



# Ethnobotany – an introduction

Traditional plant use:  
connections to health,  
history, genetics,  
cultural heritage

Studium generale  
Tinde van Andel  
January 2020

# Ethnobotany



-What is Ethnobotany?

-What are the major research questions in Ethnobotany?

-Which questions I have focused on in my research?

-Which questions I would like to answer in the coming years?

WUR Ethnobotany course in June 2020 (BIS 50309)

## -What is Ethnobotany?

‘The study of plant use by primitive and aboriginal people’ (Harshberger, 1896)

‘The scientific study of people’s interaction with plants’ (Turner, 1996)

- over time and space
- includes uses, knowledge, beliefs, management, classification systems
- both in modern and traditional societies

Term ‘Ethnobotany’ may be recent (‘Economic Botany’ is older)

Study of useful plants probably oldest science in the world

Plants are fundamental to the functioning of all human societies



Kahun's Medicinal Papyrus (1800 BCE), Egypt  
‘Manuscript for the health of mother and child’  
Herbal medicine, diagnoses

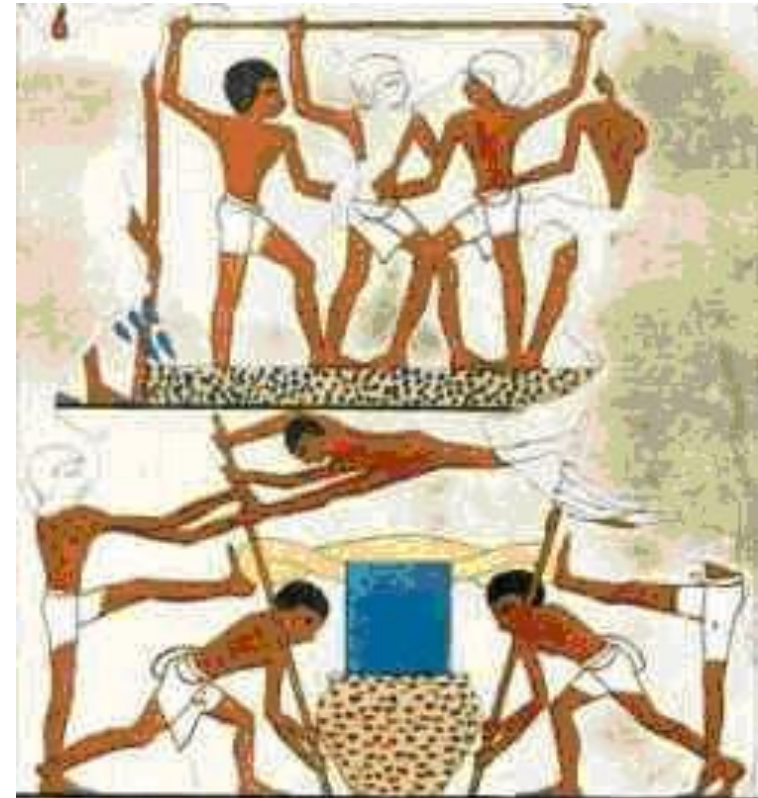
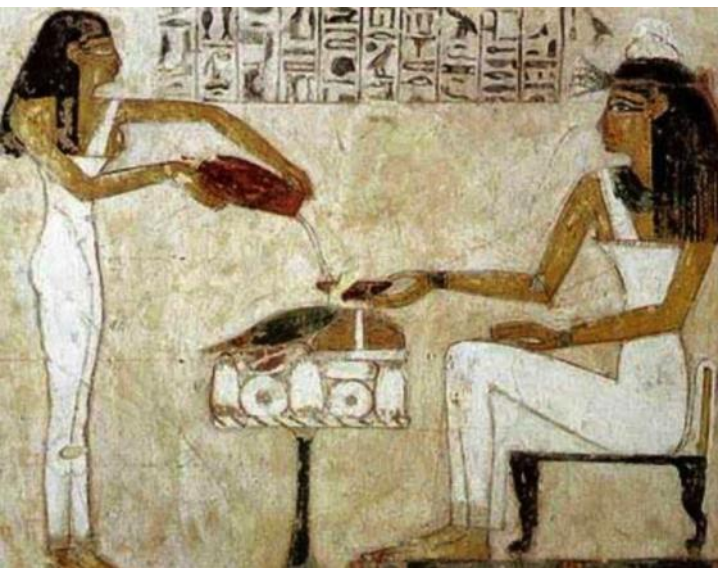




-What is Ethnobotany?

- Which plant?
- Plant part?
- Preparation?
- Application

Wine preparation documented by Egyptians  
Classic documentation of traditional plant use







documenting plant use



dried specimen mounted with label



collecting plant specimen

specimens  
stored in  
herbarium



## The Medicinal Plant Trade in Suriname

Tinde van Andel, Joelaika Behari-Ramdas,  
Reinout Havinga and Sara Groenendijk

information published  
in scientific paper

## - Major research questions in Ethnobotany?

1. What plants do people use? (food, medicine, shelter, ritual)
2. How do medicinal plants work? (pharmacology, natural products)  
(and why are magic plants important too?) Rob Verpoorte 23 January
3. Is wild plant extraction sustainable? (non-timber forest products)  
ask Frans Bongers (WUR)
4. How did people domesticate plants? (agriculture, landraces, cultivars)  
Frederik van Oudenhoven 20 January
5. How do people categorize plants? (folk taxonomy, local names)  
Irene Teixidor Toneu 28 January
6. What happens when people migrate? (plant knowledge, plant use)  
Irene Teixidor Toneu 28 January

Ethnobotany is multidisciplinary!

You can't know everything.....

Cooperation is the solution!

Nature Conservation

Pharmacology

Agriculture

Nutrition

Public Health

Anthropology

History

Botany

Ethnobotany



de hortus  
Hortus Botanicus Amsterdam - anno 1638



Universiteit Leiden

GGD  
Haaglanden

Kew  
ROYAL BOTANIC GARDENS



# What plants do people use? Food and nutrition



Alexandra  
Towns



*Hibiscus acetosella*  
Malawi

Local, wild vegetables

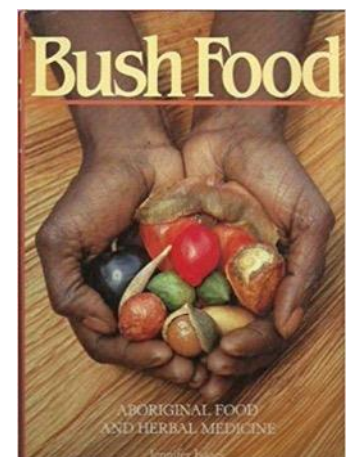
Stored dried and eaten during hard times

Government campaigns 'free ourselves from bush food'

Many different 'pregnancy foods'

Solution for malnutrition?

Wild food plants Oxfam Novib program



nature  
plants

PUBLISHED: 5 APRIL 2016 | ARTICLE NUMBER: 16048 | DOI: 10.1038/NPLANTS.2016.48

news

Re-igniting the green  
revolution with wild crops

Karl Gruber

nature

Super vegetables

*Long overlooked in parts of Africa, indigenous greens are now capturing attention for their nutritional and environmental benefits.*



Why are magic plants important too?  
Tool to transfer oral history  
Symbols of ancestral plant use



Diana Quiroz. 2015. Do not fear the supernatural! Relevance of ritual plant use for traditional culture, nature conservation, human health in W Africa. PhD thesis



Why are magic plants important too?

Magic plants are often crop wild relatives....

Important for human ancestors AND crop ancestors

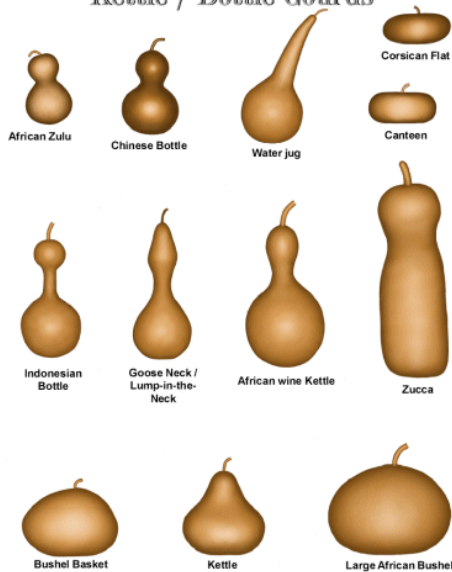


*Lagenaria breviflora*  
spirit calabash

wild ancestor of bottle gourd  
*Lagenaria siceraria*

Crop wild relatives contain  
important genes for breeding

Gourd Identification Chart  
Kettle / Bottle Gourds



nature  
plants

ARTICLES

PUBLISHED: 21 MARCH 2016 | ARTICLE NUMBER: 16022 | DOI: 10.1038/NPLANTS2016.22

## Global conservation priorities for crop wild relatives

Nora P. Castañeda-Álvarez<sup>1,2†\*</sup>, Colin K. Khoury<sup>1,3†</sup>, Harold A. Achicanoy<sup>1</sup>, Vivian Bernau<sup>1</sup>, Hannes Dempewolf<sup>4</sup>, Ruth J. Eastwood<sup>5</sup>, Luigi Guarino<sup>4</sup>, Ruth H. Harker<sup>5</sup>, Andy Jarvis<sup>1,6</sup>, Nigel Maxted<sup>2</sup>, Jonas V. Müller<sup>5</sup>, Julian Ramirez-Villegas<sup>1,6,7</sup>, Chrystian C. Sosa<sup>1</sup>, Paul C. Struik<sup>3</sup>, Holly Vincent<sup>2</sup> and Jane Toll<sup>4</sup>



## How did people domesticate plants?

- also known as Agriculture
- commercial plant breeding
- plants selected for high yield
- uniform cultivars
- little genetic diversity



## Ethnobotany

- people are STILL domesticating wild plants
- traditional agriculture, genetically unstable land races
- selected for taste, pest resistance, poor soils, medicinal compounds
- high genetic diversity in one garden
- self-selected seeds

*Capsicum annuum* L.

