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SOME NOTES ON PHILIPPINE YAMS, AND THE RESULTS OF CULTIVATION OF THREE INDIAN RACES IN 1914.*

I. Dioscorea alata, Linn.

By the kindness of Professor C. F. Baker, of the University of the Philippines and of the Department of Agriculture, Manila, through Mr. O. W. Barrett, the Botanic Gardens received in January, 1914, upwards of eighty yam-tubers for experimental cultivation. For the most part there was one tuber of each supposed race that the two Institutions had.

To accomodate the consignment five trenches were prepared two and a half feet deep in the yellow soil of the Botanic Gardens just behind the Director's house, and filled with alternating layers of the soil and manure.

The tubers from Manila was planted in these trenches at a distance from each other of two feet, in the month of January; and along with them were planted a few yams of local origin. The shoots began to appear above ground in March and continued to do so until May was in. The whole crop was dug in October; the new tubers were examined and weighed; and notes made upon them.

In the current year, 1915, experiments are being made on a larger scale, for which purpose the tubers of the whole crop of 1914 were cut up into sets, each of about 2 lbs. weight or 810 grammes, and has been planted.

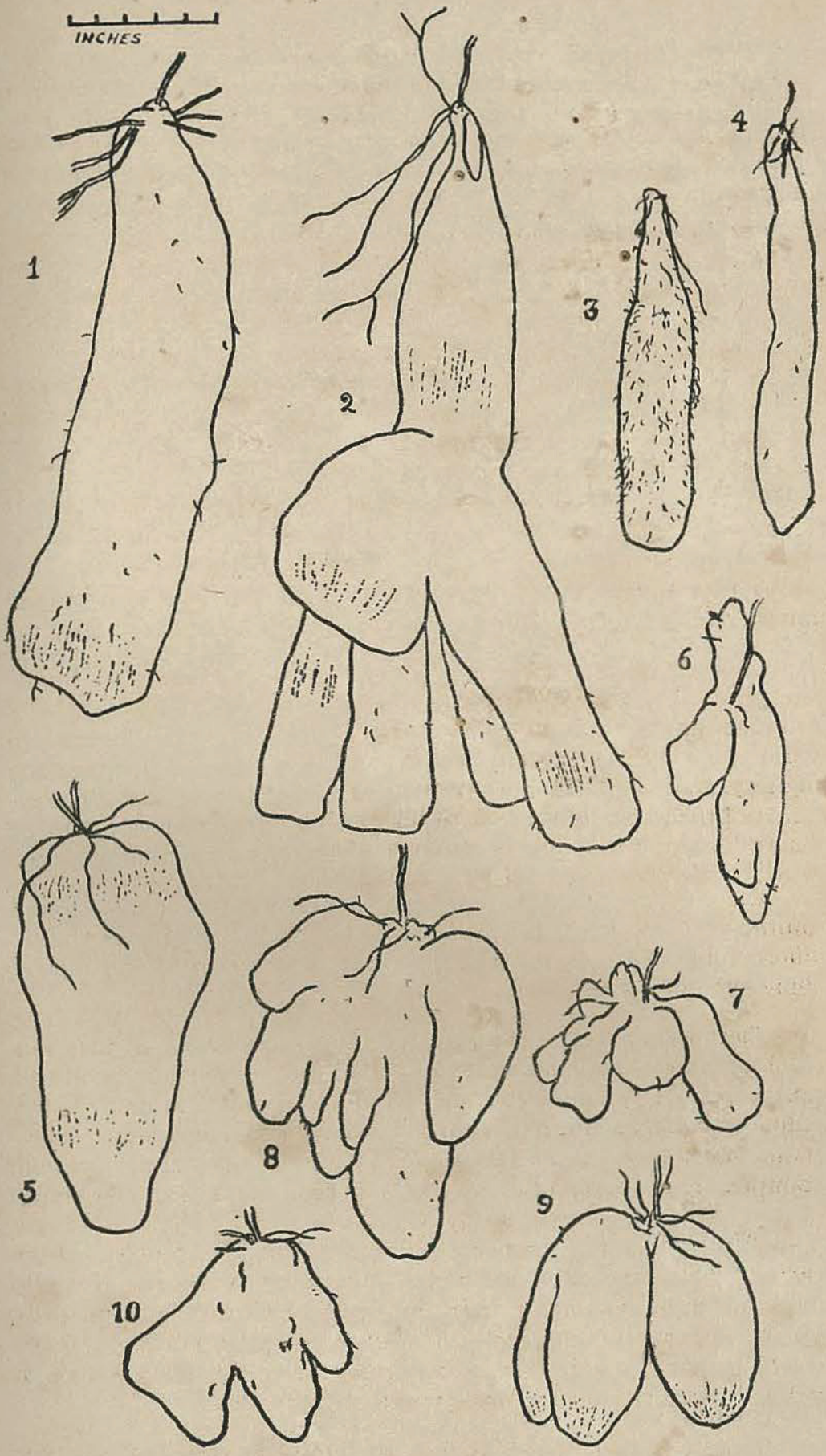
* A report on Philippine yams may be found in the Philippine Agriculturist and Forester, III., 1915, pages 205-209.

