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BIOCONTROL OF CASSAVA (MANIHOT ESCULENTA) ROOT ROTS BY FLUORESCENT PSEUDOMONAS

(Control biologique des pourritures racinaires du manioc (manihot esculenta Crantz) par des pseudomonas fluorescents)

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SUMMARY

Forty isolates of fluorescent *Pseudomonas* were isolated from the plants growing in 5 different ecosystems. Thirty-four of these isolates inhibited *Erwinia carotovora* pv. *carotovora*, in vitro, the causal agent of cassava stem rot. One month old plantlets, produced by rooting the shoots of a cultivar in distilled water, were inoculated with suspensions (1 x 10^9 cells/ml) of each *Pseudomonas*. Some isolates were able to increase root weight up to 96 per cent over uninoculated controls three months after planting when the inoculation was at planting, 15 and 30 days. Inoculated plants were free from symptoms of root pathogens and roots swelled earlier than controls. Microbial deterioration of bulked swollen roots was also reduced up to 60 per cent when roots were dip treated in a bacterial suspension (1 x 10 9 cells/ml) of the above isolates and stored for 15 days in polyethylene bags. Taxonomic studies showed that these bacterial isolates were either *Pseudomonas putida* (90 per cent) or *P. fluorescens* (10 per cent).

RESUME

Quarante isolats de Pseudomonasfluorescents ont été isolés à partir de la rhizosphère de plantes provenant de cinq écosystèmes différents. Trente quatre de ces isolats inhibent in vitro Erwinia carotovora pv. Carotovora, agent causal de la pourriture de la tige de manioc. Des jeunes plantes agées de 1 mois, produites par enracinement des pousses d'un cultivar dans de l'eau distillée, sont inoculées avec des suspensions (1 x 10^9 cellules/ml) de chaque Pseudomonas. Quelques isolats sont capables d'augmenter le poids racinaire jusqu'à 96 pour cent par rapport aux plantes témoins non inoculées. Ces résultats sont obtenus 3 mois après la plantation, lorsque l'inoculation a été réalisée au moment

de la plantation, 15 et 30 jours après. Les plantes inoculées sont indemnes de symptômes provoqués par les parasites racinaires et le renflement des racines se produit avant les témoins. La détérioration microbienne de la masse racinaire est également réduite jusqu'à 60 pour cent lorsque les racines sont traitées par trempage dans une suspension bactérienne (1.10 cellules/ml) des isolats précédemment cités puis placés dans des sacs de polyéthylène pendant 15 jours. Les études taxonomiques montrent que ces isolats bactériens sont soit Pseudomonas putida (90 pour cent) soit P. fluorescens 510 pour cent).

Roots rots are the most common and important production constraints among the pathological problems of cassava (3). They are caused by several species of fungi and bacteria (13), which are specific to the edalpho-climatic characteristics of each ecosystem (14).

Some cassava root pathogens have been controlled successfully by applying certain cultural practices, which in many cases are specific to one or more causal agents (15, 18). Their control has also been attempted through varietal resistance ; but due to the complex nature of these problems, selected clones have not performed universally well in all ecosystems (7). Resistance appears to be quite specific to each causal agent ; but as the problem are caused by more than one pathogen, the incorporation of such multiple resistance may been require a long time.

Several beneficial microorganisms have been reported to control root rots on crop species (1,9,19,20). The group of fluorescent *pseudomonas* appears to be the most promising (4,5) because of their nutritional versatility, ability to grow under a wide range of environmental conditions, and ability to colonize successfully the rhizosphere of many plant species (11). This paper reports the effectiveness of strains of *Pseudomonas putida* and *P. fluorescens* in controlling root rots of cassava.

MATERIALS AND METHODS

Strains of fluorescent pseudomonas were isolated from six cassava-growing areas of Colombia (CIAT, Palmira, Carimagua, Mondomo, Quilcace, Caidedonia and Popayan) with distinct edapho-climatic characteristics (Table 1). Samples of active rootlets from 5- to 9- month-old cassava plants were collected from different native clones in each location. Five grams of rootlet segments were washed in tap water and then in distilled water ($d\text{-}h_2O$) for 15 min. Root segments were placed in petri dishes with King B (KB) medium (10) for 24 h at 27°C. Bacterial isolates showing fluorescence on KB under ultraviolet light were purified from single isolated colonies after serial dilution seeding on KB medium.