Hot pepper diversity in a  
single Amerindian village,  
Guyana, 1996







People crossed the Bering Strait between 24,000 and 5000 years ago



People have migrated ever since



Ancient knowledge: Amazonian shamans  
oral transfer of plant use over generations  
wisdom has built up for millennia.....

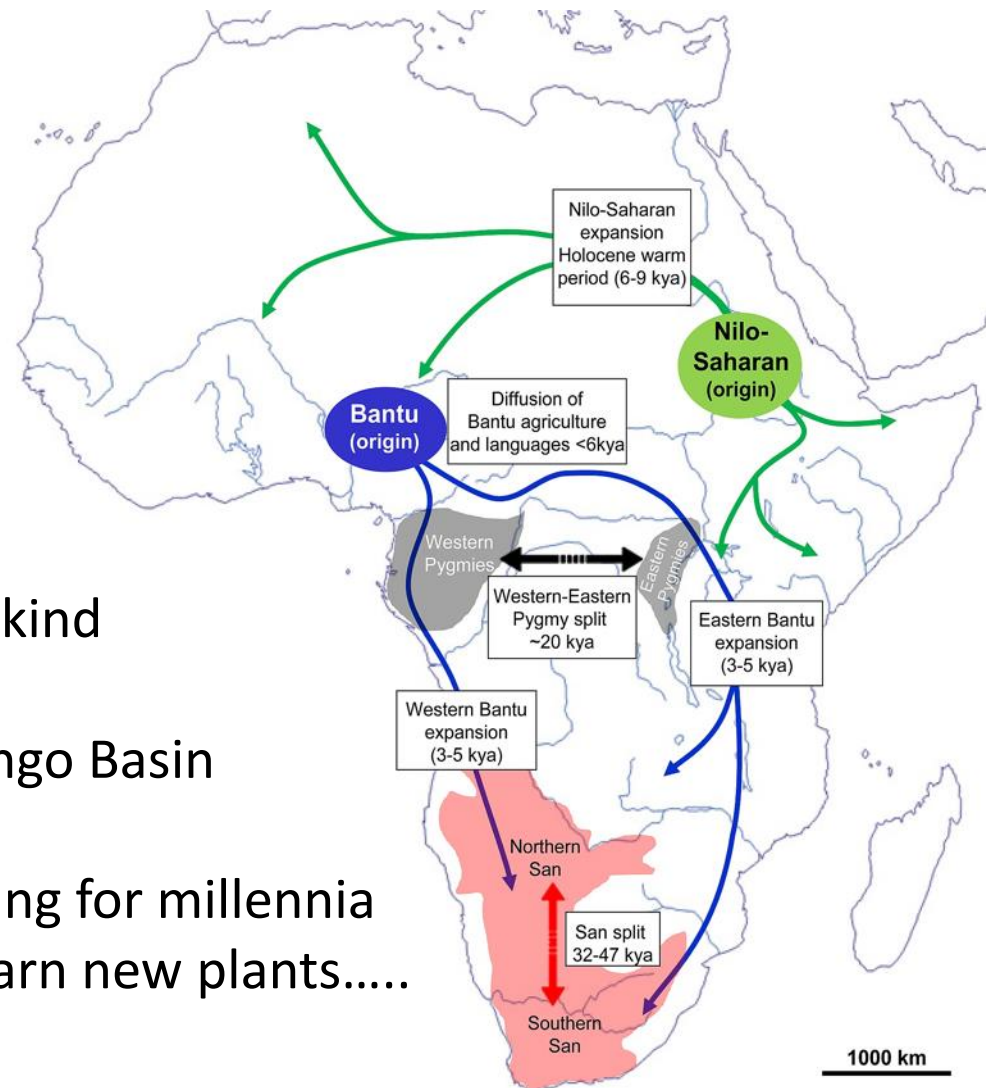


Migration is part of human life.....  
and so is adaptation to new environments

Sub-Saharan Africa: cradle of humankind

Hunter-gatherers Central African Congo Basin

Africans also have been migrating for millennia  
People continuously have to learn new plants.....  
Also women and children!





# What happens when people migrate?

## Migrant Ethnobotany: long distance migration

1. **Adaptation** to the new flora of the host country (substitutions, learning new plants and uses)
2. **Continued** use of the original flora from migrants' home country (import, cultivation, use plants that grow in both host and home environments).

What is kept, what is lost, what changes and what is new?  
(depends on how much migrants can bring with them)



Muniz de Medeiros et al. 2012. The use of medicinal plants by migrant people: Adaptation, Maintenance, and Replacement. *ECAM* ID 807452

Pieroni & Vandebroek. 2007. Traveling cultures and plants: the ethnobotany of migrations



What happens when people migrate?



Substitution -> Adapting to new flora of the host country.  
Sudanese refugees evaluating French firewood species in the Jungle of Calais



What happens when people migrate?



Gardens of Hope: Cherish the few plants that you could bring from homeland  
Import, cultivate, and focus on plants that grow in old and new country





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# Plant use from the Motherland

