

## Tuber Formation and protein content in some wild cassava (*Mandioca*) species native of central Brazil

By

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**Summary:** Screening for protein content in some wild species of *Manihot* shows 2 of them to have a notably high percentage of protein on dry matter basis. Moreover, one of these high-protein wild species was found to be extremely sweet.

Cassava, a staple crop that takes the 7th rank all over the world, represents an inadequately explored source for nutrition. Its ability to grow in sub-optimal conditions offers it a competitive superiority over all other staple food crops in underdeveloped nations. Cassava has various food forms which are well established in the consumption habits of the people which are unfortunately characterized by their low protein content. If varieties with higher protein content could be developed, this would enhance the value of cassava as a food or/and animal feed. Efforts have been made in the past to increase the protein content of cassava roots by interspecific hybridization with a wild species known for its higher protein content. This raised an increasing interest in looking for wild species, collecting them and screening them for protein content.

Among some wild species collected from Goiás state, Brazil, 4 species were shown to form tubers. These species were screened for tuber formation, fibre and protein content. They are: *M. oligantha* pax emend. Nassar subsp. Nesteli collected from Cristalina ( see [photos gallery](#) ) *M. tripartita* Muell., collected from Serra Dourada, municipal Goiania., *M. zehntneri* Ule, collected from goianesia, and *M. anomala* pohl, collected from road goiania-Inhumas (see [photos gallery](#) ). These species differed largely in tuber formation pattern and tuber content. *M. oligantha* subsp. Nesteli forms abundant cylindrical tubers, superficial, about 10.0 to 30.0cm distant from ground surface, external color of tubers is dark brown, surface is rough, cortex is white. *M. tripartita* forms extremely globosus-shaped tubers. Deep in the ground at a distance of more than 50.0 cm from ground surface, is smooth, cortex creamy. *M. anomala* forms superficial tubers distant about 20.0 - 30.0 cm from ground surface, oval-shaped, with rough surface and light brown yellow color, cortex is creamy. *M. zehntneri* forms cylindrical to oval tubers, very deep in the ground, at a distance of about 50.0 - 70.0 cm from ground surface, external color is dark brown, has white cortex and rough surface.

AOAC procedur. Contents were shown as follows.

Average protein and fibre content of wild cassava species on a percent dry matter basis

Species	Crude protein	Crude fibre
<i>M. oligantha</i> susp. Nesteli	7.10 + 0.58	26.67 + 4.86
<i>M. tripartita</i>	6.88 + 1.48	33.48 + 6.36
<i>M. anomala</i>	3.74 + 0.63	23.44 + 4.82
<i>M. zehatneri</i>	3.06 + 0.82	21.52 + 4.84

- 20 tubers of each species were analyzed and replicated 4 times.

The composition of cassava as reported in the literature is somewhat variable. This variation comes from the fact that bitter cultivations differ from sweet ones, not only in the amount of HCN they contain, but also in the proportion of nutrients (according to bolhuis, cultivars with roots containing less than 50 mg of HCN per kg are considered sweet) however, many reports state that crude protein dry matter ranges from 2.2 in sweet cassava to 2.7% in bitter cultivars, fibre percentage ranges from 3.1 to 10.3%. One obviously finds notably high percentage of protein in the first 2 screened wild species in comparison to cultivated cassava. Some reports have referred to high protein percentage in some cassava cultivars which reach 6 or 7%, but indeed this subject is very doubtful since estimation of total nitrogenous matter must be viewed with caution because it is not certain whether the breakdown products of cyanogenic glucosides enhance the total nitrogen content or not. Nartyu showed that the hydrolytic products of glucosides are incorporated into amino acids for protein synthesis in cassava. Therefore, it is not unlikely that the reported cultivars of high nitrogenous content turn out to be nothing than bitter cultivar with glucoside content. The one variety attracting attention in the screened wild

species is *M. oligantha* subsp. *Nesteli* due to its high protein content combined with a very low level of HCN. The senior author saw cows and horses eat greedily the vegetative parts and tubers of this species when grazing in its natural habitat. In literature, there are 2 other wild *Manihot* species which had been reported to have high protein content, *M. melanobasis* and *M. saxicola*, but there is no reference to their HCN content; consequently, the authors have no idea how much the hydrolytic products of glucosides interferes with the total estimated crude protein. From the first instance, it seems logical to find wild cassava with high protein content, since human selection has aimed continually to select for tuber size and less fibre, without paying attention to protein content. This could lead to discarding protein-producing genes from the cultivated varieties.

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