The largest yam produced in 1914, was one of local origin, the parent tuber having been found in the deserted garden of the Government bungalow on the top of Bukit Timah; it weighed 17 lbs. 8 oz. or almost 8 kilogrammes; and as it was still in full growth, when dug, it would have attained considerably more, say, by January in which month the plant of 1913 was still green. Next to it in weight was a yam of Philippine origin which weighed 16 lbs. 9 oz. or 7513 grammes (see page 299 figure 2.) The third tuber in size was also of Philippine origin and weighed 12 lbs. 6 oz. or 5613 grammes. In appearance it was almost exactly as the tuber of the Bukit Timah plant, but there was this difference between the plants that the stem of the Bukit Timah plant produced a profusion of bulbils, whereas that of the Philippine plant did not. The tuber which came fourth in weight was from a Philippine plant numbered 1054, (page 299 figure 1); it differed from the preceeding a little in the surface of the tuber and in its foliage; its weight was 9 lbs. 13 oz. or 4450 grammes. Plant no. 1042, (page 299 figure 5) produced a not altogether dissimilar tuber weighing 7 lbs. 7 oz. or 3373 grammes. All these big bulky tubers except no. 1057, (page 299 figure 2) were without purple sap.

Attention may be called to the slight difference in shape between the tubers 1054 (page 299 figure 1) and 1042 (page 299 figure 5) in order to make the comment that it has been man's endeavour in selecting yams to obtain something which does not give great labour in digging, i.e. something surface-rooting. From such a point of view no. 1042 (page 299 figure 5) is an improvement on no. 1054 (page 299 figure 1), and both are an improvement upon the Bukit Timah race which buried itself to a depth of 28 inches.

Some of the deep burying yams are however very tender, and are thought, by jungle tribes particularly, a much desired food, so that they laboriously dig them out. One object therefore which man must have had in view in his work of selecting would be the preservation of the delicacy of substance while getting rid of the deep burying. Rumpf relates that in his time (1653-1720) in Celebes the inhabitants had a way of circumventing the yams which was by compelling them to grow through horizontal bamboos placed in the surface of the soil. The modern use of such a device is unrecorded; but the Philippine yams possess, in one little group, no tendency to bury, though elongating considerably. For instance no. 956 (page 301 figure 3) recurved back and actually extruded the tip of its tuber from the soil. No. 943 (page 301 figure 4) behaved similarly. Nos. 935 (page 301 figure 5) and 945 (page 301 figure 6) while differing slightly also extruded their tuber-tips, and Nos. 1095 (page 301 figure 1) and 960 (page 301 figure 2) instead of growing down, elongated more or less horizontally, the larger to a length of 20 inches.

Because of their great interest, all the tubers raised of this type are here figured, though we may not have among them more than three races. It may be remarked further that they all had purple sap.



Dioscorea alata—Philippine races, which descend more or less into the earth.

The largest, from no. 945 (page 301 figure 6), weighed 8 lbs., 14 oz. or 4025 grammes and out of the whole collection, among those containing purple sap was the third in weight. No. 655 (page 301 figure 5), which differed in very little, weighed 8 lbs. 5 oz. or 3770 grammes. These two, being apparently of one race, will be kept in mind specially on account of their combination of surface production and productiveness; but of their comestible qualities we know nothing as yet.