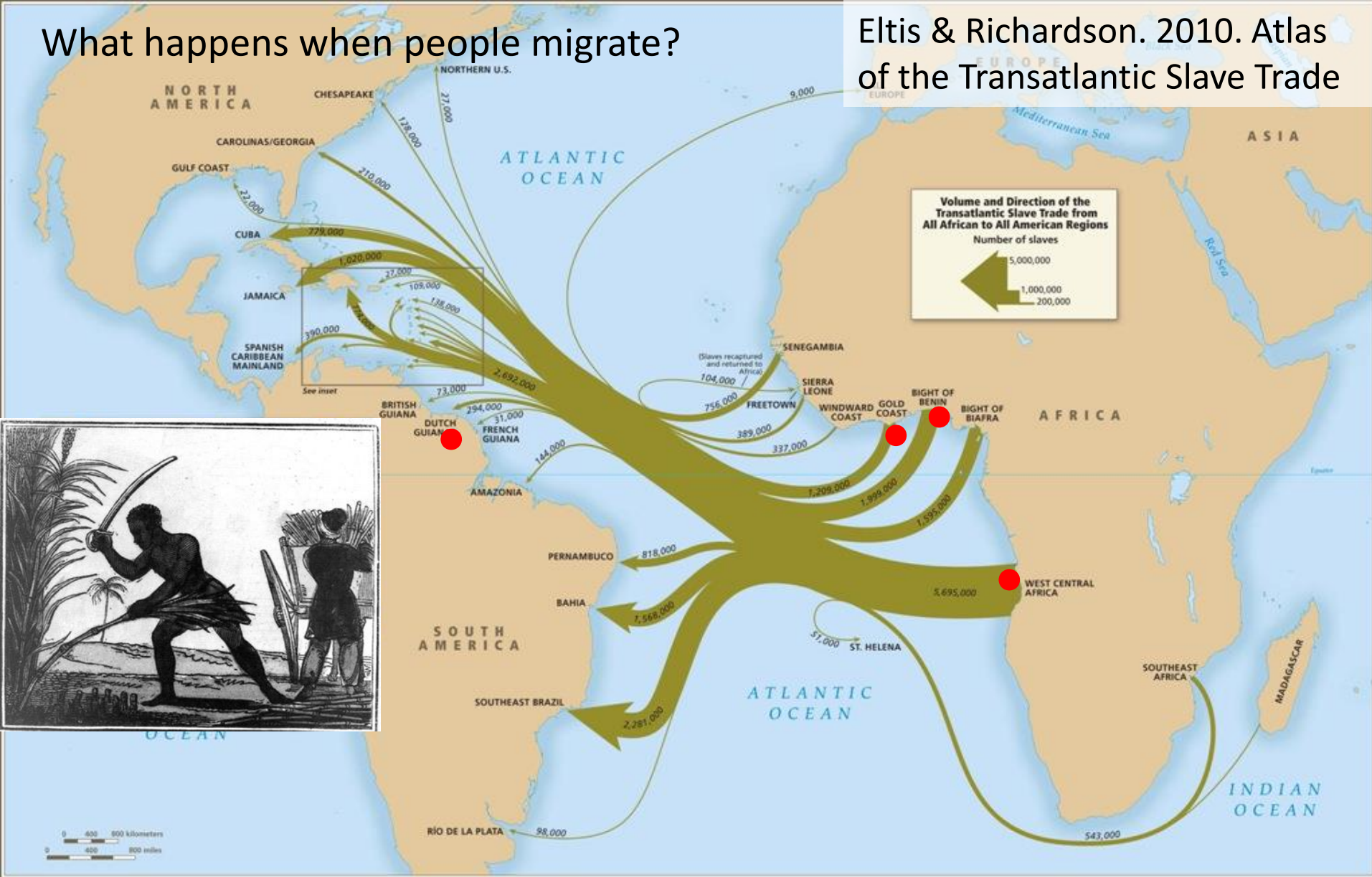


Linking Afro-Caribbean and West-African Ethnobotany  
ALW-Vidi 2010-2015



# What happens when people migrate?

Eltis & Richardson. 2010. Atlas of the Transatlantic Slave Trade



12 million enslaved Africans to the Americas from 17<sup>th</sup> to early 19<sup>th</sup> century  
300,000 Africans to Suriname, mainly from Benin, Ghana, Gabon-Angola



rice & beans  
fried plantains



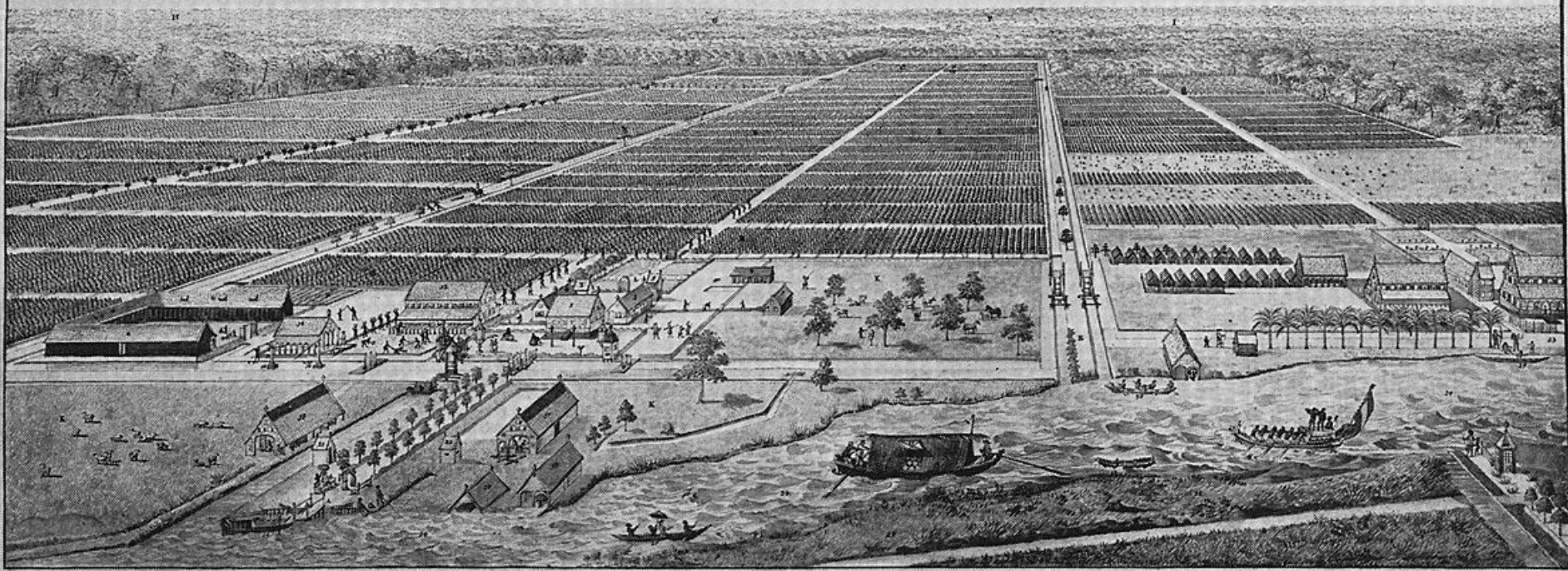
Plants that  
came with  
slave ships

Voeks & Rashford. 2012. *African Ethnobotany in the Americas*  
Carney & Rosomoff. 2009. *Shadow of slavery: Africa's botanical legacy in Atlantic world*  
Van Andel et al. 2012. 17<sup>th</sup> century collection of useful plants from Suriname. *Taxon*.



[illegible]

coffee  
indigo  
sugar cane  
cocoa  
cotton



Plantage Leevoerpoel, rechts plantage Charlottenburg, XVIII; Rijksmuseum Amsterdam, Rijksprentenkabinet.





*Sesamum indicum* was grown  
as early as 1687 in Suriname  
Historic collections Naturalis

sesame, okra, African oil palm,  
Cola nuts, watermelon, tamarind,  
pigeon peas, black-eyed peas and....  
rice!



Suriname, 13 September 1755

Diary of Daniel Rolander

“*Oryza sativa* was found by chance among coffee plants on a certain plantation, though the residents didn’t even know its name.”



“Grains are not sown in these lands; they are all imported from North America (Carolina) instead...”

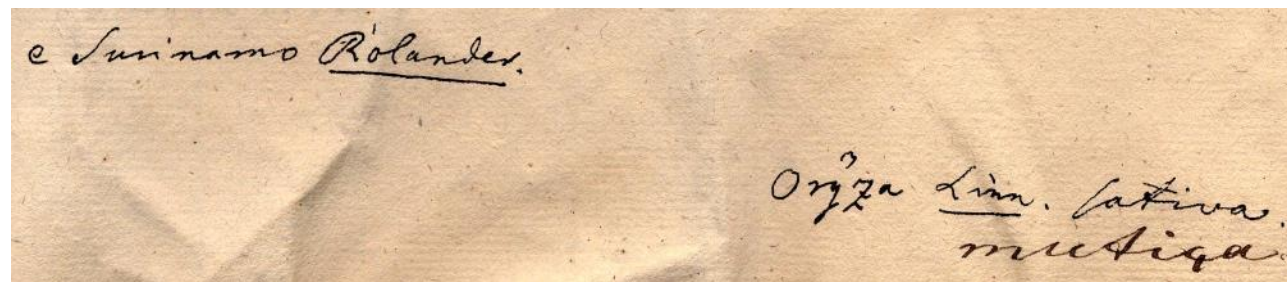
Rice was grown on Surinamese plantations without the owners’ knowledge!

By slaves?

As subsistence food?

