

# THE COMPARATIVE ETHNOBOTANY OF AFRICAN AND ASIAN YAM CULTURES

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## SUMMARY

Yam cultivation is postulated to have its origin in mesolithic times when a cultural continuum existed from New Guinea to Africa, before the development of the countries of origin of grain crops further north during the neolithic period. That the greatest subsequent development of yam-based cultivars occurred at the extremes of this continuum is attributed to later inter-actions with the respective grain-based civilizations of the Far and Near East. Man himself is conceived as being domesticated by his crops, and yam-based cultures are more in harmony with their ecosystems whereas grain-based cultures are more interventionist.

## RESUME

On situe l'origine de la culture d'igname aux temps mésolithiques quand un continuum culturel s'était établi entre la Nouvelle Guinée et l'Afrique avant le développement des pays où les plantes à graine avaient leur origine en allant plus au Nord pendant la période néolithique. Le fait que des cultivars ayant pour base l'igname se soient par la suite développés à grande échelle aux extrêmes de ce continuum est attribué aux interactions ultérieures avec les civilisations de l'Etrême et du Proche Orient qui ont pour base la culture des plantes à graine. On considère que l'homme lui-même est domestiqué par les plantes qu'il cultive et les cultures basées sur l'igname sont plus en harmonie avec leurs écosystèmes alors que les cultures basées sur les graines sont plus interventionnistes.

## BESUMEN

Se postula que el cultivo del ñame tiene sus orígenes en la época mesolítica cuando existía un medio cultural ininterrumpido desde Nueva Guínea a Africa, antes del desarrollo de los países donde se originaron los cultivos de grano — más al norte — durante el período neolítico. Se atribuye a posteriores interacciones con las respectivas civilizaciones del Lejano y Medio Este basadas en los cereales, que el grandioso desarrollo subsecuente de cultivares basados en el ñame haya ocurrido en los extremos de ese medio continuo. El hombre mismo se concibe como domesticado por sus cultivos y las culturas basadas en el ñame están más en armonía con sus ecosistemas; en tanto que las culturas basadas en los cereales, son más intervencionistas.

## INTRODUCTION

If there is to be concern with the present status of root crop production in the world, and with the development of such production in the future. It is appropriate also to try to understand something of the past. Agricultural science developed in Western Europe and hence has been influenced by European modes of thought: these in turn were influenced by cultural concepts ultimately derived from the so-called 'Neolithic Revolution' of South-Western Asia of 7 to 10 millenia ago, where propagated grain crops and a number of animal species, but not vegetatively propagated root crops, were domesticated. Various authors<sup>7,16,39</sup> have drawn attention to the interpenetration that has occurred between scientific thought and the folk ethnocentrism of Western Europe, and to the confusion generated by this that arises when tropical food production systems are being considered.

One outcome of this interpenetration of ideas is the frequent supposition that a non-grain-using, or a pre-grain-using culture is at a low order of evolution. Nevertheless, in connection with the cultivation of yams there are two major areas in the world to which, quite independently, the term "la civilisation de l'igname" has been applied. The first of these is that part of West Africa between central Ivory Coast and the Cameroun where root crops, especially yams, are the dominant staples<sup>14,18,31</sup>. The other is that part of the Indo-Pacific, mainly Melanesia, but extending also into Micronesia and Polynesia, where yams and other vegetatively propagated crops are important<sup>22</sup>. Yam cultivation in the Pacific area has been considered in detail by Burkill<sup>8,9</sup> and by Barrau<sup>4,5,6,7</sup>.

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## BOTANY

The African and Asiatic species of *Dioscorea* have long been isolated genetically from each other: probably since the Miocene and in any case since before man's appearance in the world. The differences between Asiatic and African species are, however, far less than between Old World and New World *Dioscorea*, where divergence occurred much earlier in geological history. There are close morphological parallels between many African and Asiatic species, even in the wild state<sup>14</sup>.