Figures 3 and 4 on page 299 (of tubers numbered 3790 and 1056) are reproduced to call attention to the way in which tubers vary in rootiness. Both the two tubers are deeply penetrating, the longer being 14 inches (35½ cm.) long. Another penetrating tuber was grown, intermediate in rootiness and therefore not reproduced here, (no. 1692), which with a length of 24 inches (61 cm.) had a weight of only 3 lbs. or 1361 grammes. On the other hand no. 1055 (page 1 figure 9) while penetrating only 8 inches (20 cm.) produced 4 lbs. 11 oz. (2125 grammes) of tubers, and no. 3793 penetrating 12 inches (30½ cm.) produced 10 lbs. 5 oz. or 4678 grammes.

The last mentioned had a prickly stem, and so had no. 3790 and another very similar plant, no. 1019. It may be remarked that the prickliness is not associated with any particular form or colour of tuber, or any particular form of foliage.

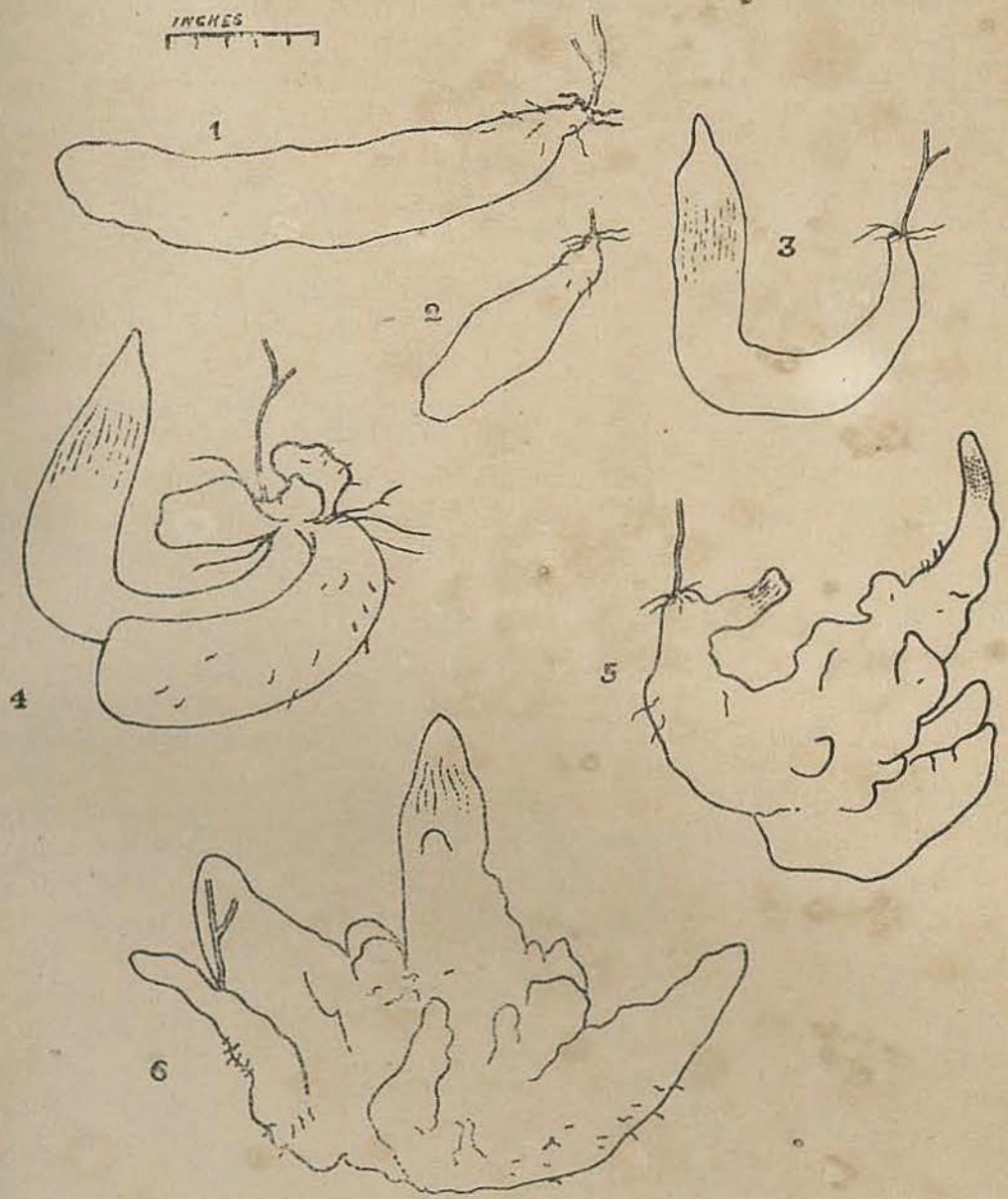
The lesser tubers grown were for the most part fingered in various ways, e.g. nos. 1019, (page 299 figure 8) and 931, (page 299 figure 7); and for the most part they carried purple sap. The relation of the extent of surface to flavour, etc., if any, has yet to be determined; but it is quite probable that there is some relationship.