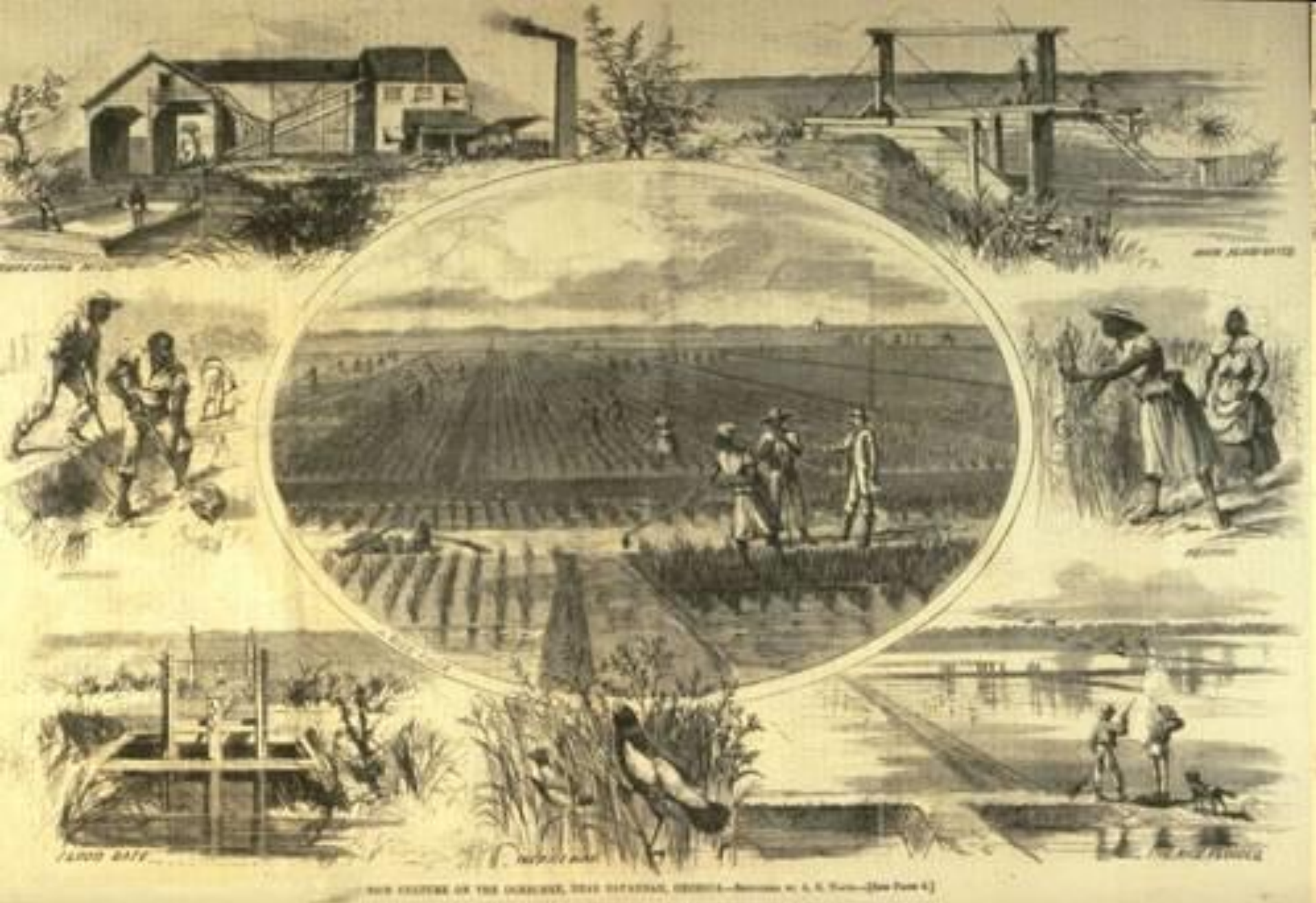
What type of rice?

African? Asian?

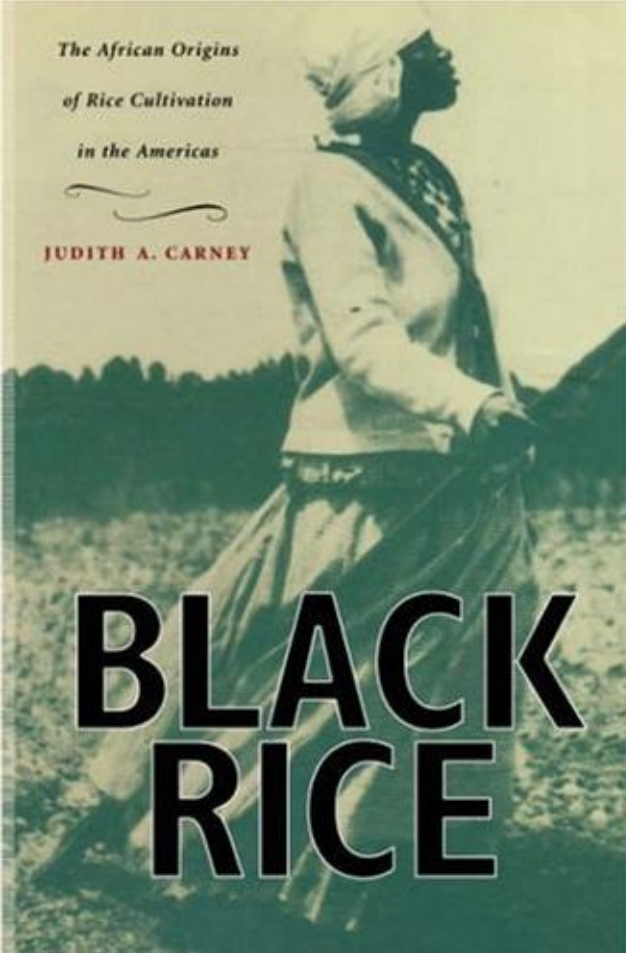


Rolander’s rice collections from Suriname in Bergius herbarium, Stockholm





Rice growing skills of African slaves brought great prosperity to South Carolina



In Africa, *O. glaberrima* is being replaced by *O. sativa* by development programs



*O. glaberrima*  
extinct in the Americas?

Carney: Before water-driven rice mills, all rice in New World was African rice  
Only botanical sample of African rice collected along border Suriname in 1938.

*O. glaberrima*: disappeared in the USA, low yield, hard to mill, better taste  
thrives on poor, acid soils, dehusked by hand (with wooden mortar and pestle)  
*O. sativa*: high yield, mechanically milled, needs fertilizer and weed control



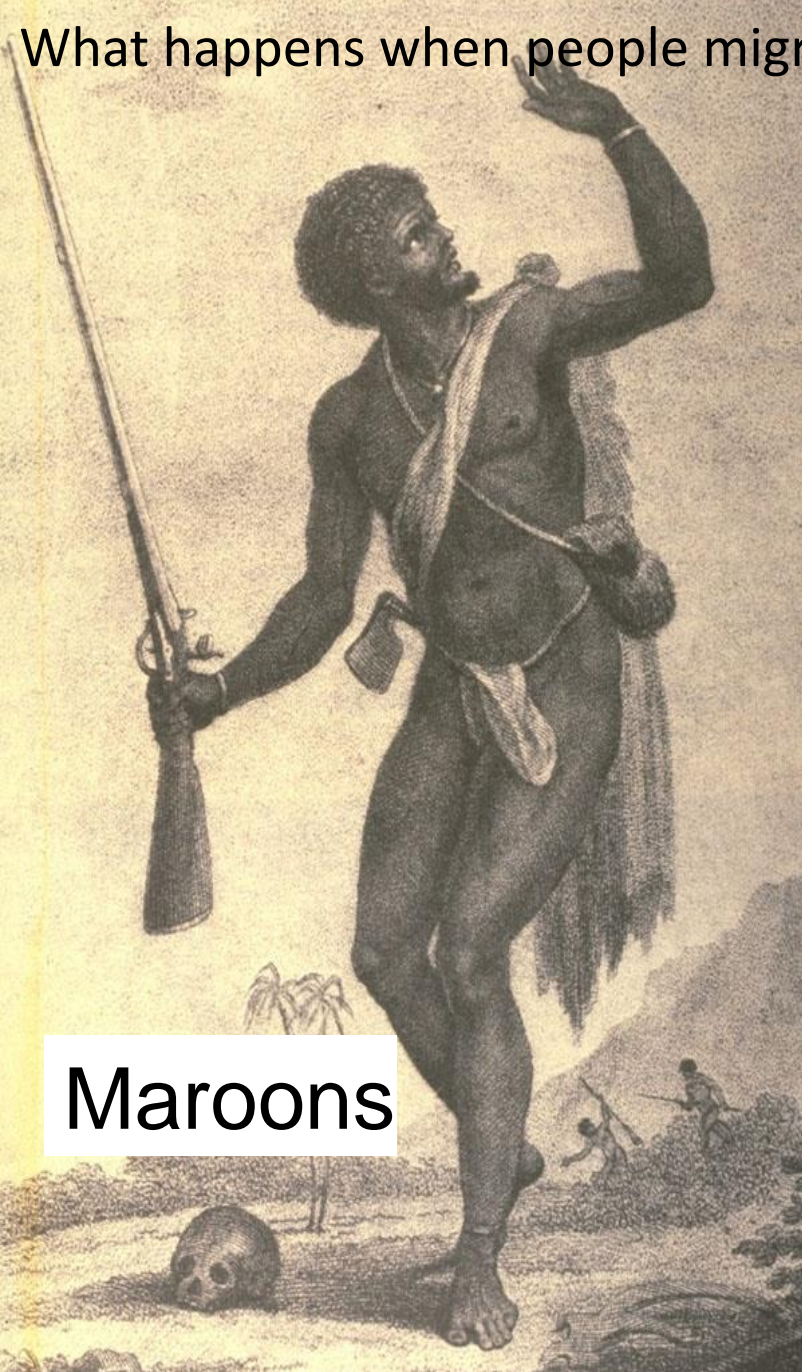
African / Black rice (*Oryza glaberrima*)  
domesticated in Niger delta, 3500 y ago



Asian rice *Oryza sativa*  
domesticated in China  $\pm$  9,000 y ago  
introduced in Africa  $\pm$  500 y ago

