

Yam Growing in the Maprik Area.

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ABSTRACT.

This article is an attempt to look into one aspect of gardening as the people construe it according to the categories of their ethnoscience, and to describe the rather unique yam growing technique of the Abelam.

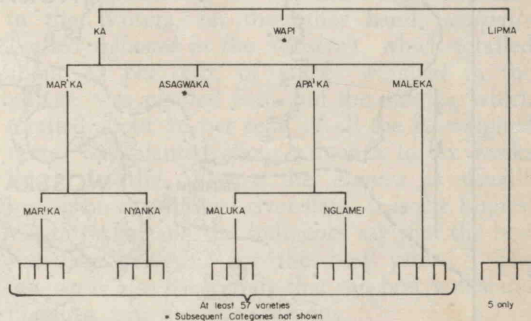
INTRODUCTION.

THE Abelam are a tribe of some 30,000 people living round the patrol post of Maprik in the Sepik District of New Guinea. (Figure 1) Most of the group live between 400 and 1,000 ft. on the southern foothills of the Prince Alexander Ranges on Pliocene mudstones and siltstones. They are basically swidden horticulturalists but they obtain significant amounts of food from trees, palms, and the trade stores.¹ The most important of the tree crops is sago which is the staple food during a dietary lean period from about February to May when the gardens are producing very little food. The Abelam have two types of gardens, the main food gardens (*ka yawi*), and the ceremonial yam gardens (*wapi yawi*). (Figure 2)

THE KA GARDENS.

The *ka yawi* are planted with numerous varieties of *ka* (*Dioscorea esculenta*), *lipma* (*D. bulbifera*), *yabiweo* (*D. pentaphylla*), and *wapi* (*D. alata* and *D. nummularia*). In two villages alone there were 112 different varieties of yam (59 varieties of *ka*, 43 of *wapi*, and seven of *lipma*).² The *ka* varieties in the northern villages fall into four main groups which could conveniently be called sub-types. These sub-types are *mar'ka*, *asagwaka*, *apa'ka* and *maleka*, each of which has easily recognizable characteristics.³ In some regions certain sub-types are divided into two further groups so that in the Wosera area, for example, the *apa'ka* sub-types consists of two groups, the *maluka* which is generally a high yielder and the *nglamei* which is a low yielder.⁴

There are regional preferences for each sub-type. The people of the West Wosera like the



strong tasting and low yielding *maleka*, the people of the Central and East Wosera prefer the high yielding but rather coarse *asagwa* and the North Abelam plant mainly the low yielding and 'sweet' *mar'ka*. (Plate I)

All the sub-types names mentioned above are also used for particular varieties within the appropriate sub-types. The criteria which determine different varietal names are the size, shape and colour of the leaf and tuber, the hairiness of the tuber, the colour of the shoot, the size

¹ Diet is discussed in some detail in Lea, 1965. (Appendix A)

² These native yam varieties are almost certainly clones.

³ The main characteristics of these four sub-types are—

Mar'ka—has a small leaf and a small inflorescence, and is generally a low yielder.

Asagwa—has a hairy tuber, which is rather coarse and fibrous when cooked. It also has a long flower and is usually planted without a trellis.

APA'ka—has a large leaf and its tubers are fat rather than long.

Maleka—has a small leaf and its tubers are small, round, and have a distinctive taste. The tubers grow up from the bottom of the hole.

⁴ Unfortunately variety names vary a little throughout Abelam territory, *nglamei* in the Wosera is known as *wolimile* in the North Abelam area.