Man has thus domesticated different species of yam in the two continents (see Table 1), but in each continent yam utilization tends to be dominated by a single cultigen. In Asia the cultigen *D. alata* is of the greatest importance, though *D. esculenta* (a species which has no parallel in Africa) and some others are also widely grown. In Africa the extremely similar cultigen *D. rotundata* is the commonest in cultivation, even though several other species are cultivated, and in the earlier times a greater number may have been utilized.

It is remarkable that both *D. alata* and *D. rotundata* are considered as cultigens, i.e. artifacts of domestication by man, which are known in the 'wild' state only as escapes from cultivation. The Asiatic species is believed to have originated from spontaneous hybrids between *D. hamiltonii* Hook and *D. persimilis* Prain et Burk., which are regarded as being two closely related species whose natural ranges overlap in Northern Burma and Thailand<sup>8,9</sup>. The ancestry of the African species is less clearly understood but it may have originated<sup>3,15</sup> from *D. cayenensis* and a savanna species, perhaps *D. praehensilis*, with a possibility of a second savanna species *D. abyssinica* Hochst also contributing to its ancestry.

Both cultigens belong to the section Enantiophyllum of the genus *Dioscorea* whose members are characterized by the formation of a single large tuber with only limited formation of subsidiary tubers. Both have probably been in predominantly vegetative propagation while under domestication since fertile seed is only very rarely formed.

## ASIAN YAM CULTURES

In his early work on the origins of cultivated Asiatic yams, Burkill<sup>8</sup> assumed that the emergence of cultivated forms was comparatively recent; that domestication occurred subsequently to the introduction of grain-based agriculture into both India and China; and that the pressures generated between these two grain-based cultures on the aboriginal peoples of the S.E. Asian peninsula provided the initial stimulus for yam domestication, at a date only about 2000 to 3000 BP. Although there is evidence supporting the hybrid origin of *D. alata*, also one can well agree that it is in tropical, as opposed to equatorial, regions that large-tubered forms of plants are most likely to have a selective advantage (as the fluctuation in seasonality between wet and dry makes a large, and more esculent, organ of dormancy necessary). The dates suggested for domestication are now considered far too recent.

The original concept of a separate origin of agriculture in the S.E. Asian region can be attributed to Haudricourt and Hedin<sup>24</sup>, and after being popularized by Sauer<sup>35</sup> was developed substantially further by Barrau<sup>5,6,7</sup>. These writers postulate that vegetatively propagated crops were brought into symbiotic association with man in S.E. Asia area independently of the S.W. Asian "Neolithic Revolution" and perhaps at a much earlier date. The aroid *Colocasia esculenta* (L.) Schott was probably the first plant to be domesticated in this area and was brought into cultivation by littoral or riverain people dependent on fishing as their major nutritional base; this crop was subsequently developed in cultivation particularly in the moister areas<sup>5</sup>. The yams, essentially plants of somewhat drier conditions than those in which *Colocasia* is best adapted are associated with regions of higher seasonality of rainfall, i.e. the savannas rather than the forests, and were suggested as somewhat later, but still exceedingly early, domesticates. Cipriani has also suggested<sup>13</sup> that they may have been the first plants ever to be cultivated. These ideas are now beginning to receive some firm archaeological support. Though recognizable fragments of neither aroid nor yam material have so far been isolated in excavations, both artifacts and findings of other plant material indicate an association between plants and man at dates around 10,000 BP in various parts of S.E. Asia. Evidence which has recently been reviewed<sup>12,37</sup> suggests a separate and earlier agricultural revolution, independent of the 'Neolithic Revolution' of S.W. Asia.

On most of the S.E. Asian mainland and many of the neighbouring islands the cultivation of aroids and yams is now of secondary importance although these crops are still known and used. Displacement was initially by rice (which may have been originally<sup>12</sup> a weed in flooded *Colocasia* fields); by dry land grain crops of more recent introduction; and, in the last few decades, by cassava. But before this displacement occurred these crops were carried by the Polynesian migrations, archaeologically dated between 4000 and 3000 BP, to the furthest reaches of the inhabited Pacific Ocean, and in many parts of this area they are still of very great importance.