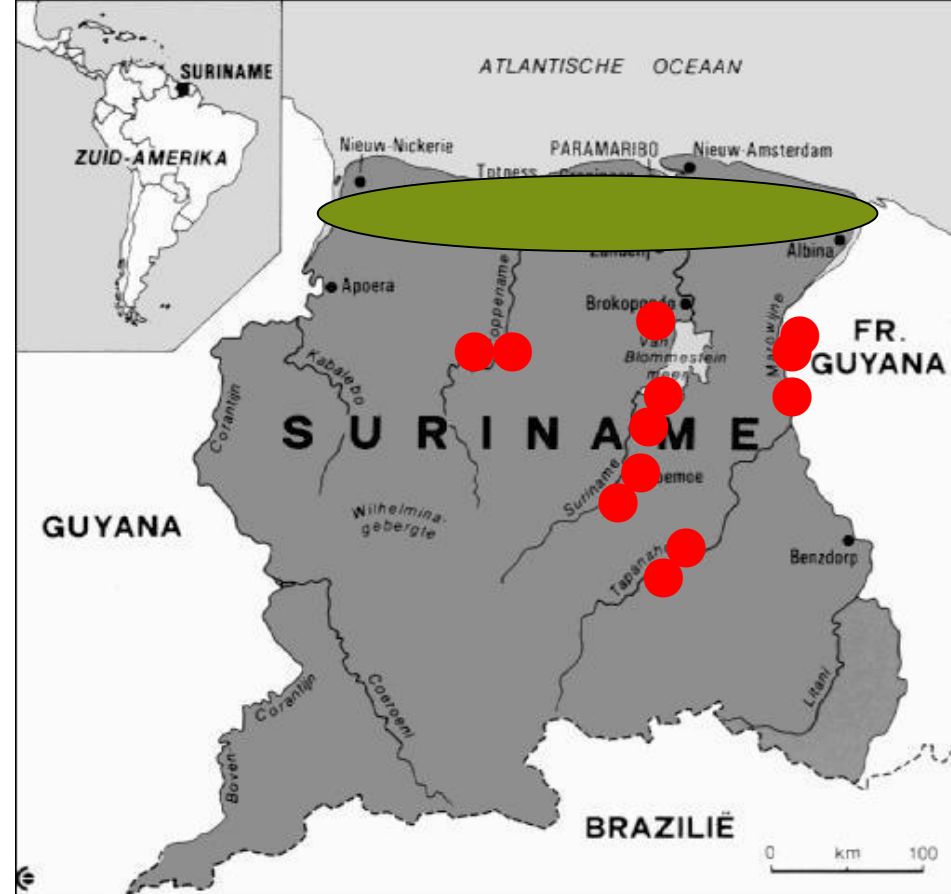
*O. glaberrima*: dark husks, long awns and dark red bran, grains break easily

What happens when people migrate?



Maroons

JG Stedman 1790



Escaped from plantations 1650-1850

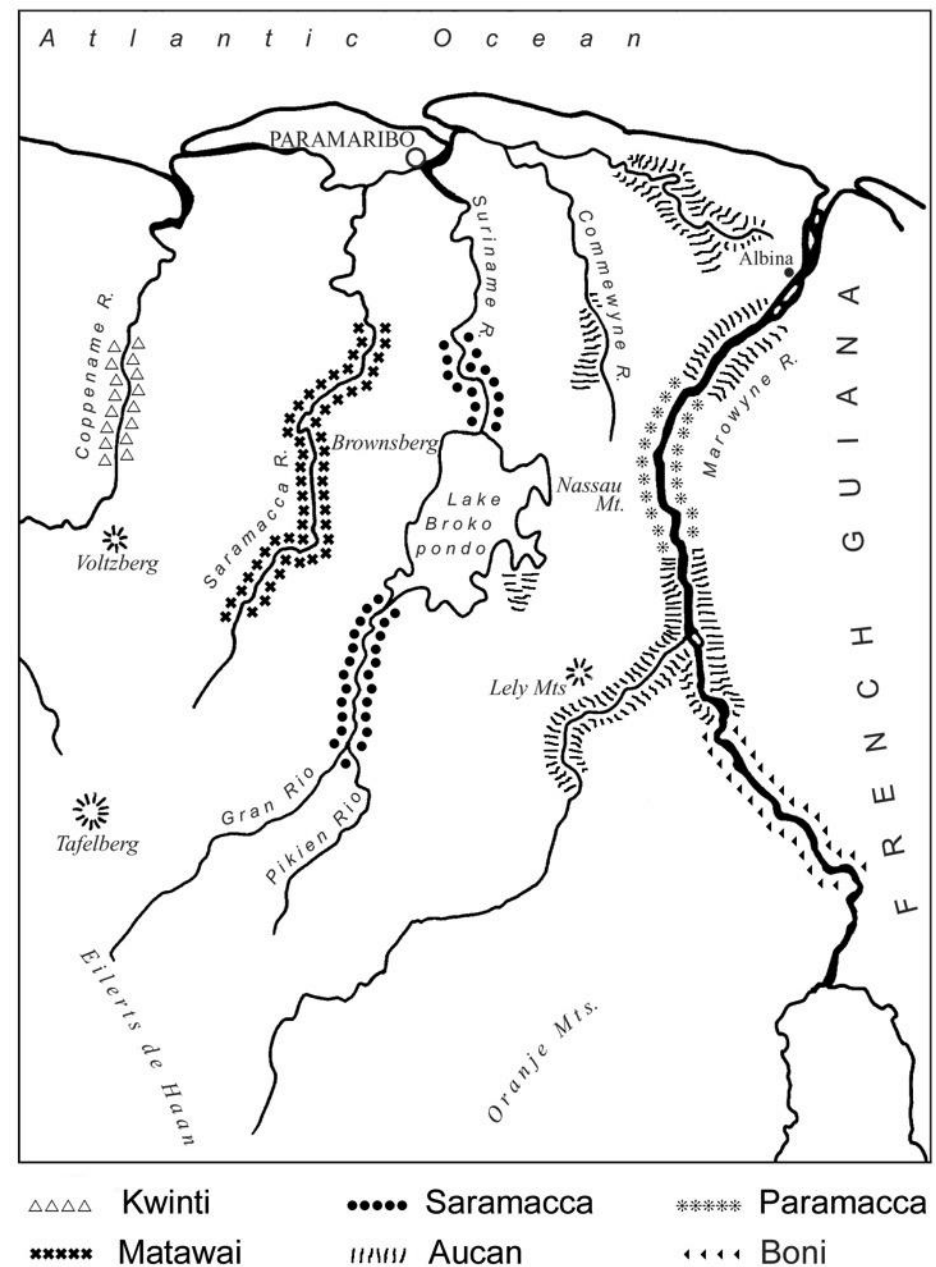
Brought seeds and shoots from plantations

“Most African culture of the Americas”

Specialists in herbal medicine, winti religion



Maroons ca. 1930



2018: ca. 140.000 Maroons in Suriname / FG / NL six languages



John Gabriel Stedman 1796. *Narrative of a Five Years' Expedition Against the Revolted Negroes of Surinam..... from the Year 1772 to 1777*

Colonel FOURGEOD, during his never ending forest expeditions, conquers the villages of the runaways....; they were driven out of their camps, and all their huts, with extensive fields, ripe and flowering rice, was destroyed...



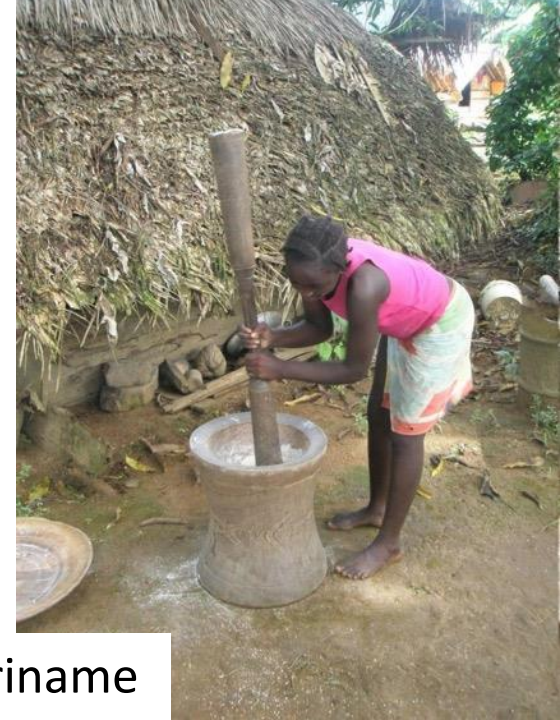


Saramacca River,  
Suriname, 1925



Upper Suriname  
River, 1960s

Maroon funeral



Upper Suriname  
River, 2008

husked and  
dehusked rice







Threshed  
(seeds removed  
from panicle)