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ABELAM LAND

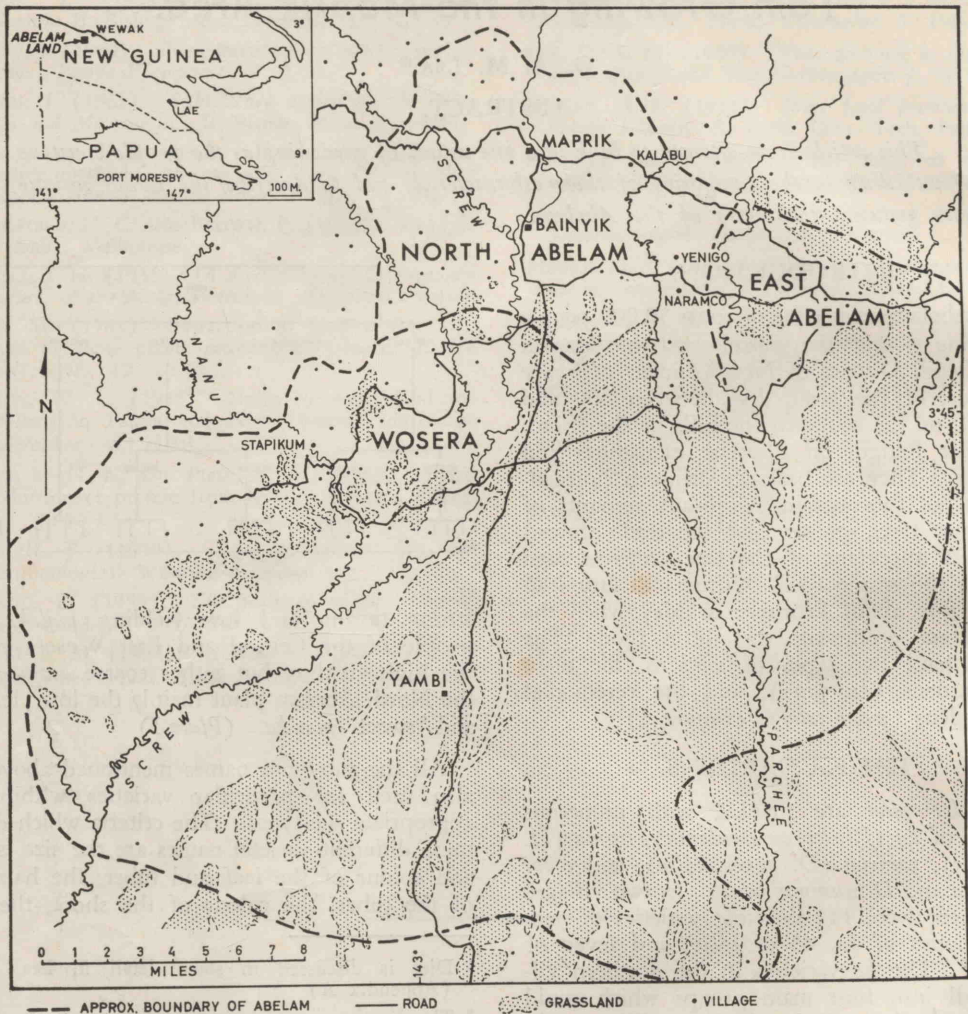


Figure 1.—Abelam regions and the locations of villages.

and frequency of thorns on the vine and the taste of the yam when cooked. It is difficult to tell whether new varieties are evolving. Informants continually said that their ancestors had many more varieties than are planted now, but this is somewhat belied by the fact that new varieties are coming into all villages from other areas in Abelam territory and from other areas in New Guinea. The *maleka* and *asagwa* subtypes were either rare or unknown in the north

villages before pacification and likewise many of the largest *wabi* and many of the *mar'ka* subtypes were unknown in the Wosera.

The names given to many varieties are descriptive: For example *tambaka* means yam like a hand and *wamaka* means the white yam. They may also be named after an animal, bird, man or kinship term; some examples are *nyamioka* meaning the dove yam, *apa'ka* the father yam and *asagwaka*, the mother yam. Many varieties

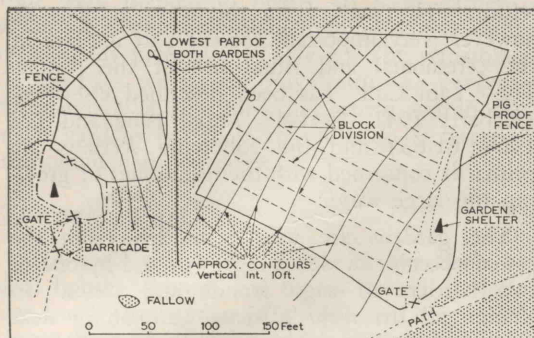


Figure 2.—Examples of typical Abelam gardens. On the left are two ceremonial yam gardens both 0.10 acres in size and containing 26 large yams (*wapi*). The plan on the right is an ordinary *ka* garden, 0.18 acres in size and containing 696 small yams, 1,979 *Colocasia esculenta* and many other plants. Usually about half the blocks within the garden are given to kin and affines.

have complex names such as the *walangguk'ka* and *gilewanbaka* which mean a spirit's egg yam and the black ear yam respectively. However the etymology of many yam names was obscure to the Abelam themselves.

In Yenigo, a North Abelam village, no variety of *ka* was considered early or late nor was any variety considered more suitable than any other for any particular environment. In Stapikum in the Wosera, on the other hand, *wolimile* (called *nglamei* in the Wosera), which totalled about 27 per cent, of all *ka* weighed in the village, was planted first, and the *asagwa*, which totalled about 56 per cent, of all the *ka* weighed there, was planted about a month to six weeks later. In the Wosera the *asagwa* is usually grown on the alluvial river flats. It is the highest yielding yam and the indigenes say that the best soils are reserved for the best yams. The *asagwa* is also the variety that can best withstand flooding and damp conditions.



Plate I.—Several contiguous *ka* gardens in the West Wosera. These *ka* plants are mainly *maleka* and the vines climb up 'ropes' to the top of trees which serve as trellises. The horizontal logs on the slope are said to hold the soil.