It is in Melanesia, the area based on New Guinea and extending through the Solomons, New Caledonia and Fiji, that the cultivation of root crops, and particularly yams, has survived to the present day as the core of the agricultural complex. Parts of this area were designated by Haudricourt as "la civilization de l'igname". Within this large and climatically diverse region, there are variations, depending basically

upon ecological factors, as to whether yam or *Colocasia* is favoured, and the whole production system of the area has also been modified within recent centuries by the introduction of the sweet potato (*Ipomoea batatas* (L.) Lamk.) which made possible extensive colonization of the New Guinea highlands where the climate is too cold for either yam or *Colocasia* to grow well. Throughout the area, the yam more than any crop is not only the major food but is also the focus of the socio-cultural system. In most of Melanesia there is a complex of ritual and socio-religious beliefs associated with almost every phase of the cultivation, storage and handling of yams. Although other species are also respected for their value as food, these cultural associations relate mainly to *D. alata*. For example, a practice has been described of growing giant tubers of *D. alata*, (frequently more than 2 m long and weighing more than 50 kg) under very carefully ritually controlled conditions<sup>25,28</sup>, and there exists a highly complex system of ritual exchanges of yams between individuals and groups and sexual taboos associated with yam cultivation by which total celibacy is insisted upon during the entire growing season<sup>28,29,33</sup>. Of ritual as an aid to history Campbell<sup>11</sup> has written "Ritual is. . . the DNA of society, the encoded informational basis of culture. . . the memory core of human achievement."

Recently evidence has been produced for the existence of horticultural systems closely similar to those of the present day, at dates around 5000 BP in New Guinea<sup>33</sup>. These dates would be consistent with the origin of the yam and *Colocasia*-based agricultural systems in New Guinea being derived from earlier cultures of mainland S.E. Asia.

In addition, there exist in several parts of Asia, small, isolated groups of people who are culturally and ethnically distinct from their neighbours, and who utilize yams as their major staple. Notable amongst these are various Indian hill tribes such as the Kadar; the Veddas of Sri Lanka; the Andaman Islanders; the Semang and Malaya and various aboriginal groups in the Philippines<sup>16</sup>. These people are at an early level of cultural evolution and have often been described by ethnographers as being completely non-agricultural. However, as pointed out by Burkill<sup>10</sup> referring specifically to the Andamans "They make *D. glabra* a crop plant to the small extent that the elders issue a taboo on the digging of the yams in the season of new growth" and, as has been pointed out elsewhere<sup>7,16,18</sup>, ritual practices associated with this "protection" of the wild yam may be regarded as an incipient stage of horticulture.

The food plants of the Australian Aborigines, at least in the Northern part of the continent, are similar to those of tropical Asia, New Guinea etc.<sup>20</sup>, and even amongst these people, there are what might be termed proto-agricultural rituals and concepts, similar to those of some of the relict Asian groups.

## AFRICAN YAM CULTURE

Though yams are cultivated and utilized to some extent through most parts of Africa which are ecologically suitable for their growth, the main concentration occurs in the West African "Yam Zone". Here *D. rotundata* is the principal species although various other species are also grown. It is, however, with *D. rotundata* that the greater part of the human cultural aspect of yam growing is associated. In fact in more than one West African language, the name applied to this species signifies some such concept as "proper yam"<sup>3</sup>.

A major ethnobotanical difference between the African and S.E. Asian areas is that in old Africa no aroid crop, adapted to swamp or at least high moisture conditions was domesticated to any substantial degree, comparable to the domestication of *Colocasia* in Asia. Today however *Colocasia* is widely known in Africa (together with the recently introduced *Xanthosoma* of American origin), but it is an introduction of only the last millenium or two. Some wild African aroids (*Amorphophallus* and *Anchomanes* spp.) are occasionally eaten but they have never been developed to any extent as cultivated plants. In contrast therefore to the Asian situation where aroid cultivation developed in the more humid areas and yam cultivation in the areas of seasonal humidity, in Africa one must look for the origins of root crop agriculture mainly in the savanna areas and in association with the yam.