Pounded  
(dehusked) in  
wooden mortar  
and pestle

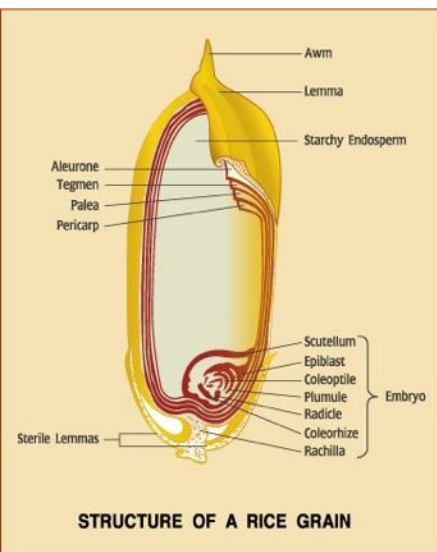


Winnowed (removing husk) by hand  
using a flat, wooden tray



Traditional dehushing does not remove rice bran  
whole grain rice -> fibers, vitamins, proteins

Mechanical milling -> only starch left





## Paramaribo market: A bag of magic rice grains: 'blaka aleisi'

- dark brown seeds with a spine
- unmilled, not meant to be eaten
- placed in ancestor food offerings
- cultivated by Maroons only



Bela Teeken  
Harro Maat  
KTI, WUR



African rice !  
*Oryza glaberrima*





Cultivated for ancestor rituals and funeral meals



Black rice became magic because it was brought from Africa



**African Rice (*Oryza glaberrima* Steud.): Lost Crop of the Enslaved Africans Discovered in Suriname<sup>1</sup>**

TINDE VAN ANDEL

Netherlands Centre for Biodiversity, Section NHN, Leiden University, Leiden, the Netherlands;  
email: andel@nhn.leidenuniv.nl

2010

**African Rice (*Oryza glaberrima* Steud.): Lost Crop of the Enslaved Africans Discovered in Suriname.** African rice (*Oryza glaberrima* Steud.) was introduced to the Americas during the slave trade years and grown by enslaved Africans for decades before mechanical milling devices facilitated the shift towards Asian rice (*O. sativa* L.). Literature suggests that African rice is still grown in Guyana and French Guiana, but the most recent herbarium voucher dates from 1938. In this paper, evidence is presented that *O. glaberrima* is still grown by Saramaccan Maroons both for food and ritual uses. Saramaccan informants claim their forefathers collected their first "black rice" from a mysterious wild rice swamp and cultivated these seeds afterwards. Unmilled spikelets (grains with their husk still attached) are sold in small quantities for ancestor offerings, and even exported to the Netherlands to be used by Maroon immigrants. Little is known of the evolution of *O. glaberrima*, before and after domestication. Therefore, more research is needed on the different varieties of rice and other "lost crops" grown by these descendants of enslaved Africans who escaped from plantations in the 17th and 18th centuries and maintained much of their African cultural heritage in the deep rainforest.

African black rice: first collection in Surinam, 2<sup>nd</sup> in New World after 1938



Black rice sown in Amsterdam Hortus Botanicus

DNA extracted and send to rice geneticists in USA

de hortus  
Hortus Botanicus Amsterdam - anno 1638



Is the black rice from Suriname really an ancestor rice?

Does Suriname *Oryza glaberrima* still look like any of the *O. glaberrima* landraces that are grown in Africa today?



Did it change after arriving in Suriname?

Where in Africa did it come from?

Did the Dutch buy rice here?

Which people were / are cultivating it?

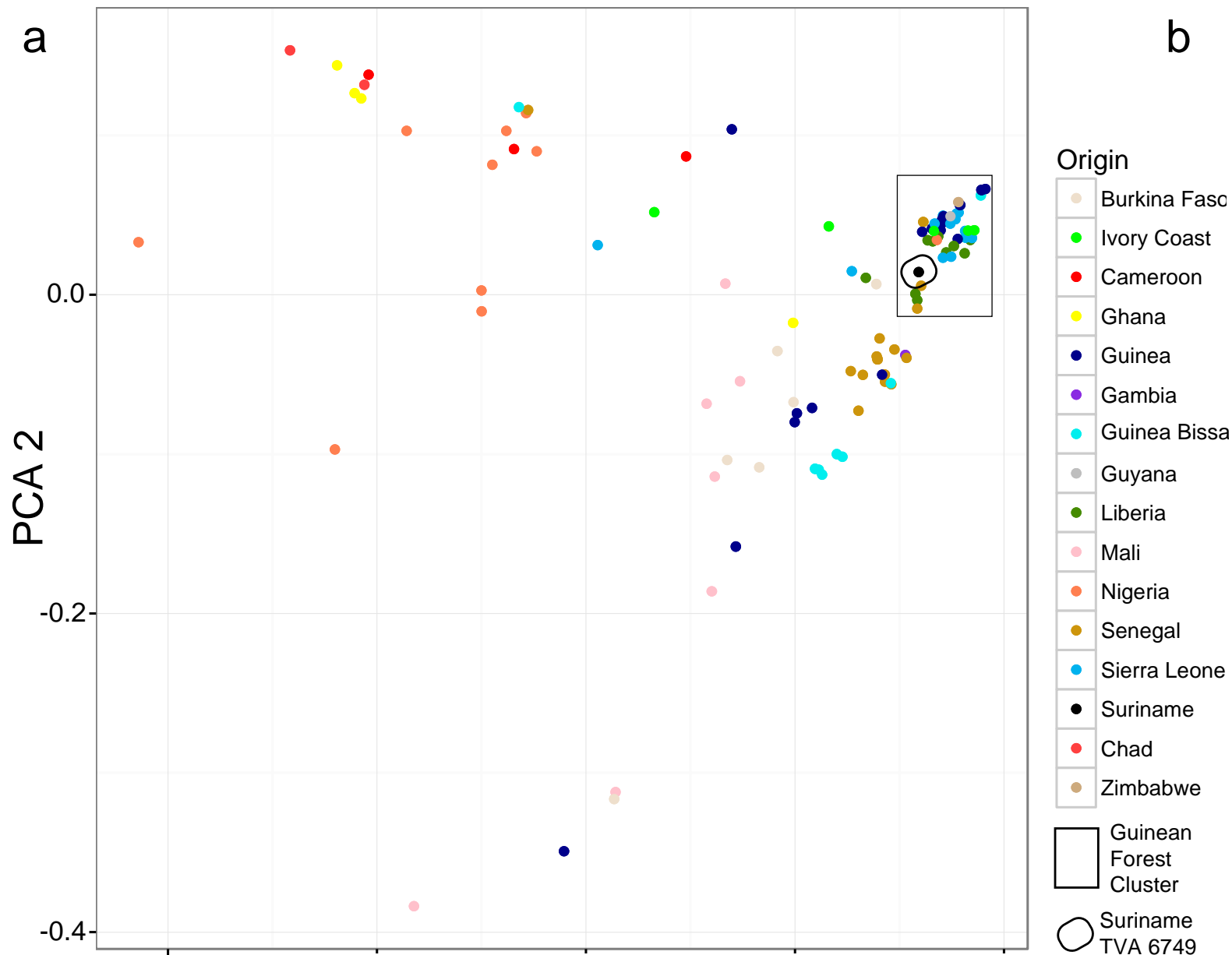
Did these people come to Suriname?



A head-and-shoulders portrait of Dr. David A. Clark. He is a man with dark, curly hair, a full beard, and glasses. He is wearing a dark jacket over a black shirt. The background is a plain, light color.

