia, FHIA-01 ('Goldfinger') is resistant to races 1 and 4 of Fusarium wilt (*Fusarium oxysporum* f. sp. *cubense*), displays resistance to burrowing nematodes and is appreciated as a dessert banana. It is both resistant to black Sigatoka and drought-tolerant (Rowe 1990; Rowe & Rosales 1993a, b, c; Daniells *et al.* 1995).

This article provides preliminary results concerning the resistance of FHIA-01 and FHIA-03 to wilt and their agronomic characteristics at different evaluation sites in Burundi.

Agronomic evaluation

The characteristics of the hybrids FHIA-01 and FHIA-03 are compared with those of the highland cooking banana Nyakitengwa (AAA-Mutika) tested at Cibitoke, Burundi, in soil not infested by wilt (Table 1). The site is at an elevation of 850 m north of lake Tanganyika, where the two tetraploids also displayed partial resistance to black Sigatoka.

Plant height of the hybrids FHIA-01 and FHIA-03 is 15% less than the reference cultivar 'Nyakitengwa'. The hybrids are robust, which is an important advantage in East Africa where bananas are often grown on slopes in hilly country. At Cibitoke, the two tetraploids gave heavier bunches than 'Nyakitengwa'. This difference was also observed in medium fertile soil (at Mageyo). In contrast, at Mashitsi (elevation 1,650 m) in relatively poor soil, the tetraploids produced bunches weighing some 15 kg, which is fairly similar to the bunch weight of highland bananas.

Fusarium wilt resistance of FHIA-01 and FHIA-03

The hybrids FHIA-01 and FHIA-03 were evaluated in the Moso region (Burundi) at an elevation of 1,200 m, where the cultivar 'Kayinja' (ABB-'Pisang Awak') is seriously attacked by wilt. External and internal symptoms were observed respectively during plant growth and at maturity using the scoring method proposed by INIBAP (Jones 1994):

External symptoms:

- 0 : no yellowing, plants in good health,
- 1 : slight yellowing limited to lower leaves,
- 2 : yellowing spread to upper leaves,
- 3 : severe symptoms and death of the plant.

Internal symptoms:

- 0 : corm completely clean,
- 1 : isolated points of discoloration,
- 2 : discoloration of up to 1/3 of vascular tissue,
- 3 : discoloration of between 1/3 and 2/3 of vascular tissue,
- 4 : discoloration of between 2/3 and 3/4 of vascular tissue,
- 5 : total discoloration of vascular tissue.

The scores for the hybrids and controls are shown in Table 2.

FHIA-03 is very susceptible to Fusarium wilt in the Moso region,

Table 1 Agronomic evaluation of FHIA-01 and FHIA-03 at Cibitoke

Cultivar	Height of pseudostem	Neck girth	Girth at 1 m (cm)	Plantation to harvest time (months)	Finger. Length (cm)	Finger Diameter (cm)	Bunch weight (kg)
FHIA-01	2.75	82	53	13.2	15.5	13.0	24.0
FHIA-03	2.95	95	65	12.8	17.5	14.0	26.5
Nyakitengwa	3.29	72	45	16.1	14.5	11.5	14.0

Table 2. Degree of susceptibility to Fusarium wilt of FHIA-01 and FHIA-03 in the Moso region

Genotype	Genome group	External symptoms	Internal synptoms
FHIA-01	AAAB	0.0	0.2
FHIA-03	AABB	2.3	4.5
Pisang Awak ('Kayinja')	ABB	3.0	5.0
Gros Michel (race 1)	AAA	2.5	4.2
Bluggoe (race 2)	ABB	2.4	4.0

where the cultivars that indicate the presence of races 1 and 2 are also susceptible. The yield of FHIA-03 decreased by half during the first vegetation cycle and was practically nil from the second cycle onwards. This variety should be proposed in Fusarium-free regions where it produces very large bunches (Table 1). FHIA-01 is resistant to Fusarium wilt and can usefully replace 'Pisang Awak' in regions in which the disease is present. ■

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FHIA-01 and FHIA-03: an alternative for making banana beer

In parallel with the agronomic evaluation, the hybrids FHIA-01 and FHIA-03 were tested for the manufacture of banana beer, a very popular beverage throughout East Africa.

After the classic juice extraction operations, it was found that the two hybrids gave good quality juice. Water is added and then roasted, crushed sorghum is sprinkled on the preparation. The beer is ready after two days of fermentation. Beer made with FHIA-01 is of the highest quality and comparable with that of 'Kayinja' (Pisang Awak), whereas FHIA-03 gives a third grade beer, comparable with that made from 'Igitsiri' (AAA-EA). This grading is performed according to the taste of the beer on the second day of fermentation and the fermentation rate, which governs the speed of deterioration of the beverage. Beer made from FHIA-01 is drinkable for 7 days whereas that made from FHIA-03 deteriorates after 5 days.

In Burundi, where the cultivar 'Kayinja'–the favourite for making banana beer–is susceptible to Fusarium wilt, the hybrid FHIA-01 is resistant to the disease and is an excellent alternative for the production of banana beer.

East Africa

The role of banana in the functioning of farms on the high plateaux in East Africa: application to the case of the Kirimiro region of Burundi

The highland bananas found in particular in the high plateaux in Africa have been little studied in the past. The great majority belong to the *Musa acuminata* AAA-EA triploid group and form a subgroup specific to East Africa. The Kirimiro central plateau region was chosen for the study of the crop under the sustainable management conditions of traditional farms based on better understanding of the processes that govern soil-plant relations.

The region is representative of the East African high plateaux through its climate (elevation 1,600 - 1,900 m, annual average precipitation approximately 1,100 mm, average annual temperature 17 to 20˚C). It is also very densely populated (from 500 to over 1,000 persons per km2), has soil with a low production potential, high risk of water erosion (erosivity > 450, slope index sometimes in excess of 5.5) and is much used for banana growing. The study consisted of surveys of 40 farms and a series of research station experiments (7 erosion plots and 52 agronomic fields in random blocks with 4 replicates).

The surveys show that the Kirimiro region is characterised by farms whose area is less than 50 ares in 30% of cases, a very low level of productivity and very limited investment capacity. Farms are organised in 5 fields