TWO INTERESTING SPECIES OF MANIHOT L. FROM SURINAME

by

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(With tab. IX).

When, during my stay in Suriname in 1933, I planned to visit the Voltzberg, Prof. Stahel, the Director of the Agriculture Experiment Station, told me that he had discovered there, in one of the fissures in the granitic dome, which forms the top of this low mountain, an unusual kind of cassave. As I had for the "Flora of Suriname" been working on the *Euphorbiaceae*, I was of course much interested in this plant, especially while Prof. Stahel suggested that it would be possible to cultivate it in the Agricultural Garden at Paramaribo from cuttings.

When I arrived at the Voltzberg, the plant was easily found growing in a fissure between the granite plates along one of the ravines just below the dome-shaped top. The plant possessed rather long (2—3 m) stems, more or less decumbent or creeping along the fissure, and from these stems rose side-branches which bore the leaves and flowers (see tab. IX). The roots were but very little thickened. Some of these stems I have taken with me. On the return voyage to Paramaribo they were sheltered as much as possible against sun and rain. The side-branches were pressed for the Herbarium.

From these stems c. 20 small pieces were cut; each piece c. 10 cm long and possessing 1—2 buds. These cuttings were planted in the Agricultural Garden at Paramaribo. Most of them did not root, but some succeeded. From the plants grown from these cuttings seeds were gathered. Part of the latter were laid out again at Paramaribo, and part of them were sent by Prof. Stahel to the Colonial Institute at Amsterdam. Prof. de Bussy, the Director of the "Handelsmuseum", sent part of the seeds to the "Algemeen Proefstation voor den Landbouw" at Buitenzorg (Java), and part of them to me. The latter were laid out in the greenhouses of the "Hortus Botanicus" at Utrecht and of "Cantonspark" at Baarn. In Utrecht none of the seeds germinated, but in Baarn the curator A. Knol

succeeded in raising several plants. The seeds which were laid out in Buitenzorg gave several plants, which grew very well. From the plants raised from seeds at Paramaribo as well as from those raised at Buitenzorg I received specimens, and particulars about these plants will be communicated below.

When I worked on the *Euphorbiaceae* of Suriname, some specimens which differed from the true *Manihot esculenta* Crantz already had drawn my attention. In "The Euphorbiaceae of Suriname" p. 33 I stated this, but as the material was scanty I referred the specimens provisionally to *M. esculenta* Crantz. A closer examination of the abundant material which I had now at my disposal proved that the differences are not only obvious, but also constant through more than one generation. Therefore I am convinced now that the plant represents a new species, probably belonging to the sect. *Parvibracteatae* Pax, and within that section to the subsection *Utilissimae* Pax; the leaves, however, are slightly peltate, which does not fit the characters of this subsection. Most probably it is related to *M. esculenta* Crantz, from which it differs conspicuously by the large 2—3-parted stipules, which are not deciduous, and by the smaller leaves, which are slightly peltate. Perhaps this new species may be regarded as the ancestor of the *M. esculenta* Crantz, which is known as a cultivated plant only. It looks as if it is closely related also to *M. Burchellii* Müll. Arg. Apart from the leaves, which are never lobulate, it has also much in common with *M. melanobasis* Müll. Arg., a rare species which has recently been found in Suriname too.

The new species is based on the material, which I collected on the Voltzberg. So in this peculiar and probably unique case, we are dealing with a new species from a rather difficult accessable locality, and from which on the date of publication live plants are to be found in three continents.

I will give now first the description of the type material, and than some notes on the other specimens and especially on the plants grown from seeds collected in Paramaribo.

Manihot saxicola Lanj., nov. spec.; — *M. esculenta* auct. non Crantz, Lanjouw in Pulle, Flora of Suriname II (1932) p. 72 (p.p.); — *Manihot* spec., Lanjouw in Rec. trav. bot. néerl. XXXII (1935) p. 238.