Taro, mainly *Colocasia esculenta* with a few *Xanthosoma*, bananas,⁵ beans,⁶ green vegetables,⁷ sweet corn, tobacco, sugar cane, cassava, tomatoes, 'pit pit' (*Saccharum edule*), paw-paw and many other crops are interplanted among the yams. (Appendix A) The *ka* gardens are usually planted with yams at the beginning of the wet season (October) and the main harvesting takes place six or seven months later at the beginning of the following dry season (May or June). Other crops are planted and harvested in a more haphazard fashion. *Ka* gardens, usually just over half an acre in size, and having a fallow period of 10 to 20 years, have been described elsewhere⁸ and are not very different from other Melanesian lowland food gardens. The main point of interest is that yields of yams from the gardens are high when compared with other tropical areas especially as so many other crops are interplanted (taro alone yields at least two tons per acre). Typical yields from other tropical countries vary from three to six tons per acre⁹ but among the Abelam the average yield of all varieties of *ka* was nearly 20 lb. per plant giving an approximate yield of 8.4 tons per acre. It must be borne in mind, however, the variety planted, the techniques used and the environment in which the yam is planted all lead to great deviation from this figure. Yields between 40 and 70 lb. are quite common for *ka* grown by special techniques for ceremonial purposes. These techniques are very similar to those used to grow the ceremonial *wapi*.

Table 1.—Statistical Summary of Gardens in Yenigo Village 1961-1962.

Population 1962	....	....	....	234
Village Area	....	....	....	1,158 acres
Average number of <i>ka</i> gardens	....	....	....	51
Average number of <i>wapi</i> gardens	....	....	....	38
Average area under <i>ka</i> garden	....	....	....	32.59 acres
Average area under <i>wapi</i> garden	....	....	....	3.75 acres
Average size <i>ka</i> garden	....	....	....	0.69 acres
Average size <i>wapi</i> garden	....	....	....	0.10 acres
Total area cultivated per person per annum	....	....	....	0.15 acres
Number of <i>ka</i> per acre (approximately)	....	....	....	950 - 2090/ha
Number of taro per acre (approximately)	....	....	....	2,000

THE WAPI GARDENS.

The *wapi* gardens produce less than 10 per cent. of the yams in most villages and in terms of time and effort expended this is a very low

return. The *wapi* from the *wapi* gardens is, however, very important for the part it plays in the ceremonial and ritual life of the people. The 'Yam Cult' has been described elsewhere (Kaberry 1941, 1941-42, Forge 1962 and Lea 1964: 61-63) and the following sections are primarily concerned with the techniques of growing the large *wapi*.

The gardens are usually hidden from the casual observer by dense regrowth and by one or two barriers of sago fronds and canes. In Yenigo all the *wapi* gardens were on or near ridge tops on the friable soils originating from yellow siltstone, avoiding the heavier mudstone and colluvial soils on the lower slopes. Inside the outer barriers are a garden house and a high, strong pig-proof fence around the actual growing area. If two or more gardens are together, high but flimsy sago frond fences separate each garden. *Wapi* gardens are often in groups of two to nine contiguous gardens.

Wapi gardens are small and in 1961 and 1962 there were respectively 33 and 47 *wapi* gardens with an average of 30.7 yam holes per garden which gives a density of 340 *wapi* holes per acre. Many of the yams were in small holes 3 to 5 ft. deep. Only about six *wapi* in each garden were planted in holes up to 10 ft. deep which produce the huge tubers, which often weigh over 100 lb. and measure more than 6 ft. in length. The smaller holes usually produce tubers weighing between 25 and 60 lb.

Most villages have their favourite *wapi* garden sites; each site may be used for four years in succession and only left fallow for three to five years. Sixteen of the 1961 gardens in Yenigo were on the same site as 1960 gardens and ten gardens were being used for the fourth year in succession.

Only the *wapi* which produce long or heavy tubers are grown in the *wapi* gardens. Of the 41 varieties known to the author in Yenigo, only

⁵ Over 30 varieties of both taro and bananas.

⁶ *Psophocarpus tetragolobus* and *Vigna sinensis*.

⁷ The main green vegetables are *Brassica chinensis*, *Brassica* spp., *Abelmoschus manihot*, *Amaranthus tricolor*, *Amaranthus hybridus* and *Deeringia amaranthoides*.

⁸ Lea 1964: 78-110; Lea 1965.

⁹ International Bank 1965: 71; Barrau 1958: 45; Morgan 1959: 146; Johnston 1958: 115.

four were planted in nearly all *wapi* gardens, seven were commonly planted and nine were only occasionally planted. (Table 2) The remaining 21 varieties were seen only in the *ka* gardens. Occasionally a few taro are grown within the *wapi* gardens but their consumption is reserved for ceremonial occasions.

The Seed Wapi.

The *wapi* are stored in rows on the floors of yam houses, though any tubers over 5 ft. long are hung from poles (Plate II) and suspended from the roof of the yam house or some other house within the village which is not used for any domestic purpose. The largest of the yams are often allowed to rot after they have been exchanged and some of the other tubers used in exchanges are allowed to rot if an exchange is rejected.¹⁰ The yam sprouts at the head of the tuber about four or five months after the harvest and when the sprout is about a yard long it is taken to the garden, which has been completely cleared and prepared for planting.