Saulo Alves Aflitos  
WUR Bioinformatics



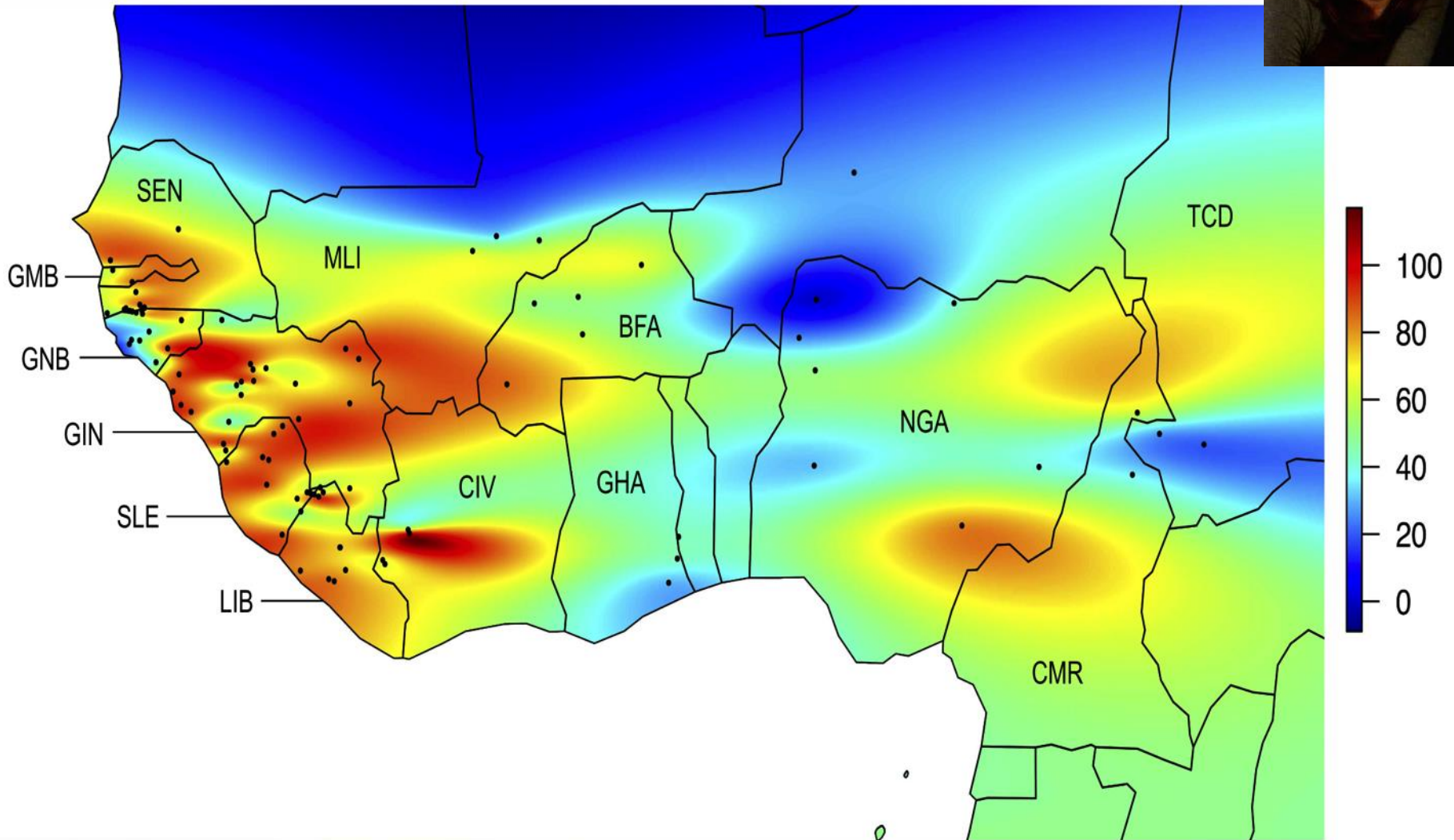


Comparison of DNA of Surinamese sample to 109 samples of *O. glaberrima* across West Africa

Heat map showing genetic distance to  
Suriname *O. glaberrima* sample  
red = hot = close



Margret Veltman  
MSc student WUR



Suriname sample looks like upland *O. glaberrima* landraces grown by  
Mande-speaking peoples in Liberia, Guinea, Sierra Leone and Ivory Coast



*Donstag. den 5 de. Inorg. en doordendag de windt NO tot  
9 O: frisse bram 2: ook labber Coette goet weer  
Cogten 4 Slaven  
de stroom om de West wy Cogten 4 Slaven Een Man  
20 Coffers Ryst. 2 Vrouwen en Een Jongen ook Cogten 20 Coffers Ryst  
voordts Savonds en Inaghts de windt NO: labber Coette  
goet weer tot Inorgens...*

Logbook of slave ship The Unity: digital Archives Middelburg, Zeeland

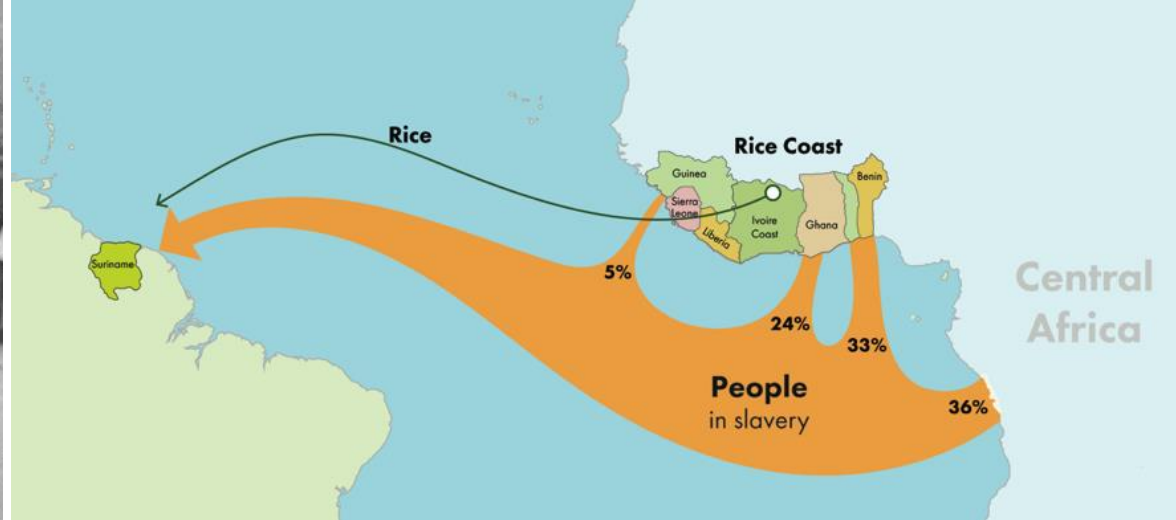
D' Eenigheid 1761-1763  
from Vlissingen to Essequibo, Guyana

5 January 1762 near Kwa Kola, Liberia

“We bought four slaves, one man,  
two women, one boy...”

“We bought 20 chests of rice...”





Ancestor crops are not witchcraft!  
They are people's unwritten history

Maroon funeral dishes with rice  
People have to bring homegrown,  
home-processed rice to funerals  
Here is where seed exchange takes place



## Tracing ancestor rice of Suriname Maroons back to its African origin

Tinde R. van Andel<sup>1,2\*</sup>, Rachel S. Meyer<sup>3\*</sup>, Saulo A. Aflitos<sup>1</sup>, Judith A. Carney<sup>4</sup>, Margaretha A. Veltman<sup>1</sup>, Dario Copetti<sup>5</sup>, Jonathan M. Flowers<sup>3,6</sup>, Reinout M. Havinga<sup>7</sup>, Harro Maat<sup>8</sup>, Michael D. Purugganan<sup>3,6</sup>, Rod A. Wing<sup>5,9</sup> and M. Eric Schranz<sup>1</sup>



Where did all the other Maroon rice landraces (*O. sativa*) come from?  
How do these fit in the gene pool of African and Asian cultivars?  
How can we find out? How can we preserve this diversity?



alekisoola

kpakpa alisi

blaka aleisi (*O. glaberrima*)

moi uma

kuli alisi

lebi saka

ahonyo alisi  
(shameful rice)

spari (stingray rice)





Nickerie, Wageningen: heavy clay polders coastal Suriname

First trials in the 1900-1940s

Landbouwproefstation Paramaribo

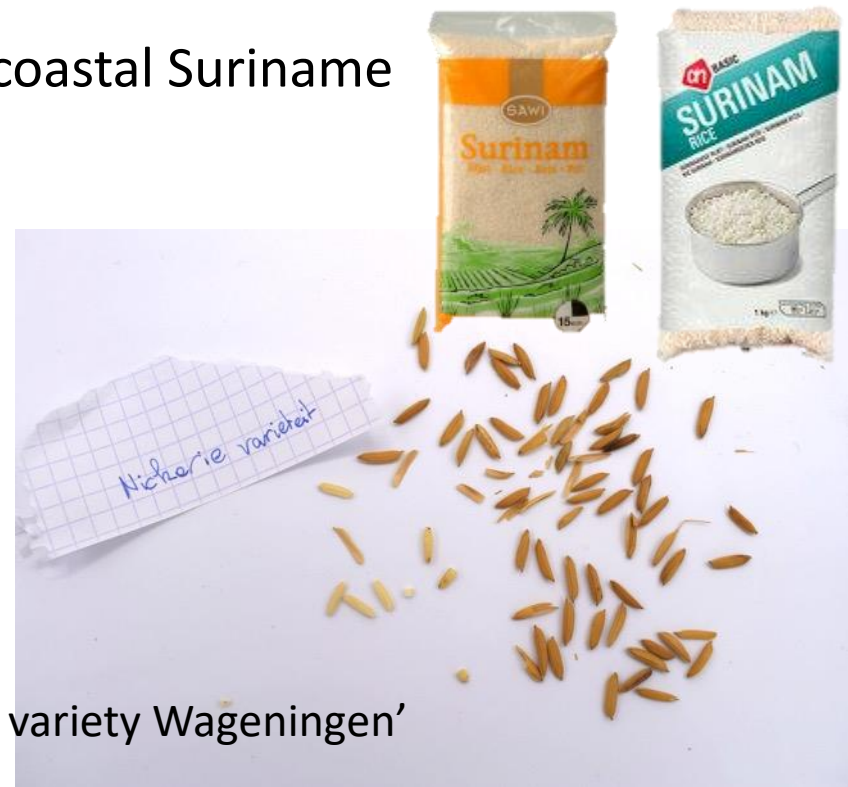
Large-scale commercial ricefields

Set up by Wageningen University 1950s

Asian rice (long grain) rice:

wet rice 'SLM81b'

commercial cultivars



'Nickerie variety Wageningen'





commercial  
wetland rice

big open monocultures

height of a machine

fertilizers, pesticides

machine-harvested

high yields

no hairs  
no awns  
short stems  
no lodging  
smooth leaves







traditional  
Maroon  
upland rice

grown in rainforest

height of a Maroon woman

no agrochemicals

harvested by hand

long awns, hairy  
orange, black tips  
some shatter easily  
lodging in the wind  
scratchy leaves