Radix tuberosa, parce crassata. Frutex caulibus elongatis, c. 2 m longis, rubescentibus. Folia alterna, longe petiolata; petiolus teres, gracilis, rubescens, 2.5—8.5 cm longus; stipulae irregulariter fere usque ad basin 3- vel interdum 2-partitae, laciniis lanceolatis c.

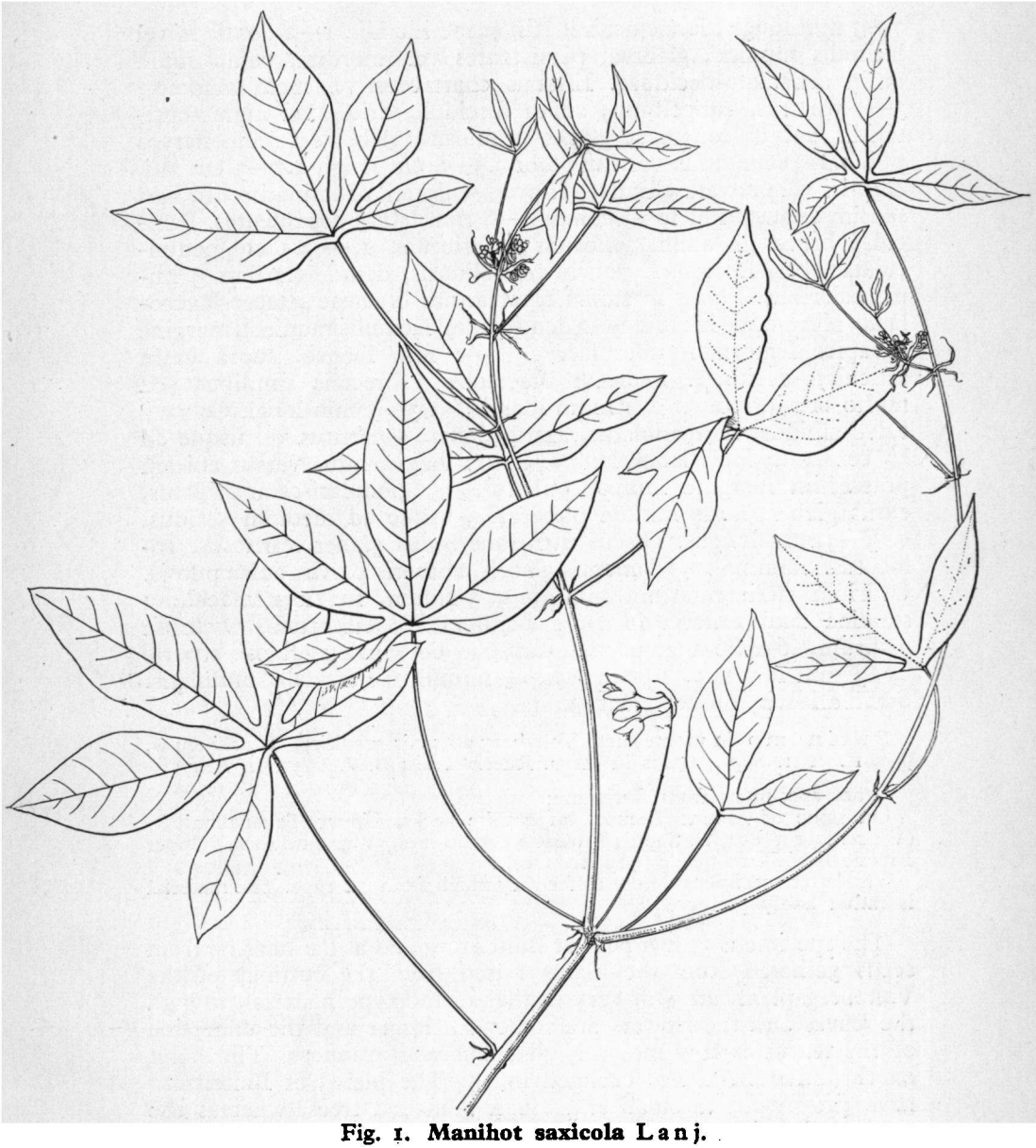

Fig. 1. **Manihot saxicola Lanj.**

7—9 mm longis, longe acuminatis, saepe hic illic 1—2 dentibus vel lacinulis munitis, glabrae, persistentes vel interdum paulo supra basin articulato-deciduae. Limbus chartaceus vel membranaceus, 3—5-partitus, subpeltatus, supra fuscidulo-viridis vel nigrescenti-viridis, subtus conspicue glauco-pruinosus, glaber vel secus nervos pilis raris et minutis vestitus; lobi 3.5—6 cm longi, 1.2—3 cm lati, elliptici vel obovato-elliptici vel ovato-elliptici, acuminati acuti, basi sensim angustati et in disculum 4—8 mm latum confluentes. Paniculae breves in axillis foliorum superiorum, 1.5—3.5 cm pedunculatae, basi floribus ♀ paucis vel solitariis, deinde floribus ♂ numerosioribus. Flores in axillis bractearum; bracteae setaceo-lanceolatae, plerumque hic illic 1—2 dentibus vel lacinulis munitae, margine et apice fimbriato-puberulae, c. 4—6 mm longae, supra basin articulato-deciduae. Pedicelli bracteolis 2 bracteis similibus sed multo brevioribus, ♀ c. 12 mm longi, ♂ c. 3—5 mm longi. Calyx ♀ fulvo-albidus, campanulatus, extus glaber, 5-partitus vel usque ad $^1/_3$ connatus, lobis lanceolatis c. 8 mm longis, intus versus apicem praesertim margine minute puberulis, ♂ globulari-campanulatus, extus glaber, intus minute puberulus, usque ad medium 5-fidus, c. 3—4 mm longus. Discus utriusque sexus glaber, carnosus, 10-lobatus. Stamina 10, filamentis glabris, antheris parvis, apice pilosis. Ovarium rudimentarium minutum, 3-fidum, in flore maculino; stamina rudimentaria in flore femineo 10, filiformia. Ovarium glabrum, 6-alato-angulosum. Capsula oblonga, ruguloso-aspera, c. 13 mm longa, c. 10 mm crassa, minute 6-alata, alis undulatis. Semina laevia, obscure marmorata.

