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About the Institute
The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

MANIHOT SEMINAR

1. The Problem

Classification of M. esculenta

Why interested? Evolution at the species level, and role man has played in development.

M. esculenta, a lowland tropical root crop has several advantages for this study--many ill-defined species in a well-defined genus.

Kinds of plants--their distribution, their types, some of the variations, structures, their use, and some of their relatives.

2. Theories of origin

Alphonse DeCandolle--set the stage, and pretty well located the origins in S. Am., preferring eastern tropical Brazil.

Vavilov--center of origin in the drier regions of NE Brazil. Based origin on numbers of species found in Brazil.

Sauer--center of origin in the Venezuelan savanahs and coastal lowlands, figuring both man's activities, and capacity of some cultivars to withstand drought.

Mine--several centers--Centr. Am., eastern and western S. Am., in regions of moderate to high rainfall, not in arid parts either of Brazil or Venezuela because these are least likely areas for man's early agricultural activity, and because there are number of likely related species of the more humid areas. Not a simple, one-time beginning, but a series, because of dispersion of men, and concurrent outcrossing and hybridizing with several locally occurring wild spp., particularly along coastal regions of E. S. Am., in Centr. Am., and in favorable habitats along the eastern margins of the Andes.

2. origins, continued

interesting there are no wild spp. of M. in the West Indies
A number of "weed" spp, I think derived from cultivars, not
giving rise to the cultivars. (Harlan first proposed this
for certain grass spp.)

3. Some problems in classification

1. The old bitter versus sweet controversy.

DC seemed to be on right track, following Pohl, who
postulated a number of species involved in the cult.
complex.

No morphological evidence for two spp,one "bitter", one
"sweet" as Pax and Hoffm. have done in Pflanzenreich
monograph.

Some geographical variations--in E. S.M., and W.Indies,
both, but in vaguely defined western S. Am., and Centr.
Am., only the "sweet".

Soil differences? Defferent genetic backgrounds?

Technique for study--never has been really examined, and
must be properly analyzed, both physiologically and genetically.
Method evolved by Klein to permit adequate analysis.

2. Some points which this raises--

a. study of cultivars must be made in context with
wild relatives.

b. introgression from wild into cultivated complex
both of physiological characters and morphological structures.

c. Methods of analysis of variables--must learn what gene
combinations stick together, and for this need some
tool to keep track of the individual variation--computer
work.

3. problems of class. -cont.

Actually possible to subdivide cultivars into two large groups, using morphological chars, as follows:

A. roots dark brown, rough surfaced, stems brown, yellow, or red

B. roots light tan, smooth surfaced, stems gray or silver-gray

These, unfortunately have little correlation with other obvious characters, such as branching pattern, and have no correlation with the variable HCN content.

4. Sampling techniques, and problems of classification.

1. Lack of understanding of biology of ~~genus~~ species, and its methods of pollination, have caused explosion in spp. names.

2. Inadequate herbarium specimens ~~xxxmix~~, without sampling of variation on one plant has led to confusion.

3. Needs in sampling--populations, and how to get them--for cultivars, fairly simple, since most expt. sta. have a local collection. For wild spp., need not only to take specimens representing variability, but photos, and best yet, bring into cultivation.

Work in Jamaica at the experiment stations.

4. Nomenclatural problems--the type method has serious flaws in cultivated plants--impossible to designate an appropriate single sheet, or even group of sheets, which indicates the species. Furthermore, subdivisions of species, as presently set up by Int. Rules Nomencl. for cult. plants is not realistic when dealing with hybrid populations.

(1)

at symp. (Biology, Food + People)

1. Last year, Mangelsdorf mentioned M. (cassava) as one of the world's largest 12 ~~producers~~ food crops ~~stated we need ... carbohy~~ ~~or protein, ... studies decrease ... emphasis~~ — in Peru, Bacigalupo, chief of nutr. of Youth ... stated that problem of carbohydrate, in Peru was bigger problem than prod. of protein — situation on protein handled thru by fish — protein — per pound, less costly than carbohydrate.

2. Strange, then, that so little attention paid to studies of M., by agric, nutr, etc.

3. These studies, I hope, ~~th~~, will lay a found. on which more adequate studies can be made —

A. though origins + tax. may seem remote from productivity great evidence available, ~~Galinat~~ Kornn Evol, + its significance for breeding, that such studies do indeed have direct bearing.

B. As studies progress, we must take into acct. the many wild spec. that have direct bearing on the cultivars.

4. The genus M. — widespread Am trop + subtrop. 100–200 sp.
From Texas + Arizona to N. Argentina,
with 2 great centers of var + sev lesser centers —

— greatest — E. Brazil, from state of Maranhão
S. to Bahia + inland to Goias + Mattogrosso,
S. + E. of Amazon basin —

— second — West Mexico, s. to Guatemala.

— Secondary centers — Paraguay + Venezuela

(5) In each of these centers, the problem of hybridization is one that has caused past taxonomists to proliferate species names — the organization of the said mechanism in the genus facilitates out-breeding + hybrid formations — The fruitful number of plant breeding exists — and some indication that few genetic barriers between sp.

(6) Habitats — most are heliophilic - open areas, but few occupy heavy shade areas — some intermediate in requirements —

Many from more arid regions — including trees, shrubs. In moister regions, find the clambering habit —

The shrub habit seems to fit into all of the habitat types.

(7) Root structures — most have enlarged storage capacity, whether found in mesophytic, or xerophytic areas. So far, only the clambering types are found w/o root enlargement.

(8) Sufficient nos. + kinds of wild species in any of these areas, there, from which to draw a satisfactory species for cultivation.

What other possibilities? People —

in Mexico - Botanic Garden

" Colombia - near Barranquilla -

" Peru - the coast area -

4 or so. of these areas are sufficient cultures to have begun an agriculture with these plants.
And it is my contention that there are indeed "origins" in so. of them, and that as cultures spread, new germ plasm entered the complex, helping to account for the present diversity in the cultivars.

Thus particularly attractive to help account for the bitter + sweet types. The sweet ~~cults~~. now found in all areas where M. is cult., but the bitter is restricted to those areas where M. becomes the dominant carbohydrate, namely eastern S. Am, the Amazon basin, and the W. Indies.

Sweets probably came from W side (Mexico to Bolivia) where today this is the only type.

Whereas the bitters probably entered into cult. as tubers moved east along the caribbean coast and south along eastern south America, and thence up the Amazon + its tributaries.

The diverse origins may also help to explain another phenomenon - the weedy species found in various areas.