Against this however must be considered the biological origin of *D. rotundata*. One of its parents, *D. cayenensis*, is itself a forest species and other parent or parents savanna species. *D. rotundata* may have arisen initially at the forest/savanna ecotone, as we have discussed elsewhere.

Today an enormous range of cultivated forms exists which shade imperceptibly from pure *D. cayenensis* on the one hand to something very close to an improved form of *D. praeheasilis* at the other end. Although a considerable number of these cultivated forms have been studied<sup>40</sup> and others have been recently collected and established in Puerto Rico, the cultivated material in existence in West Africa, has never been exhaustively studied. Serious erosion of the genetic resources is taking place both through the displacement of yam cultivation by rice and cassava and also by the spread of the particularly favoured cultivars of yam. In Ghana, for example, it is believed that some 80 percent of yam production is accounted for by two particular cultivars. High priority should be given to fully collecting and cataloguing the existing West African cultivars to prevent them from being lost forever<sup>14,17</sup>.

In West Africa, yams are not only a major nutritional source but, at least until recently, a focus of human culture. Comments on the importance of yams and their social and even religious significance have been made spasmodically by visitors to West Africa since the 16th Century, but little attention has been

devoted to the subject by ethnographers or anthropologists, and little reliable information appears in the literature.

In the yam growing areas, before the impact of Western education and influence, the farming cycle concerning the yam was also the basis of the human social calendar, dominated by the annual ceremony held to open the yam harvest<sup>18,32</sup>. Other events in the farming year were also associated with social, cultural or religious festivities, few of which have been well documented. Yam was an essential constituent of sacrifices or other offerings in the traditional religious systems; in at least parts of the Yam Zone of West Africa the yam is associated with particular deities in the traditional religious systems<sup>2,32</sup>. A man's social position may be related to his competency as a yam farmer; theft of yams may be regarded as a more heinous crime than theft of other goods, even of greater value.

These and other philosophical concepts related to African yam cultivation have been discussed elsewhere<sup>14,18</sup> but, just as there is a need physically to collect the African yam cultivars before they are lost, there is a need for ethnological study of traditional concepts and practices relating to yam cultivation before these too finally disappear. Many traditional customs are now confined to the older generation. Such a study should be of value in understanding the historical development of production systems, and be a guide towards the future development.

Traditions strongly suggest yam cultivation antedates the introduction of the use of iron, which occurred approximately 2000 BP. Many writers have assumed that agriculture of any sort in Africa can only have arisen since the trans-Saharan Neolithic contacts with the middle east: while there is little doubt that such factors would have influenced and accelerated the development of any existing agricultural system<sup>1</sup>, the beginning of the agricultural evolution may well be considerably older and of purely African origin. The collection of wild yam has been related<sup>19</sup> to African artifacts dated ca. 50,000 BP, while an analysis based on both climatic changes, and changes in the human population that are archaeologically recorded by appearance of microlithic industries in West Africa suggests a major cultural change approximately 10000 BP. We have suggested that this coincides with the appearance of organized production of yams based on the selection and protection of natural hybrid yams at the rain forest/savanna ecotone<sup>3,15</sup>.

## ORIGINS OF THE YAM CULTURES

Current views on plant domestication<sup>21</sup> suggest that, whereas grain crops were domesticated in the sub-tropical areas of S.W. Asia and middle China, in closely circumscribed areas that can be regarded as Centres of Origin in the Vavilovian sense, the tropical and equatorial crops were domesticated over wide, diffuse areas or "non-centres" in sub-Saharan Africa and in South-East Asia. These broad areas were originally culturally separated from the more northerly centres, although as history proceeded, cultural interaction took place between each centre and its equivalent "non-centre". Yams in both Africa and Asia can be regarded as domesticates of the "non-centres".