Table 2.—Some Yield Data of the *Wapi* Gardens, Yenigo, 1961.

Variety of Wapi.	Total holes,*	Number Weighed.	Average weight lb.	Maximum weight lb.	Maximum length.	†
					ft. in.	
Yepmane	176	33	30.75	117	7 2	A
Mambatap	173	57	47.63	100	7 8½	A
Kwandjel	154	52	51.29	140	8 11½	A
Nggwokurpi	148	30	29.10	52	?	A
Mbalepane	54	20	29.80	49	?	B
Yame	42	8	49.63	76	7 0	B
Landji	42	7	27.14	40	6 5½	B
Tswagap	35	....	....	....	....	B
Wundunggul	28	9	26.89	42	?	B
Ambekurpi	23	8	24.00	43	5 8½	B
Yaambu	20	4	35.50	41	3 2	B
Tseam	5	....	....	....	....	C
Kwandji	4	....	....	....	....	C
Mane	4	....	....	....	....	C
Yilan	4	....	....	....	....	C
Kwarind'ngil	4	....	....	....	....	C
Mbut'nggup	3	....	....	....	....	C
Ambnumuna	2	....	....	....	....	C
Masu	1	1	50.00	50	?	C
Vi'a	1	....	....	....	....	C
Muna'	1	....	....	....	....	C

* Total holes planted (30 gardens only).

† Frequency of occurrence in the 30 gardens counted.

A Abundant.—In more than 20 gardens.

B Common.—In more than eight but less than 15 gardens.

C Rare.—In less than three gardens.

Immediately before planting takes place, the top 12 in. of the tuber, with the sprout attached, is cut from the rest of the tuber. This section is then hollowed out to prevent the seed tuber from rotting and planted in the mounds of the deepest holes where the largest of the yams will be grown. The rest of the tuber is cut into sections about a foot long. Some of these are hollowed out and planted immediately in the sides of the large yam mounds even though they have no shoots. Other hollowed out sections are put in the garden house and covered with mounds of moist earth taken from the *wapi* garden; this procedure is said to encourage the rapid development of the sprout. After two or three weeks the sections of the tubers have shoots and are planted in the gardens.

The Preparation of the Garden for Planting.

Clearing of the garden sites in Yenigo begins when the *wapi* first sprout which is between late September and early October. The clearing is not difficult and a garden which has been used for growing yams the previous year only needs to be weeded. A new garden site usually has a five-year fallow growth of low bush dominated by *Saccharum robustum*, and the only difficult work is removing the roots of the stumps of cane. The men do all the work in the *wapi* gardens with the exceptions of the final clearing and sweeping of the garden which is done by young girls and old women (i.e., those women who do not menstruate).

Food and sex taboos are observed by all the ceremonial *wapi* growers for about seven months of each year which is the time from planting until the final harvest. Most of the married males over 30 years of age are ceremonial *wapi* growers. The younger men, who help with the planting and who entrust one or two yams to the care of an older man, observe temporary taboos but relax them after the planting has finished. After planting, only those men observing all the taboos are allowed in the gardens until the harvesting takes place. Women are inimical to the growing of the yams and the strongest of

¹⁰ In a hostile exchange between a man in Yenigo and a man of Naramco, the Yenigo man let some Naramco yams hang in the rafters of a 'talking' house until they were rotten. This made the Naramco man very angry and resulted in a new series of exchanges in which the Naramco man refused to accept a yam. This also was left in a prominent place and left to rot.



Plate II.—Preparing to weigh a *wapi*. The yam was attached to a pole with rattan supports.

all the taboos is on sexual intercourse.¹¹ Other taboos prohibit the eating of meat and fish, and they are not allowed to accept any food from anyone but their wives, who are assumed to be observing similar taboos.

The Planting of the Wapi Garden.

By late October both the gardens and the seed tubers are ready for the planting.¹² Holes from 8 to 12 ft. apart are dug to depths varying from 3 to 10 ft. One boy or young man digs each hole and two to five men break up the clods of earth as they are thrown up. The top soil is kept to one side, separate from the sub-soil. Usually two to four holes are dug at the same time so the work force within the garden will consist of about 15 men, some working, some resting and some just looking, supervising or talking.

On the day after the digging, the boys are dismissed and the men proceed with the planting. A long piece of cane is first placed in the middle of the hole and then the soil, carefully broken by hand, is put back into the hole; top soil goes

into the centre of the hole and the sub-soil around the outer edges of the hole. Additional top soil is collected from the surrounding area, 6 to 12 ft. from the centre of the hole and is added to create a cone-shaped mound 3 to 4 ft. above the surface of the ground which has been slightly lowered by the removal of the top soil. (Figure 3) The cane down the centre of the hole is then removed leaving a small hole and the hollowed out seed tuber is placed on top of the mound¹³ with the roots over the small

¹¹ "The cultivation and distribution of long yams may be termed a phallic cult". (Kaberry 1957: 7), Mahony (1959: 9) and Defugin (1959: 61) note similar taboos in Ponape and Yap. In one yam garden in Yenigo, nearly all the yams died and the planter admitted that he had had sexual intercourse.