S u r i n a m o in monte dicto Voltzberg ad saxis graniticis (L a n j o u w, 955, fl. et fr. Sept., typus in Herb. Rheno-Trai.; B.W. 6331, fl. Aug.).

Other specimens from Suriname:
On slope of Mount Teeboe, on granite rocks, Upper Tapanahoni R. (V e r s t e e g 801, fr. Sept.); Mount Knopaio-moi, on granite rocks, Upper Litanie R. (V e r s t e e g 419, fr. Dec.).
The latter specimens do not differ very much from the type. The material is rather badly preserved.

The specimens grown both at Buitenzorg and at Paramaribo from seeds gathered from the plants raised from the cuttings of the Voltzberg plant, are still very similar to the type material, though the leaves and the flowers are somewhat larger and the underside of the leaves is less intensely glaucous and pruinose. The habit on the other hand has changed much. The plants at Buitenzorg have grown out to small and much branched trees, whereas the original plant had a rather long but more or less decumbent stem and was but sparingly branched.

The plants grown from seeds in one of the greenhouses at Baarn (Cantonspark) have grown to more than 1 m in height. The stems and petioles are subviolaceous and pruinose. The petioles are up to 11 cm long. The leaves are conspicuously peltate and beneath distinctly glaucous, and generally somewhat larger than in the type. The stipules are here and there subentire, and persistent. Fruiting pedicels up to 32 mm long.

The following peculiarities on the plants cultivated at Buitenzorg from seeds obtained from the cuttings of the Voltzberg plant, are translated from copies of letters sent by the "Algemeen Proefstation voor den Landbouw, Landbouwkundig Instituut" at Buitenzorg (Java). These copies were kindly communicated to me by Prof. de Bussy, Amsterdam.

