Winners of Session 2

R.A. Zorilla, T.O. Dizon, D.C. Pantastico, J.I. Orajay, F.S. de la Cruz Jr., I. Van den Bergh and D. de Waele for *Survey of nematodes in Quezon province, Philippines*

A. Belgrove, B. Nel and A. Viljoen for *Characterization of fungal endophytes as possible biological control agents against* Fusarium oxysporum *f.sp.* cubense

M.A. Jimenez, J. Bermeo, M. Jama, L.Perez and R. Maribona for *Sensibility of* Mycosphaerella fijiensis *populations to triazole and strobilurin fungicides in Ecuador*

Winners of Session 3

M. Onyango, F. Nguthi, J. Mutisya and F. Muniu for *Characterization of banana cultivars, production practices and constraints of production for farmers in banana growing areas of Kenya*

Babita Jhurree-Dussoruth for *Evaluation of `Petite naine' in Mauritius*

Nor Aini M. Fadzillah, Intan Nasrah Omar Shukri, Siti Khalijah Daud and Zakaria Wahab for *Aluminium toxicity induces lipid peroxidation and affects antioxidant enzyme activities in cultivars of* Musa *sp.*

Winners of Session 4

Che Rahani Zakaria and Rahil Mohd for *Development of fruit rolls from banana*

Sam Zainun Che Ahamad for *Quality of frozen breaded banana*

K.P. Baiyeri for *Moisture level of plant residues used as storage media influenced post harvest behaviour of mature plantains*

An outbreak of banana xanthomonas wilt *(Xanthomonas campestris* pv. *musacearum)* in the Democratic Republic of Congo

In January 2004, following a request from FAO Goma, the first author accompanied local agricultural officers on a visit to the Masisi region, North Kivu province, in order to investigate a banana disease (Ndungo and Kijana 2004). These initial observations suggested that the disease might be bacterial wilt caused by *Xanthomonas campestris* pv. *musacearum*, which has recently been reported in Uganda (Tushemereirwe *et al*. 2003). Subsequent visits were made in May and August 2004 and this report confirms the earlier diagnosis.

Local farmers first observed the disease in 2001 at Bashali Mokoto village, 72 km northwest of Goma in North Kivu (Figure 1). The altitude at the site ranges between 1700 and 1740 m. The varieties grown include 'Pisang awak' (ABB) (90% of all bananas), beer and cooking East African highland bananas (AAA), the dessert bananas 'SukariNdizi' (AAB) and Cavendish (AAA), and plantains (AAB) (Ndungo 2004). As in Uganda, all banana genotypes are affected but 'Pisang awak' seems to be the first to get infected and the Cavendish varieties last, after the matooke and beer clones.

The symptoms were similar to those observed in Uganda (Tushemereirwe *et al.* 2003) but tended to be more severe. These include progressive yellowing, wilting and blackening of leaves, as if scorched by fire. Internally, yellow or brown vascular streaks were seen throughout the plant and pockets of pale yellow bacterial ooze were especially prominent in airspaces at the leaf base of the pseudostem. Premature ripening and internal discoloration of fruits was observed, as was blackening and shrivelling of the male bud. The latter, however, was much less common than what has been observed on the same varieties in Uganda, where in newly affected areas the first symptoms were often seen on the flowers. Using methods described by Tushemereirwe *et al*. (2003), the bacteria isolated at CABI Bioscience were indistinguishable from the *X. campestris* pv. *musacearum* samples from Uganda. The isolates caused rapid wilting following inoculation into young banana plants.

As in Uganda, the disease was first reported in 2001 but the situation in the Democratic Republic of Congo is different. Contrary to the situation in Uganda, where the disease has spread at the average alarming rate of 75 km per year, probably by insects visiting the male buds, the disease in DRC has spread very slowly, from an initial

site of a few plants in one village (Bwere hill) to a radius of approximately 10 km. Towards the centre of this area the yield is almost reduced to zero, which has an alarming impact on food security. Many bananas continue to produce suckers but these are invariably infected from the motherplant and rarely flower (Ndungo and Kijana 2004). The disease is also more intense close to five small lakes. The first and second authors have recently observed a new disease focus about 20 km from the first one, so continued vigilance and control actions are necessary. Infected flowers are much less common and it appears that the principal mode of spread may differ from the one in Uganda. In DRC, control will be more a matter of trying to eradicate the disease and cleaning up infected fields rather than removing male buds to prevent insect transmission.

It is impossible to ascertain the origin of the outbreak. One hypothesis is that the disease has recently spread from wild enset plants, which are found on nearby hillsides and swampy areas. It may thus be prudent to destroy enset plants in the immediate vicinity of cultivated bananas and the presence of the disease in enset should be investigated. Apart from enset, no other alternative host has been demonstrated so far. It is possible that the bacteria can infect other closely related species (such as Zingiberaceae, Marantaceae and Cannaceae) but so far there is no evidence that this occurs in nature, and even if it does, it may not be important for the spread of the disease.

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Bacterial wilt (*Xanthomonas campestris* pv. *musacearum*) on enset and banana in Ethiopia

Enset (*Ensete ventricosum*) is a staple food for over 12 million people in the southern highland areas of Ethiopia. It grows best at altitudes ranging from 2000 to 2700 m (Brandt *et al.* 1997). Enset bacterial wilt was first reported in Ethiopia by Yirgou and Bradbury (1968) and is currently found in all the enset growing regions and on wild enset plants, although it has not been reported on enset in other countries. It is mainly spread through infected farm tools, infected planting material, repeated transplanting that damage the corm and roots, animals fed infected plants and possibly insects feeding on the foliage. Since cultivated enset is harvested for its starchy pseudostem and corm, it is not normally allowed to flower. As a result, the question of insects infecting flowers does not normally arise, but symptoms typical of insect transmission have been observed on banana flowers (Yirgou and Bradbury 1974).

An enset and banana pest and disease survey, funded by the Flemish Association for Development, Co-operation and Technical Assistance (VVOB), has recently been conducted in the main enset and banana growing regions. The largest banana producing area is located at Arba Minch in southern Ethiopia (1200 m) (Figure 1). This area is geographically separated from the wetter highland areas where enset is grown. No banana bacterial wilt has been reported so far in this area.

The second banana growing area is located in western Ethiopia and most of the bananas are found between 1050 and 1700 m (Figure 1). Distances of over 100 meters between plots are very common. Although it is not the main crop, enset is also grown in this area and enset bacterial wilt is present. Most farmers indicated that the disease (locally called cholera) has been present on enset and banana for some 20 years. The varieties grown in this region are 'Kenya' ('Dwarf Cavendish'), 'Faranji muz' ('Pisang awak'), 'Abesha muz' (a matooke