¹² Like the *ka*, planting of the *wapi* among the Woseras and the Abelam west of Maprik is earlier than in Yenigo. Planting in the Wingei area is even later than in Yenigo.

¹³ Before the seed yam is planted it is first rubbed with strong smelling magical leaves and grasses. Each *wapi* variety has an acknowledged expert who is sometimes called in to do these tasks and to generally supervise planting. More often the yam planter performs his own magic.

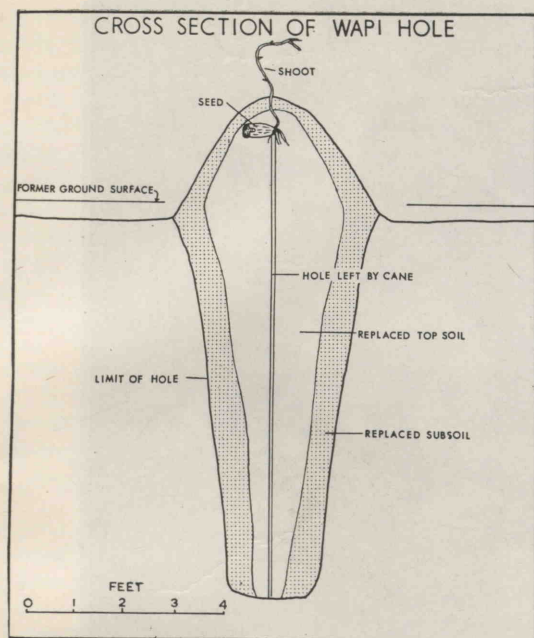


Figure 3.—A cross section of a *wapi* hole.

hole. The tuber is then carefully covered with soil so that the shoot comes out of the top of the mound. The mound is patted firm with sub-soil, which is more resistant to erosion than the top soil, in a layer over all the outside of the mound. (Plate III) The mounds are decorated with hibiscus flowers and a sprouted coconut is placed alongside the yam and will remain there until the harvesting.

Most *wapi* gardens contain about 6 to 10 large *wapi* and each one takes between 25 to 35 man hours to plant. The smaller *wapi*, usually at the bottom of the garden,¹⁴ are each planted in about four man hours for the holes are only about 3 ft. deep and they are not planted with as much care as the large *wapi*.

The Care of the Wapi.

The growing point of the shoot is nipped off with thumb and forefinger when the shoot is 3 or 4 ft. long; below this cut two to eight new shoots develop. Pieces of cane radiating out from the top of the mound guide each shoot on to the main trellis which is 20 to 30 ft. high. (Figure 4) If the land is level, rows of *wapi* may be planted on both sides of the trellis.

Smaller yams at the bottom of the garden usually have a lower and more simple trellis.

After the trellis is made the garden is kept clean weeded by the yam grower, errant shoots are trained onto the trellis, much magic is performed¹⁵ and the tubers are periodically inspected. The first inspection hole is made into the top of the yam mound about two months after planting and, if more than one tuber is developing, all but the largest are removed. After about four months inspection holes are dug to see how

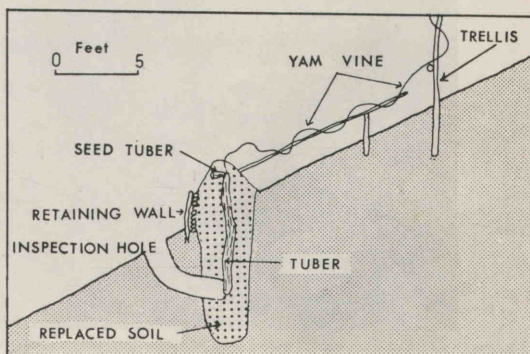


Figure 4.—A cross section of a ceremonial *wapi* hole on a hill slope. The trellis is often from 25 to 30 ft. high.

¹⁴ cf. The Fijian practice where "...planting of best seed yams is at the bottom of the slope where the soil is deepest" (Watters 1960: 44). In Stapikum the biggest of the *wapi* were also planted at the bottom of the garden because on the top slopes soils were generally shallow and hard sandstones often outcropped or lay close to the surface. In Yenigo the higher, friable and better drained soils originating from siltstone were considered infinitely better than the lower, heavier and often colluvial soils.

¹⁵ After planting there are three main periods of magical activity and the magic varies a little with each variety of *wapi*. The first stage is when the garden is cleansed of all female influence; the second is when the vine is encouraged to climb to the top of the trellis and the final stage is when the development of a large tuber is urged. Cooked mixtures of strong smelling leaves are the main ingredients though leaves of large creepers are important ingredients in the second stage and pounded roots of the same creepers are important in the final stage. The mixtures are poured into small holes made in the yam mounds. In all stages appeals are made to the *nggwalndu* (ancestral spirits) to look after the yams. Carvings representing the *nggwalndu* are placed in the *wapi* garden houses to watch over all stages of the *wapi* growing.



