

HYDROCYANIC ACID CONTENT IN SOME WILD *MANIHOT* (CASSAVA) SPECIES

By

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ABSTRACT

Abstract: Tubers of five wild *Manihot* species collected in Central Brazil were analyzed for hydrocyanic acid (HCN) content. The one with lowest HCN content, *M. oligantha* subsp. *nesteli*, may be useful in a cassava breeding program.

Wild races and species have been used frequently as sources of many valuable characters, but the inadequacy of our collections of many crops is recognized by plant breeders (Harlan 1976). In this context, cassava stands as a neglected crop with respect to exploring its wild relatives. Only a few of the described *Manihot* species are maintained in living collection, and little information is available to plant breeders on the others (Martin 1976). Low hydrocyanic acid (HCN) content is a character that breeders hope to establish in cassava cultivars because it represents one of the most important factors determining quality of cassava. Significant differences in HCN content of varieties had been reported by various workers (Wood 1965; Oyenuga and Amazigo 1957). This led to the belief that cultivars with a low level of HCN may be obtained by using suitable parents in breeding programs.

Through an international cassava improvement program, a number of wild *Manihot* species were collected by the senior author in Central Brazil. In September 1976, seeds or cutting of the five *Manihot* species were planted in the cassava germplasm collection at the Instituto de Ciências Biológicas at Goiânia. In September 1977, the unpeeled tubers of the species were analyzed for HCN content according to the recommended method (Association of Official Agricultural Chemists 1970). Five plants of each species were analyzed and the analyses replicated four times.

The results are summarized in Table 1. The species differ significantly in their HCN content within a range of 238 mg/Kg fresh unpeeled roots in *M. tripartita* to 62 mg/Kg unpeeled fresh roots in *M. oligantha* subsp. *nesteli*. When HCN content is considered on a dry matter basis, the results are similar except that *M. anomala* has the highest HCN content. HCN content in tuber is reported to vary from one cultivar to another (Oyenuga and Amazigo 1957). However, analysis of about 100 cultivars for HCN content by Raymond et al. (1941) gave an average of 158 mg/kg fresh whole root with a maximum value of 434 mg/Kg. Little information is available about HCN content in roots of wild *Manihot* species.

Table 1 - Hydrocyanic acid content of unpeeled tubers of wild *Manihot* species

Species	HCN Content in fresh root (mg/Kg)	HCN Content on a dry matter basis (mg/Kg)
<i>M. tripartita</i> Mueller	238.1 a	657.2 b
<i>M. anomala</i> Pohl	199.2 a	1026.3 a
<i>M. zehntneri</i> Ule	125.8 b	504.2 b
<i>M. gracilis</i> Pohl	97.2 c	291.2 c
<i>M. oligantha</i> Pax emend Nassar subesp. <i>nesteli</i>	62.3 d	183.2 d

a-d Means within a column followed by the same letter are not significantly different by Duncan's multiple range test (P=0.5).

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Bolhuis (1954) reported 430 mg/Kg of HCN in fresh roots of *Manihot saxicola*, but this is probably the only wild *Manihot* species in which the HCN content has been estimated. He considered that the high HCN content represented an obstacle in using this species in breeding cassava, despite its high protein content. Bolhuis (1954) stated that minimum lethal dose of hydrocyanic acid for a human being is 50-60 mg. However, Chronic toxicity due to the continuous intake of small amounts of HCN is considered more important than acute toxicity because of this association with many diseases (Nestel and MacIntyre 1973).

The occurrence of the species with low HCN levels is a valuable discovery. In this context, it is apparent that our species *M. oligantha* Pax emend. Nassar subsp. *nesteli* with its notable low HCN content can be considered a useful parent for breeding cassava. Hybridization experiments using this species are underway and it may be worthy of mention here that this species has combined to produce hybrids with low HCN content and high crude protein content (Nassar and Costa 1977).

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