Managing Cassava Diseases Transmitted through Asexual Seed

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INTRODUCTION

Cassava (*Manihot esculenta*) is planted on 18 million hectares in 102 developing countries.

Cassava is an important source of carbohydrates for both humans and animals, and is also used as an industrial raw material.

Propagation is by stem cuttings, which can transmit important diseases such as cassava bacterial blight (*Xanthomonas axonopodis* pv. *manihotis*), root rots (*Phytophthora tropicalis*, *P. drechsleri*, *P. palmivora* and others), and superelongation disease (*Sphaceloma manihoticola*).

Phytophthora Root Rot (PRR)

Cassava Bacterial Blight (CBB)

Superelongation Disease (SED)

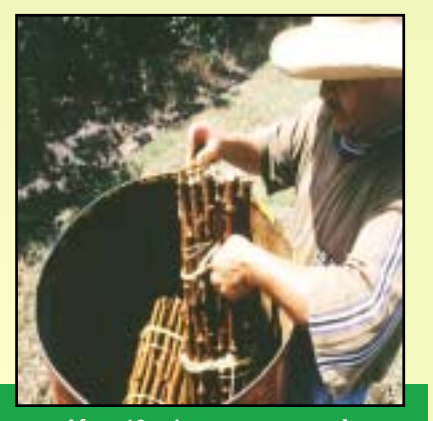
The single most effective control measure is to plant stem cuttings from healthy plants. Several control practices were evaluated for the management of PRR, CBB, and SED in cassava

MATERIALS AND METHODS

On-farm field trials were established in three departments of Colombia to evaluate the effect of three different treatments on the incidence and severity of root rots in harvested roots. Stem cuttings were grouped and submitted to four types of control as follows:

Thermotherapy: Stem cuttings were immersed for 49 minutes in water heated to 49 °C over a wood fire **(Figure 1)**.

Heat water to 49 °C over a wood fire and introduce stem cuttings



After 49 minutes, remove the stems and plant the treated seed

Figure 1. Cassava stem cuttings rustically treated in hot water by farmers to control diseases and pests.

Biological control: Three strains of *Trichoderma* sp. were used to prepare suspensions of 10^6 conidia/mL. Stem cuttings were then inoculated by immersing them in the suspensions for 10 minutes. The suspensions were also applied periodically to the soil near the base of each plant.

Chemical control: Stem cuttings were immersed for 5 minutes to test the effectiveness of suspensions of the following fungicides: copper oxychloride (Oxiclor® 35WP), captan (Orthocide® 50%), metalaxyl (Ridomil®), and benomyl (Benlate®) (3 g/L, commercial product).

No treatment: Traditional farmers' practice.

In the greenhouse two thermotherapy systems were evaluated: immersion of stem cuttings in water at 49 ºC for 49 minutes and immersion at 49 ºC for 5 hours. The day before all stem cuttings had received a pretreatment in water at 49 ºC for 10 minutes.

Stem cuttings of regional cassava varieties were used for all treatments. A randomized complete block experiment design was used.

RESULTS

Immersion of stem cuttings and periodic applications of suspensions of different strains of the biological agent *Trichoderma* increased yields by 11%. *Trichoderma* reduced by 71% the percentage roots affected.

Trial results indicate that heat treatments affected CBB (**Figure 2**) but did not affect germination (data not shown). Temperature is more likely to affect old and/or very thin stem cuttings most. Therefore stem cuttings were successfully protected after immersion in hot water using copper oxychloride or captan. The pretreatment proved beneficial.

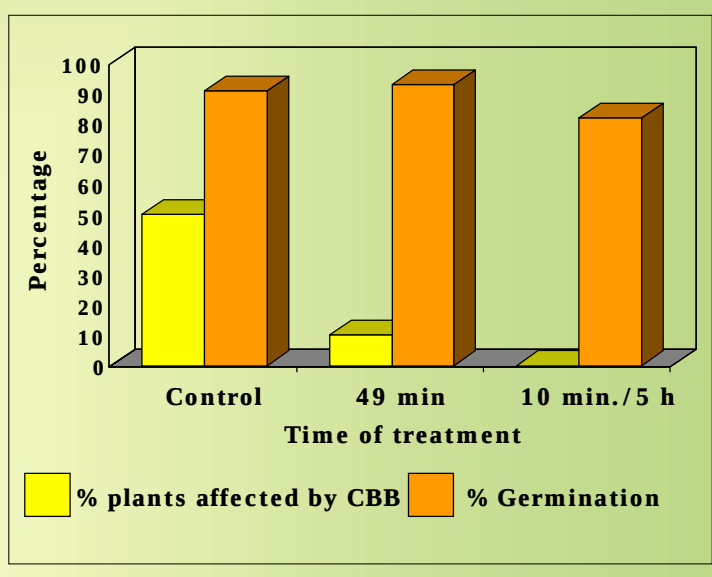


Figure 2. Effective control of CBB in cassava stem cuttings treated with hot water at 49 °C for 49 minutes or 5 hours.

CONCLUSIONS

- Treating cassava stem cuttings with hot water for 48 minutes at 49° C effectively controls PRR, CBB, and insects (data not presented).
- Immersion of heat-treated stem cuttings in copper oxychloride, or a short pretreatment (10 minutes) 24 hours before the long treatment (5 hours), prevents undesired losses in germination.
- Inmersion of stem cuttings in copper oxychloride controls CBB, PRR, and SED.
- CBB can also be controlled biologically by immersing stem cuttings in Lonlife (an extract from citrus seeds).
- The hot-water treatment, combined with the selection of healthy stem cuttings and immersion in a suspension prepared with the fungus *Trichoderma viride*, a biological control agent, will also control PRR.
- Resource-poor farmers in Colombia are currently validating technology packages, including the seed treatments presented herein.

REFERENCES

Alvarez E; Llano G; Loke JB. 2002. CIAT Annual Report. Integrated Pest and Disease Management. <http://www.ciat.cgiar.org/ipm/index.htm>