Plate III.—The ceremonial *wapi* has been planted and two men are firmly patting down the outside of the mound and making it smooth.

the tuber is developing.¹⁶ (Figure 4) Soil is carefully loosened around the growing point, magic paint is put on the side of the tuber¹⁷ and the soil is replaced. There may be two to four of these inspections before the harvest. At the last inspection the approximate length of the tuber is measured and pieces of cane of equal lengths to the tubers, are put in a line in the hamlet of the grower. These tallies advertise the proficiency of the grower and herald the coming exchange and associated 'sing-sings'. The yam is considered mature when the creeper dies and short rootlets appear at the growing point of the tuber.¹⁸

The Harvesting of the Wapi.

The *wapi* are individually harvested as they mature, about seven months after planting. The varieties of the sub-type *kurpi* (*nngwokurpi*, *mbalepane* and *ambekurpi*) usually take about eight months to mature and they are harvested and exchanged later than the other varieties.

When each yam is dug out, a narrow trench about 2 ft. wide and 6 ft. long is made so that the tuber, which grows vertically downward, is

at the head of the trench. (Plate V) Most of the soil is removed by digging sticks and hands though spades are sometimes used for removing soil from that part of the trench furthest away from the tuber. Near the plant dibble sticks and fingers carefully pry away the soil from around the tuber. Because *wapi* are often over 6 ft. in length they need very careful handling and as many as six men may be needed to lift them out and carry them to the garden house. Here they remove all soil from

¹⁶ Mahony (1959 : 9) notes similar techniques in Ponape.

¹⁷ Forge (1962 : 10) writes, "The supposed action of the paint was described to me as follows:—the paint is so 'hot' that it irritates the sides of the yam . . . , and the yam squirming and stretching to relieve the irritation drives itself further into the ground thus getting longer and longer".

¹⁸ As soon as a yam grows to more than about 5 ft. 6 in. it is given a name. These names are the same as may be given to a man, for example they may be named after an ancestor, or they may even be given satirical names. In an exchange in 1961 a man was called 'driman', which is Pidgin for a dreamer, by his exchange partner. This man grew a large yam in 1962 and he called it 'driman'.



Plate IV.—A *ka* garden shortly after it has been planted. The mound at the bottom right contains two *wapi*. A small retaining wall supports the mound and crossed supports take the vine to the trellis at top left. The *ka* garden also is planted with taro, sweet corn and tobacco.

the tuber with their fingers and small sticks until it is quite clean. The yam is then suspended from a pole by cane rope, tied so that it is supported every 9 in. The pole is then lashed to the rafters of the garden house until the yam needs to be decorated and prepared for exchange.

Yields from the Wapi Gardens.

Although of some value, the yield data shown on Table 2 should not be regarded as giving accurate data nor will it stand any sort of analysis. It was impossible to collect valid yield data from the *wapi* gardens for the following reasons:—

1. There were numerous taboos and a desire for secrecy in the *wapi* gardens. When my wife was in the field I was asked not to go into the *wapi* gardens between planting and harvesting and I had to make observations from over the fences.

2. No one would let me weigh the tubers until after they had been presented to the *tshambera* (exchange partners). This was mainly through fear that the tuber might get damaged but also partly because they thought that the yam, almost humanized, would be offended.¹⁹ It was impossible to check on all yams for the small ones often were not exchanged and the long *wapi* frequently changed hands again after they had been given to *tshambera*.

3. All large *wapi* were weighed while attached to a pole. It was impossible to watch all lashings and the scale at the same time so some of the readings are probably inaccurate.

4. The number of big *wapi* planted in each *wapi* garden depended on the ambitions of the yam grower and the amount of labour

¹⁹ Often the yams are spoken of as being 'like men' for they have spirits and can hear but cannot speak (Kaberry 1941: 356).



Plate V.—Harvesting a *wapi*. This particular tuber weighed 98 lb. and was 7 ft. 8½ in. long.

on which he could call. Thus the density of planting varied greatly from garden to garden.

5. Sometimes two *wapi* were planted in the same hole. In the 30 gardens counted (2.66 acres) there were 921 *wapi* holes which gives an average density of 346 holes per acre; however I estimate that there were about 1,150 tubers harvested.
6. Many of the gardeners were ashamed of small specimens which were either discreetly hidden in the yam houses or eaten immediately by the yam grower and his family.

The average yield of all *wapi* from the *wapi* gardens was 39.65 lb., but, as many of the smaller ones were not weighed (see 6 above) the actual average yield per tuber is certainly somewhat lower, probably around 33 lb. However, as there are sometimes more than one tuber per hole, the yield would be approximately 41 lb. per hole, giving a total yield per acre of

about 6.3 tons. By referring to Table 1 the total product of *wapi* in Yenigo is only about 24 tons a year which is very little compared with the 285 tons of *ka*.