The Oebi merah of the Singapore markets, grown along with the Philippine yams, ranked with the largest of the fingered ones; but it differed in foliage very markedly, and yet more by producing a great abundance of bulbils.

There were among the Philippine yams two tubers (nos. 1040 and 1046) forked rather than fingered, 12 and 15 inches long, (30½ and 38 cm.) respectively, without purple sap, of a form which leads from the simple elongated shape to the flat condition wherein branching occurs in one plane only. Of flat tubers no. 1031 (page 299 figure 10) was an example. This flattening is probably to be considered as a fasciation.

Two tubers only with uprising fleshy shoots were found. One is figured which was received as "alata from Manila" (page 299 figure 6). These uprising shoots appear in the end of one season, grow thick and store food, to shoot out in the following season; they are cases of growth such as is usually made after the resting period being made in advance of it. In the figure two fleshy shoots may be seen by the side of the old dying stem of the finished season.

One of the plants with uprising shoots had purple sap and the other had not.



Dioscorea alata—Philippine races, which do not descend into the earth.

Some of the Yams showed themselves earlier than others both in sprouting and in the withering of their shoots: but further investigations are necessary in order to demonstrate what races are early and what are late, especially as in the start of the season much depends upon the part of the parent tuber used as a set (see pp. 306-307).

2. *Dioscorea aculeata,* Lamk., *the lesser yam.*

In this Bulletin on page 227 attention was called to the appearance in Singapore island of the lesser yam, and on the following page to its appearance in the Province Wellesley. Since those lines were printed, the yam has been found in the garden of a Kling at Durian Tunggal, Malacca.

With the advent of cultivators other than Malays into the Colonies, there is considerable probability that it will attract more and more interest, and that small patches will appear elsewhere. The Kling at Durian Tunggal said that he had himself brought the parent tubers from India.

This lesser yam in the eastern tropics has a rather general cultivation from India to Papua. In India its chief centres are the Nerbudda valley, the Behar plains, and upper Assam; but it is by no means uncommonly grown in the south. It may be found in Burma, the Shan Hills, and French Indo-China; in the Philippine islands it is quite an important article of food, and in north-eastern New Guinea it is said to be the most important of all roots. South-westwards from the Philippine islands and New Guinea it is met with. It was stated by the celebrated Rumpf that in his time (1653-1720) it had rather recently acquired an extension from the east of the Archipelago to the neighbourhood of Batavia where men, chiefly immigrants from that direction had a penchant for growing it. Despite this extension upon the west, north and east of the Peninsula, despite the going and coming between India and Malaya, Siam and Malaya, despite the Bugis invading and the Dutch and Portuguese trading from islands where it is commonly cultivated, it seems not to have obtained a place between the Isthmus of Kra and Singapore until recently: and this can only be ascribed to a want of interest in its cultivation as from so many of the adjoining lands there must have been thousands of opportunities of bringing it had Malay cultivation but room for it. It had not however. But with the advent of settlers whose cultivation is deeper—Kling and Chinese—there would seem to be room for more yams and especially for the lesser yam. Under this impression experiments were commenced at Singapore in 1912 when three races of *D. aculeata* received from India were first planted in the Economic Garden.

These races from India were,

Goradu from Akola, Berar	...	No. 33,346
China alu from Jorhat in Assam,		No. 34,383
Pora alu from Chittagong.	...	No. 34,125

A root of each had been received from Major A. T. Gage, Superintendent of the Royal Botanic Gardens, Calcutta, in the end of 1912, and the tubers were planted in the Economic garden.

Thirty plants in all were grown. Seven were raised from tubers of Goradu, ten from China alu and thirteen from Pora alu.

The seven plants of Goradu gave in turn 4½ lbs. of tubers, the ten of China alu 5¾ and the thirteen of Pora alu 31¾ lbs.