Although different yam species were domesticated in the two areas, a parallelism of evolution can be found not only in the morphology of the plants themselves, but also in the cultural complexes built up around them. In particular, the protocultural phase of evolution which we have postulated elsewhere<sup>18</sup> for the African yam cultivation is a parallel with that in the less advanced Negrito and similar relict peoples of Asia. That these relict groups, whose cultures, though primitive, can be considered to be of much higher antiquity than those of major civilizations (Indian and Chinese) of Southern Asia, have similar practices despite their isolation suggests that the first steps towards yam domestication (in Asia) may have been taken by the remote ancestors of these people, when they were much more widely spread through tropical Asia than they are today. The presence of similar customs amongst the Australian aborigines, who first reached that continent 30,000 BP and whose stone tools resemble very early African and pre-Aryan Indian artifacts<sup>27</sup> also suggests extreme antiquity for at least the beginnings of the man/yam symbiotic relationship. Davies<sup>19</sup> and I<sup>15</sup> have already suggested similar extreme antiquity for the initiation of similar man/yam symbiosis in the African "non-centre". Indeed it appears that some form of cultural continuum may have existed in extremely early times right across the tropical Old World from West Africa at one extreme to New Guinea at the other. If so, then the development of the man/yam relationship into a true agriculture at the two extremities of such a continuum, could have occurred under the later influence in each extreme area of cultural contact with a grain-based civilization.

One could term this early phase of proto-agriculture the "Mesolithic Revolution", based on the "protection" or partial domestication of vegetatively-propagated plants.

The hypothesis of such a cultural continuum is supported from an unexpected direction, by ethnomusicology. Sophisticated, computer-based statistical taximetric techniques have been used to analyse the traditional music patterns of a great number of different ethnic groups and classify them according to their degree of similarity. In this study, it was found that higher orders of correlation exist between the music of Africa, Melanesia and the relict Indian groups, all within this postulated cultural root crop using continuum, than would be expected without very early contact between such widely separated groups. This hypothesis for the origins of yam-based agriculture conforms with the views of Lomax and Berkowitz<sup>30</sup> "that a con-

tinuous ring of gardening cultures once linked Oceania to Africa" of which "only traces of this ancient human distribution seem to have survived the incursion of higher cultures."

## DOMESTICATION OF MAN

It could be said that domestication is a reciprocal process, and that man has been domesticated by his crops just as he has domesticated them. The consequences for man of the evolution of various food production systems have not been explored except in general terms, and it would be interesting to study the cognitive and conceptual aspects of these on human culture<sup>36</sup>. Attention has already been drawn to differences in cultural behaviour between societies with grain-based agricultural systems derived from the S.W. Asian "Neolithic Revolution", and those with vegetational systems based on root and tuber crops of the S.E. Asian area<sup>24</sup> which we now regard as being derived from a "Mesolithic Revolution". The former require a direct, active and selective approach by man to his crops and lead to an "interventionist" type of mentality, a concept which was anticipated in the 18th Century by Rousseau<sup>34</sup>. In contrast, the less active relationships between man and vegetatively propagated crop plants such as the yam lead to a "non-interventionist" attitude of mind and a closer integration of man into the overall ecosystem rather than as a modifier or exploiter of it.

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TABLE 1

Principal African and Asian yams utilized as food

<u>African</u>	<u>Asian</u>
<i>D. rotundata</i> Poir.	<i>D. alata</i> L.
<i>D. cayenensis</i> Lamk.	<i>D. esculenta</i> (Lour.) Burk.
<i>D. praehensilis</i> Benth.	<i>D. nummularia</i> Lamk.
<i>D. bulbifera</i> L.	<i>D. bulbifera</i> L.
<i>D. dumetorum</i> (Kunth) Pax.	<i>D. hispida</i> Dennst.
	<i>D. pentaphylla</i> L.