Maximum weight and length of various varieties are also shown in Table 2. The *kwandjelwabi* weighing 140 lb. and measuring 8 ft. 11½ in. in length was the longest tuber seen in 1961 or 1962 though cane markers showed that in previous years yams up to 11 ft. 8 in. in length had been grown.²⁰ Such huge tubers make the Abelam rather unique among yam growers although yams up to 8.5 ft. long have been found in New Caledonia (Barrau 1956a : 399, 1958 : 45) and yams weighing 250 lb. have been reported on Rotuma (Hartley 1963 : 60) and Burkill (1935 : 815) mentions yams up to 130 lb. in the Malay Peninsula.

CONCLUSION.

With a gradual decline in the indigenous culture the ceremonial incentive is becoming less important and men are finding new outlets for their time in cash cropping, agreement work, inter-village visiting and travel. (Many of the younger men no longer grow ceremonial *wapi*, and many of those that do plant the *wapi* in *ka* gardens, don't bother to observe the taboos or to grow huge tubers.) Also as more non-seasonal crops such as sweet potato, and crops easier to cultivate such as cassava, become more common and trade store foods become more predominant in the diet, taste prejudices and the keeping quality of the yam are not as significant. Thus it seems inevitable that the yam among the Abelam will follow the fate of the yam in New Caledonia (cf Glaumont 1897 and Barrau 1956b), Fiji and many other Pacific Islands—it will become less important in the diet and the techniques of growing ceremonial yams will gradually become moribund.

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²⁰ This yam was grown in Naramco just before the war. It was called *isimban* and was a *mambatap wapi*. Cane markers are always accurate for *ishambere* see to it that there is no exaggeration. Kaberry (1957 : 41) measured one yam 11 ft. 2 in. long in Kalabu.

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APPENDIX A.

SOME PLANTS IDENTIFIED IN 'THE MAPRIK AREA.'

In the right hand column the Abelam name, as spoken in Yenigo village, is shown italicized, the English name follows in ordinary print and the Pidgin English name follows in inverted commas.

Garden Plants.

Botanical name		
<i>Abelmoschus manibot</i> (L.) Med.	<i>tsagne</i> (many variety names), 'apika'.	
<i>Allium</i> sp.	onion, 'anien'.	
<i>Amaranthus hybridus</i> L.	<i>kumbur'ie</i> aliagwus (Wosera) 'aupa'.	
<i>Amaranthus tricolor</i> L.	bare, 'aupa'.	
<i>Amaranthus</i> sp.	<i>wuraman</i> , leaves eaten. A coarse wild variety fed to pigs.	
<i>Ananas comosus</i> (L.) Merr.	<i>uan na djuia</i> , pineapple, 'ananas'.	
<i>Arachis hypogaea</i> L.	peanut, 'kasang'.	
<i>Brassica chinensis</i> L.	Chinese cabbage, 'kabis'.	
<i>Brassica</i> c.f. <i>junceae</i>	<i>mil</i> , 'kabis'.	
<i>Capsicum</i> sp.	chilli.	
<i>Capsicum frutescens</i>	capsicum, 'lambau'.	
<i>Carica papaya</i> L.	<i>mbale-minya</i> , paw-paw, 'popo'.	
<i>Celosia cristata</i> L.	<i>kumbur'ie</i> (leaf eaten).	
<i>Citrullus vulgaris</i> Schrad.	water melon, 'melen'.	
<i>Coffea canephora</i> Pre.	Robusta coffee.	
<i>Colocasia esculenta</i> (L.) Schott	<i>Mai</i> and <i>waula</i> (many varieties), taro, 'taro'. Leaves eaten of four varieties.	
<i>Cucumis sativus</i> L.	<i>amangg</i> , cucumber, 'kukamba'.	
<i>Cucurbita maximima</i> Duchesne	squash.	
<i>Cucurbita pepo</i> DC	pumpkin. (shoots eaten) 'pamken'.	
<i>Deeringia amarantoides</i> (Lmk.) Merr.	<i>winba</i> , 'kumul'.	
<i>Dioscorea bulbifera</i> L.	<i>lipma</i> , aerial yam, 'patata'.	
<i>Dioscorea alata</i> L.	<i>wapi</i> , yam, 'yam'.	
<i>Dioscorea nummularia</i>	<i>wapi</i> , yam, 'yam'.	
<i>Dioscorea esculenta</i> Bkl.	<i>ka</i> , yam, 'mami'.	
<i>Dioscorea pentaphylla</i>	<i>yabweo</i> , yam.	
<i>Ficus wassa</i> Roxb.	<i>kwandjel</i> , 'kumul'.	
<i>Ipomoea batatas</i> (L.) Lam.	<i>kiwika</i> , sweet potato, 'kau kau'.	
<i>Lycopersicum esculentum</i> Mill.	tomato, 'tomato'.	
<i>Manibot esculenta</i> Crantz.	<i>tsagopi</i> , cassava, 'tapiok'.	
<i>Musa</i> spp.	<i>lapu</i> , (many varieties), bananas, 'banana'.	
<i>Nicotiana tabacum</i> L.	<i>nyinggwus</i> , tobacco, 'brus'.	
<i>Oryza sativa</i> L.	rice, 'rais'.	
<i>Psophocarpus tetragolobus</i> (L.) DC	<i>mbermargu</i> and <i>kwasi-minim'gwu</i> , green and red winged bean.	
<i>Saccharum edule</i> Hassk	<i>kundia</i> , edible 'pit-pit'.	
<i>Saccharum officinarum</i> L.	<i>nggui</i> , sugar-cane.	
<i>Vigna sinensis</i> (L.) Savi.	<i>bin ma'gwu</i> , long bean, 'bin'.	
<i>Xanthosoma</i> sp.	<i>ya'mei</i> , 'taro kong kong'.	
<i>Zea Mays</i> L.	<i>tsua ma'gwu</i> , sweet corn, 'kawn'.	

