*Proc. 8th Int. Symp. Insect-Plant Relationships, Dordrecht: Kluwer Acad. Publ.*
*S.B.J. Menken, J.H. Visser & P. Harrewijn (eds), 1992*

# Influence of phenolic compounds on the relationship between the cassava mealybug and its host plants

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Key words: Antibiosis, flavonoids, *Manihot esculenta*, *Phenacoccus manihoti*, phenolic acids

The cassava mealybug, *Phenacoccus manihoti* Matile-Ferrero (Homoptera, Pseudococcideae) is a phloemophagous insect feeding on cassava *Manihot esculenta* Crantz (Euphorbiaceae; Calatayud (unpubl.). No correlation could be found between primary nutrients (sucrose and free amino acids in sieve and intercellular fluid of cassava) and antibiotic resistance, (Tertuliano & Le Rü, 1992). Analysis of secondary compounds in the phloem sap of cassava showed us only phenolic compounds (Calatayud, unpubl.). Using liquid chromatography, we assayed phenolic acid and flavonoid contents of phloem sap and intercellular fluid of leaves (sampling by the modified centrifugation method of Rohringer *et al.*, 1983) from cassava mealybug host plants, to see whether the presence of these compounds is related to plant resistance (antibiosis).

Table 1. Intrinsic rates of increase (Rc) of *P. manihoti* on eight host plants (Tertuliano & Le Rü, 1992). Means (± S D) with different letters are significantly different ($P < 0.05$; n = 417 to 574)

| Host plants | Rc |
|---|---|
| Poinsettia | 0.038 ± 0.003 c |
| Incoza | 0.133 ± 0.003 b |
| Faux caoutchouc | 0.141 ± 0.003 b |
| Zanaga | 0.155 ± 0.009 a |
| 3 M 8 | 0.141 ± 0.005 b |
| Talinum | 0.150 ± 0.001 ab |
| Ganfo | 0.160 ± 0.003 a |
| 30 M 7 | 0.150 ± 0.011 ab |

We tested eight plants differing in host resistance (antibiosis) to cassava mealybug (Table 1): five varieties of cassava (*M. esculenta*), "Faux caoutchouc" (hybrid between *M. esculenta* x *M. glaziovii* Mull. Arg.), Poinsettia (*Euphorbia pulcherrina* Willd.) and Talinum (*Talinum triangularae* Jacq.).

Mean concentrations of total phenols from two substitute plant species (Poinsettia and Talinum) were found to be higher in infested plants than in unifested ones (Fig. 1). This

response to mealybug attack was significantly higher ($P < 0.05$) in Poinsettia, considered to be the most resistant plant (antibiosis) among the host plants tested. After discriminant analysis, major phenolic compounds were found to be higher in infested cassavas than in unifested ones. Only one compound (glycosyl flavonoid) was correlated ($r^2 = 0.7$; $P < 0.05$) to cassava resistance (Fig. 2). This compound seems to reduce the development of *P. manihoti*.

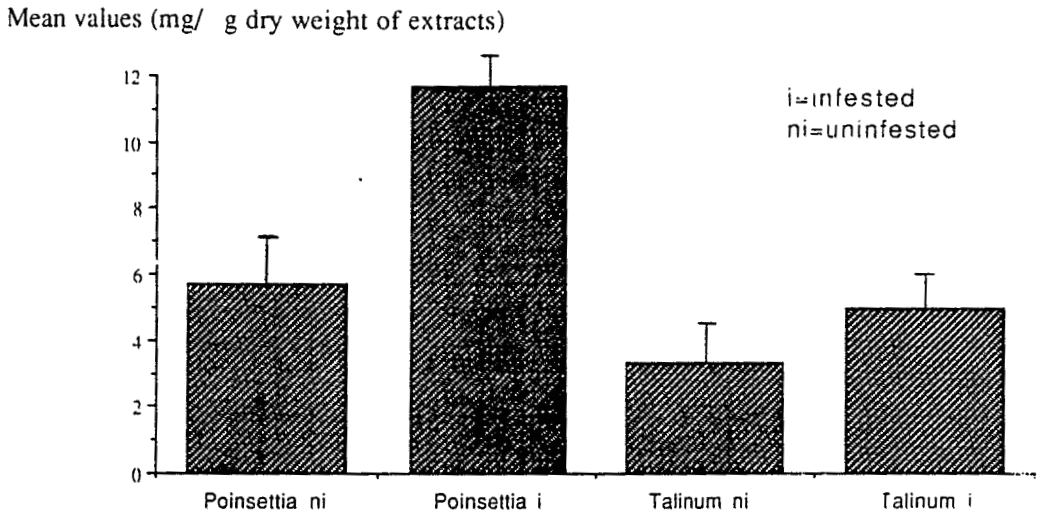


Figure 1. Mean concentrations of total phenols in phloem sap and intercellular fluid of leaves from Poinsettia and Talinum.

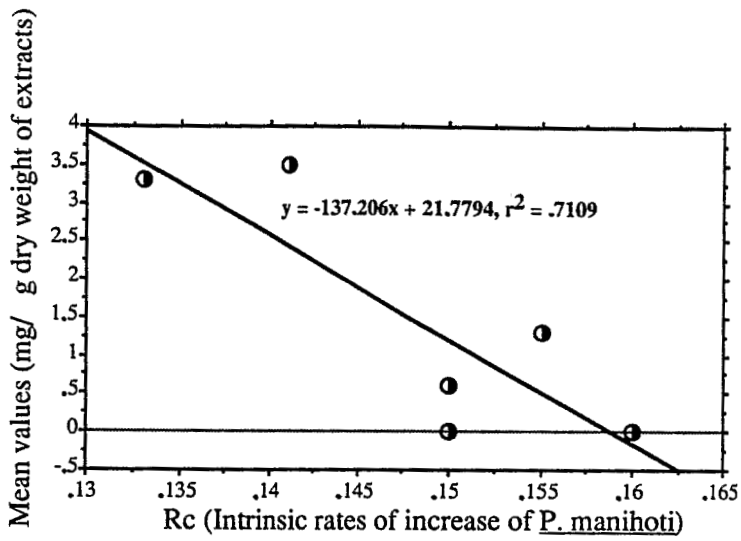


Figure 2. Linear relationship existing between mean concentrations of one glycosyl flavonoid (*) and Rc values of tested cassavas.

These results show that phenolic compounds, and in particular glycosyl flavonoid, present in phloem sap and intercellular fluid of leaves are correlated with plant resistance (antibiosis) to cassava mealybug. Since the correlations observed alone are insufficient to

prove causal relationships between phloem composition and mealybug performance, we must complement the analyses by experiments using artificial diets simulating the sap of cassava to test some of the factors presumed to be active in the mealybug response.

*Acknowledgements.* We thank S. Dossou-Gbete for statistical analysis and A. Kiakouama for technical assistance.

## References

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