These sown again in 1914 returned:—

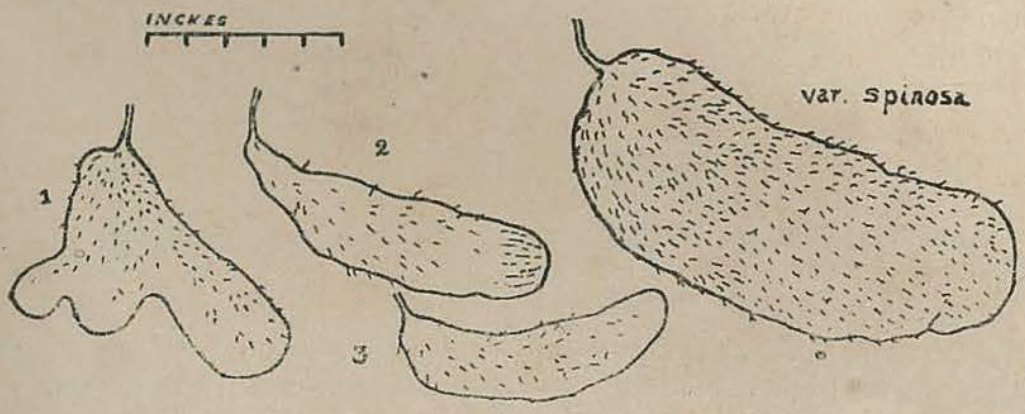
No. 34,125	311	yams	weighing	154½	lbs.	or 70	kilogrammes.
No. 33,346	100	,,	,,	46	,,	or 21	,,
No. 34 383	200	,,		28	,,	or 12½	,,

The tubers of the first ran up to 3 lbs. or 1460 grammes, those of the second to 2¾ or 1,247 grammes, but those of the third were not above 1 lb. or 454 grammes in weight.

The rate per acre works out at:—

No. 34,125	21,851	lbs.	per acres or	9,932	kilogrammes.
No. 33,346	13,011	,,	,,	5,902	,,
No. 34,383	7,820	,,	,,	3,593	,,

The greatest yield is greater than the best expected of potatoes in particulary fertile districts of Europe. But then the plot was very small (28 feet by 22 feet) containing four rows of plants sown in well manured trenches.



Dioscorea aculeata—four Philippine races.

Along with the greater yams from the Philippine islands, described in the preceeding pages, were grown four races of the lesser yam from the same sources, typical roots of which are figured here in outline.

Collectively the races are there called in the Tagalog language Tugui a name like that, Tu-cu, used in Annam.

They occur both wild and cultivated and those that are wild produce copious thorns on the roots. Thorns, however, are not a sure distinguishing mark of wild races, for at least elsewhere some cultivated races possess them, e.g. one which is in favour in Central Burma and is there called Wet-ka u or Pig-cut-off yam because of the way in which the thorns protect the tubers from the depredations of the wild pigs.

The plants of the first Philippine race,—whether of wild or cultivated origin I have not been informed,—produced the large tubers (as figured on the right) and with these such thorny roots. These tubers however were diffuse and placed far beyond the protection of the thorns present, a circumstance suggesting that we have in it a cultivated race, the thorns left being indications of a not remote origin from the wild state. The tubers were few in number but attained as much as 5 lbs. 6 oz. (2439 grammes) in weight. The other three races were without thorny roots and distinguished as follows:—

a. Tubers elongated, with a slight tendency to be diffuse, reaching in weight 1 lb. 8 oz. (640 grammes).

b. Tubers small, many, closely bunched, attaining in weight 4 oz. only (113 grammes).

c. Tubers lobed, few, and some of them rather large, attaining in weight 1 lb. 5 oz. (596 grammes).

The figures given are drawn exactly to scale: *a* is numbered 2; *b* is numbered 3; and *c* is numbered 1.

The races will be the subject of further experiments in 1915, when they will be tested against those brought from India and against others newly received from Saigon.

PREPARATION OF YAMS FOR THE TABLE.

Europeans in the East do not know, how to cook yams: therefore the following recipes are reproduced from one of the publications of the Imperial Department of Agriculture for the British West Indies.

Roasted Yams.—Lay a yam before the grates of the stove or in the oven, turning it occasionally until cooked, scrape off the outer skin, cut into pieces or mash with butter; serve hot.

Baked Yams.—Pare a yam, put it in the oven and bake until soft, take it out of the skin, mash with butter, put back into the skin; cut in pieces and serve hot.

Boiled Yams.—Pare a yam, put it into boiling water, cook until tender; serve whole.