NOTES.—

1. The following garden plants are also grown outside the gardens: *Abelmoschus manibot*, *Amaranthus* spp., *Ananas comosus*, *Arachis hypogaea*, *Brassica* spp., *Capsicum* spp., *Cucumis sativus*, *Cucurbita* spp., *Manibot* spp., *Musa* spp., *Nicotiana tabacum*, *Lycopersicum esculentum* and *Celosia cristata*.

2. Fronds from the following ferns are also eaten:—*mbandjip*, *mbumi*, *wangguk*, *tserai*. See also some edible shoots under palms. Also many wild Cucurbitaceae eaten: *tsargelen*, *kwarmbut* (*Trichosanthes* sp. ??) *marie-kinjo*, (*Luffa* sp.) *arsel*, *yamekinjo* (leaf also eaten), *katabi*.

Some Food Producing Trees and Plants.

Botanical name		
<i>Annona muricata</i> L.	<i>mi-wal</i> , soursop, 'kapiok'.	
<i>Areca catechu</i> L.	<i>masa</i> , betel nut palm, 'bwoi'.	
<i>Artocarpus atilis</i> Fosberg	<i>talumba</i> and <i>kam</i> , (nuts only eaten), breadfruit, 'kapiok'.	
<i>Artocarpus atilis</i> Fosberg	<i>wal</i> (flesh and nuts eaten), breadfruit, 'kapiok'.	
<i>Bambusa</i> sp.	<i>danggwu</i> , bamboo with edible shoots.	
<i>Canarium</i> sp.	<i>mainggio</i> , 'galip'.	
<i>Carica papaya</i> L.	<i>mbale-minya</i> , paw-paw.	
<i>Citrus</i> sp.	lemons, limes, etc.	
<i>Cocos nucifera</i> L.	<i>tipma</i> , coconut, 'kokonas'.	
<i>Dioscorea</i> cf. <i>alata</i> L.	<i>duawapi</i> , yam, 'wild yam'.	
<i>Diospyros</i> sp.	<i>kelau</i> (inside kernels of fruit eaten).	
<i>Ficus</i> aff. <i>F. cynaroides</i> Corner	<i>mar'ru</i> (shoot and fruit eaten).	
<i>Ficus copiosa</i> Steud.	<i>kwarmbi</i> (nut <i>kombasik</i>), 'kumul'.	
<i>Ficus wassa</i> Roxb.	<i>kwandjel</i> , 'kumul'.	
<i>Graptophyllum</i> sp.	<i>mbar'gl</i> (leaf eaten often planted in hamlets).	
<i>Gnetum gnemon</i>	<i>yuit</i> , 'tulip', leaf and fruit eaten.	
<i>Kleinbovia hospita</i> L.	<i>weireman</i> , leaves eaten—also tree of the fallow.	
<i>Mangifera indica</i> L.	<i>tsake</i> , introduced mango.	
<i>Mangifera minor</i>	<i>tsake</i> , native mango.	
<i>Medusanthra papuana</i> Becc.	<i>mi-tip</i> , leaves eaten. Also fallow tree.	
<i>Merremia vitifolia</i> (Burm. f.) Hellier	<i>nyambil</i> , 'wild bin'.	
<i>Metroxylon sagu</i> Rottb.	<i>nang</i> , sago, 'sak sak'.	
<i>Morinda citrifolia</i> L.	<i>tsimbia</i> (the red-hot fruit).	
<i>Pandanus conoides</i> ?	<i>dkwia</i> , 'arang' or 'garoka'.	
<i>Phaseolus lunatus</i> L.	<i>dungumene</i> , a pea-like plant of the early fallow—immature white seed eaten.	
<i>Piper betle</i> L.	<i>kwarsi</i> , 'daka'.	
<i>Pometia pinnata</i> For	<i>wa</i> (many varieties), 'taun'.	
<i>Syzygium malaccense</i> L. Merr. and Perr.	<i>nggwanggale</i> , Malay apple, 'lor lor'.	
Leguminosae	<i>kwarandungu</i> (leaf eaten. Often planted to mark boundaries).	