Variation factors of bananas susceptibility to crown rot in Cameroon

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Introduction

Figure 1: Superficial infection

In Cameroon, the main quality defects affecting bananas exported towards Europe are related to crown rot of bananas, a post-harvest disease. When harvest, crown are healthy, but after few days of shipment, the fungal infection develops superficially and internally affecting the crowns, then pedicels and ultimately the banana pulp (Figure 1 & 2). This post-harvest disease is caused by a broad unspecific and opportunist parasitic complex. Within this complex, *Colletotrichum musae* is the most pathogenic species. Clusters formation in the packing station involve cut sections that are ways of penetration for pathogens. Fruits contamination can occur within the field, but mainly occurs in the washing tanks in the packing station. Chemical control currently performed is not satisfactory and has to face with: (i) fungicide resistance occuring in fungal populations, (ii) the presence of fungicides residues in fruits skin, (iii) environmental contamination with fungicide mixtures rejected in packing stations.

Figure 2: Infected clusters

The aim of this study was to evaluate whether production zones and seasonal variations of the year had an influence on the susceptibility of bananas to crown rot

Materials and methods

Two plots of different altitude Ekona (500m, average temperature 22° C) and Dia-dia (80m, average temperature 27° C) were selected. The susceptibility of bananas (*Musa acuminata*, AAA, subgroup Cavendish, cv. Grande-Naine) to crown rot was evaluated through the artificial inoculation of clusters with *Colletotrichum musae* (10^4 conidia/ml).

Figure 3: Pathogen inoculation

During 12 months, 15 bananas trees were harvested monthly in each banana locations. In the laboratory, for each banana tree, 3 clusters consisting of four bananas fruit were cut out from hand n° 2. Once latex run out, the crowns were surface sterilized with alcohol 50%. A droplet of 50 µl of a conidial suspension was then deposited at the top of the crown. A sterilized square filter paper was placed on the droplet in order to maintain the inoculum in place (Figure 3). Fruits were packed in perforated plastic bags, placed in commercial boxes and stored at 13° C for 13 days in order to simulate shipment. The Internal Necrotic Surface (INS) expressed in mm^2 was then evaluated as shown in figure 4. To carry out this evaluation, the clusters of 4 fruits was separate in two parts. The statistical interpretation of the results is based on ANOVA (four ways) and mean separations were calculated by Tukey test at a 5% probability level with Minitab 15.

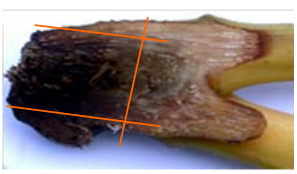

Figure 4: Internal necrotic assessment

Results and discussion

Site influence on banana susceptibility to crown rot

Fruit susceptibility to crown rot is consistently higher in low-altitude Dia-dia plantation than fruit produced in high-altitude Ekona plantation (Figure 5).

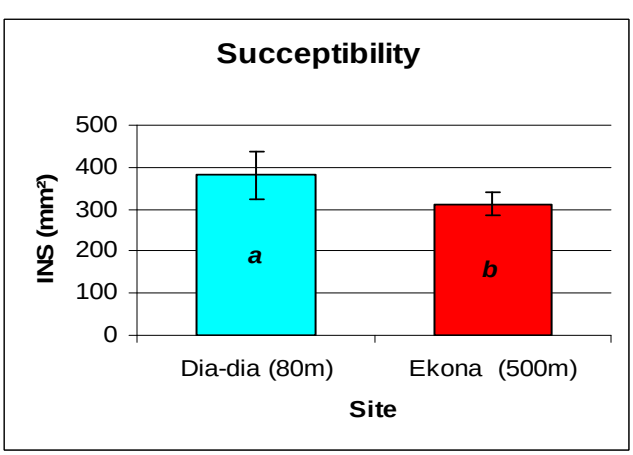

Figure 5: Site variation of the internal necrotic surface (INS) on banana clusters inoculated with a conidial suspension of C. musae (10^4 conidia/ml). Statistically different values of INS are represented with letters a &b). INS mean is the result 1 year assessment, and standard-errors are represented by vertical bars.

Season influence on banana susceptibility to crown rot

Levels of fruits susceptibility to crown rot are high during rainy season compared with dry season in both sites of production especially in low-altitude zone (Figure 6).

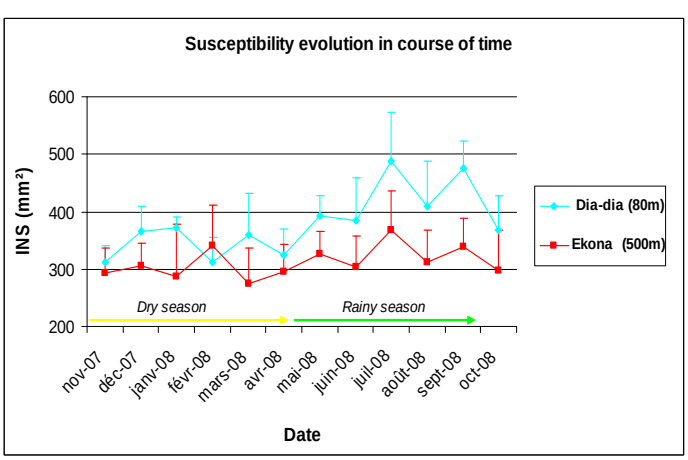

Figure 6: Variation of the internal necrotic surface (INS) on banana clusters inoculated with a conidial suspension of C. musae (10^4 conidia/ml) in the course of time. INS mean is the result 15 replicates and standard-errors are represented by vertical bars.

There is a highly significant site effect ($p<0,000$) and a significant season effect ($p<0,015$) between Dia-dia (80 meter altitude) and Ekona (500 meter altitude). Both site of production and the period of the year have an influence on fruit susceptibility to crown rot. The mechanisms involved in such susceptibility variations of fruits remain unexplained.

Conclusions

These results provided evidence for wide variation in the susceptibility of banana to crown rot as previously reported for fruit susceptibility to wound anthracnose (Chillet *et al.*, 2000). Highland site and dry season seem less favourable to disease severity and can be more adopted for untreated bananas export. This hypothesis must be checked by experiments in many plantation of different altitudes in order to confirm altitude influence.

Acknowledgements and references

The authors wish to thank the Agro-industrials plantations of Cameroon (PHP, CDC Del Monte, SPM) for their collaboration in this project.

❑ **Chillet M., de Lapeyre de Bellaire L., Dorel M., Joas J., Dubois C., Marchal J. and Perrier X. (2000).** Evidence for the variation in susceptibility of bananas to wound anthracnose due to *Colletotrichum musae* and the influence of edaphic conditions. *Scientia Horticulturae*. **86 :** pp. 33-47.