

Research Application Summary

**Biotic constraints to banana production in Eastern and Central Provinces of Kenya**

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**Abstract**

Banana is an important crop whose production faces major challenges, especially pests and diseases. A banana pests survey was carried out in Eastern and Central Provinces of Kenya. Results showed Fusarium wilt as the most widespread disease, especially where variety Gros Michel dominated. Sigatoka, cigar end rot and Armillaria corm rot appeared not to significantly reduce yields. A new potentially devastating disease was observed and is under investigation. Weevils and nematode effects were observed, but most farmers were probably not aware of their impacts. Use of uncertified seedlings is a major factor in spreading these pests and pathogens.

Key words: Bananas, diseases, pests

**Résumé**

La banane est une culture importante dont la production fait face à des défis majeurs, notamment les ravageurs et les maladies. Une enquête sur les parasites de banane a été réalisée dans les provinces de l'Est et du Centre du Kenya. Les résultats ont montré la fusariose que la maladie est la plus répandue, en particulier où la variété Gros Michel dominée. Cercosporiose, la pourriture du bout de cigare et la pourriture du bulbe Armillaria ne semble pas réduire de manière significative les rendements. Une nouvelle maladie potentiellement dévastatrice a été observée et est sous enquête. Les effets de charançons et de nématodes ont été observés, mais la plupart d'agriculteurs ne sont probablement pas conscients de leurs impacts. L'utilisation de plants certifiés est un facteur majeur dans la propagation de ces ravageurs et agents pathogènes.

Mots clés: Banane, les maladies, les ravageurs

**Background**

Bananas are the world's fourth most important crop after rice, wheat and maize (INIBAP, 2000). Over the recent past, production of bananas has been unstable in Kenya mainly due to constraints caused by pests and diseases. This survey was

aimed at assessing the current status of banana pests and diseases in the country.

### Literature Summary

Banana fruit can be eaten raw or cooked; the trunk and leaves can be fed on livestock while there are other uses including wrapping food, thatching and making ropes and mats (Nelson *et al.*, 2006; Pillay and Tripathi, 2007). Pests and diseases can reduce yield of bananas by up to 100% depending on pathogen, while quality is also compromised (Jones, 2000). The most common diseases of bananas are caused by fungi, bacteria and viruses (Ploetz, 1993; Jones, 2000). Fusarium wilt (Panama disease) is the most destructive disease of bananas in the world, affecting mostly the desert varieties (KARI, 2005). The weevil, *Cosmopolites sordidus* is the most important insect pest of banana and plantain. Affected plants suffer retarded and stunted growth, leaf drop and reduced bunch size, and the number and vigor of suckers is reduced (Mwangi, 2007). Nematodes affect the roots reducing the uptake of water and minerals. Previous research has indicated that planting infected seedlings is one of the major pests and pathogen dissemination pathways.

### Research Approach

A pest and disease assessment survey was carried out in July 2010 in eight key banana producing districts in Eastern and Central provinces of Kenya. Orchards with a minimum of 100 stools were sampled randomly at an average spacing of 4 km along major roads. Data were obtained through a questionnaire administered to farmers and observations made during a transect walk through each orchard. A photocard was used to help farmers in identifying pests and diseases present or encountered in the recent past. Samples of diseased plant parts were collected for isolation and identification of pathogens. Agronomic practices were documented to assess the factors that favoured disease spread.

### Research Application

The results showed that Fusarium wilt was the most devastating disease of bananas in Eastern and Central Kenya with incidence reaching >80% especially in areas where the highly susceptible variety Gros Michel was dominant. In other areas Fusarium wilt incidence varied depending on orchard management, especially water and manure application. Black leaf sigatoka, though widespread, did not appear to significantly reduce yield. Cigar end rot and Armillaria corm rot had limited occurrence while weevils and nematodes were reported to be of concern in some areas. Planting of infected seedlings was the major disease spread mechanism. Inappropriate agronomic practices, e.g.

regular pruning and desuckering without disinfection of tools, and lack of knowledge on the disease and its management also seemed to increase spread. Improving access to healthy banana seedlings, preferably of resistant cultivars, is proposed as an effective pests and disease control measure. The information obtained from this study will be used in an ongoing project to improve the protocols for propagating healthy banana seedlings using macropropagation technology.

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### References

- INIBAP, 2000. Bananas. International Network for the Improvement of Banana and Plantain, International Plant Genetic Resource Institute.
- Jones, D.R. 2000. Diseases of banana, abaca and enset. CABI, London, UK.
- Kenya Agricultural Research Institute, 2005. Panama disease: Enemy of banana production. [www.kari.org/fileadmin/.../Legume.../PanamaDisease\\_020506](http://www.kari.org/fileadmin/.../Legume.../PanamaDisease_020506).
- Mwangi, 2007. Responding to banana *Xanthomonas* wilt amidst multiple pathogens and pests. A crop crisis control project brief. International Institute of Tropical Agriculture (IITA). Kampala, Uganda.
- Nelson, S.C., Ploetz, R.C. and Kepler, A.K. 2006. *Musa* species (bananas and plantains). In: Elevitch, C.R. (Ed.). Species Profiles for Pacific Island Agroforestry. Permanent Agricultural Resources, Honolulu Hawaii'i
- Pillay, M. and Tripathi, L. 2007. Banana. Chapter 15. In: Kole, C. (Ed.). Genome Mapping and Molecular Breeding in Plants. Volume 4 Fruits and Nuts. Springer-Verlag, Berlin pp. 281-301.
- Ploetz, R.C. 1993. Fusarium wilt of banana. APS press, St. Paul, US.