1. From a letter d.d. June 4, 1936.

From 50 seeds treated with warm water, and laid out in small baskets, 12 have germinated. The seedlings were planted out in the field and grew so well, that at the end of one year they had reached already a height of more than 2 m (see fig. 2, tab. IX). The seedlings were very similar, all with dark green, small, 3-lobed leaves, with a rather strong ramification, and flowered abundantly. The fruit production too was very satisfactory, though part of them proved later-on to be empty. From 11 seedlings a sufficient number of seeds have been gathered, while tree 11 (see fotograph, fig. 2) was crossed reciprocally with the variety Basirao. The fruits resulting from these crosses will be gathered shortly. After sufficient seeds to secure the preservation of the variety (species?) had been collected, from each plant 6 cuttings were taken and planted; the total number of cuttings amounting to 72. The cuttings varied from c. 2.5 cm in diameter to less than 1 cm. They did shoot but very slowly. One month after planting, 24 out of 72 had come out, from which 12 could be considered successful. These 12 good cuttings differed considerably in thickness.

2. From a letter d.d. Nov. 2, 1937.

I can inform you that the 12 cassave plants grown from the seeds which we received from you, have indeed all the same pyramid growth form. On Sept. 23rd the plants no. 10 and 11 (from each three cuttings had succeeded) have been pulled up. The amount of thickened roots per plant proved to be very small. The total quantity was sent to the Laboratory for Chemical Research for the

determination of the dry material percentage and of the toxicity. The results of the analysis were as follows:

No. of Plant	Dry material %	Prussic acid reaction after Guignard
10	31.4	red
11	29.3	red

3. From letter of Jan. 24th., 1938.

After the remaining seedlings of the wild cassave from the Voltzberg had been pulled up, a sample of plant 2 was sent to the Laboratory for Chemical Research. The results of the analysis were as follows:

No.	mg HCN per kg	dry material %	Albumen %
422/2	434	21.6	2.3

So these roots proved to be very poisonous, and to contain little dry material, but much albumen. As the analysis given above was made from fresh roots, the albumen % of the dry material will come above 10 %, which is very high. As it has been proved already that this cassave-variety, in view of the productive capacity, will have no chance in cultivation, we will try to raise from it, by crossing it with the ordinary cassave, a new variety, which combines the higher percentage of albumen with the other good qualities. Usually the percentage of albumen of the ordinary cassaves does not come above 1.5 % of the fresh roots.

After the last letter no more communications on our *Manihot* have been received. Neither did I receive herbarium specimens of the hybrids, though it would be interesting to see whether the characters of the leaves and stipules are shown by them.

On the plants cultivated at Paramaribo I can give no further information. I received some alcohol material which has been dealt with above.

Manihot melanobasis Müll. Arg. in Linnaea XXXIV (1865) p. 206; in D C. Prodr. XV. 2 (1866) p. 1074; Pax in Engler, Das Pflanzenreich IV. 147. II (1910) p. 84.

On the savannah at the Upper Sipaliwini River Mr. H. E. Rombouts collected some specimens of this species, which so far was represented in the herbaria by one collection only. The latter had been secured by Schomburgk on the savannah near Pirara in British Guiana. As Rombouts collected complete material of this species, I can give here some additions to the description.

Low herbaceous shrubs. Leaves blackish green or olivaceous green above, subglaucescent beneath; lobes usually very narrow, c. 3—7 mm broad, and long acuminate, in the lower half usually bilobulate, sometimes 2—3-dentate or sinuate-repand, rarely subentire. Panicles c. 3—5 cm pedunculate. Pedicels of ripe fruits c. 1.5 cm long, angulate and thickened towards the top. Capsule c. 11 mm in height c. 9 mm in diameter, oblong, narrowly 6-winged.

Suriname: Savannah, Upper Sipaliwini River (Rombouts 409, fl. Jan.; Rombouts 464, fl. and fr. Febr.).