Ruben Mawdo  
Traditional healer Aucan Maroons  
Marowijne River, Suriname 2017

Sapali rice  
only found  
on one single  
rice field

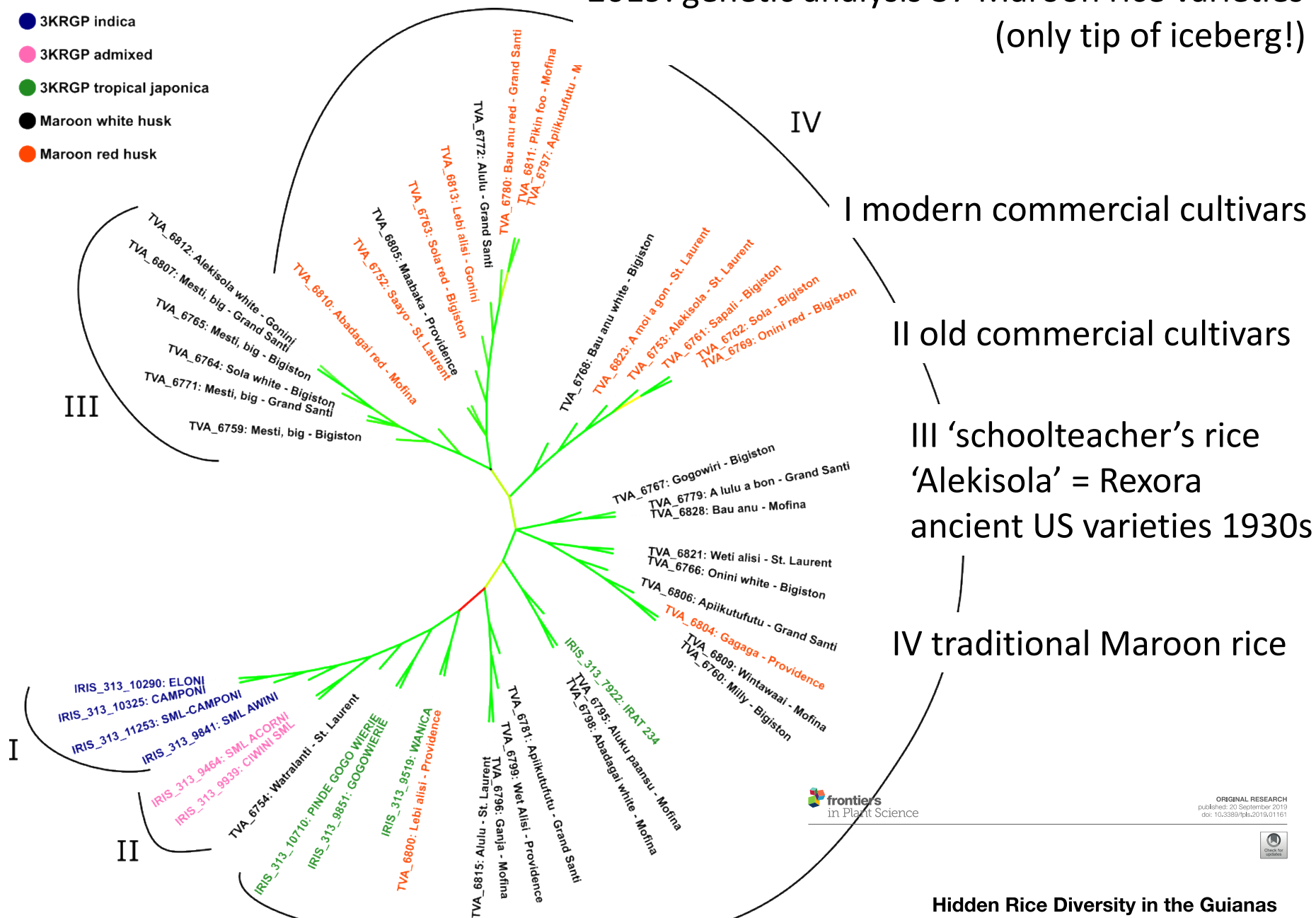


Sapali: enslaved woman who braided rice  
in her hair when she fled from coastal plantation  
and shared it among the runaways that later became the Aucan Maroons



# 2019: genetic analysis 37 Maroon rice varieties (only tip of iceberg!)

- 3KRGP indica
- 3KRGP admixed
- 3KRGP tropical japonica
- Maroon white husk
- Maroon red husk



frontiers  
in Plant Science

ORIGINAL RESEARCH  
published: 23 September 2019  
doi: 10.3389/fpls.2019.01161



## Hidden Rice Diversity in the Guianas

Tinde Van Andel<sup>1,2\*</sup>, Margaretha A. Veltman<sup>3</sup>, Alice Bertin<sup>1</sup>, Harro Maat<sup>4</sup>, Thomas Polme<sup>5</sup>,  
Derk Hille Ris Lambers<sup>6</sup>, Jerry Tjoe Awie<sup>7</sup>, Hugo De Boer<sup>1,3</sup> and Vincent Manzanilla<sup>2</sup>





1863-1900 after abolishment of slavery -> East Indian and Javanese contract labourers shipped to Suriname to work on plantations  
 Small scale agriculture: wet Asian rice (traditional landraces) used for breeding  
 Today: commercial cultivars from rice breeding institute

‘mutmuria’ (from India 1914) = ‘mbotomolia’ (Maroons)

‘koelie aleisi’?

‘watalanti’?



‘Red cooking water’  
Hairy husks, awns, red seeds  
Grows in between other rice  
Deliberately sown by Maroons



‘Shameful rice’ (ahonyo)  
Long awns, brown and white husks  
Deliberately sown by Maroons



Rice weeds! *Oryza rufipogon*, *O. latifolia*  
interbreed with *O. sativa* and forms ‘weedy rice’  
Or hybrid *O. sativa* X *O. glaberrima*?  
Hairs, awns, scratchy leaves protection against birds, rodents

Stick in animal fur,  
scatter because they want  
to disperse naturally!





Suriname: rice fields  
reflects 375 years of  
migration history  
and skillful adaptation

Landraces:  
food security  
cultural heritage  
unknown genes  
unwritten history

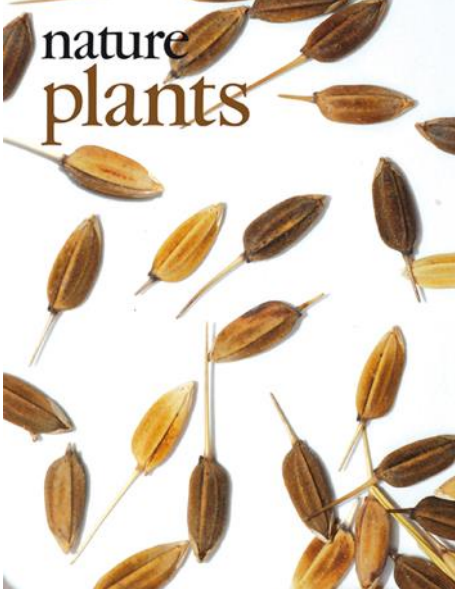
Self-developed  
landraces through  
crossing with  
crop wild ancestors?  
rice weeds?



Africa? Slave ships  
between 1650-1850  
*O. sativa*, *O. glaberrima*

USA? *O. sativa*  
Carolina Gold ca. 1750  
'Rexora' ca. 1930

Asia? Java? India?  
Rice exchanged with  
Hindostani, Javanese  
ca. 1883-1930  
Kuli alisi? Watralanti?



Scientific papers

poster distributed  
in Suriname and  
French Guiana

How can I help to preserve  
Maroon rice diversity?

45 samples stored in  
germplasm bank in  
Suriname



Marlies Lageweg  
SPECIMENS  
Art Rotterdam  
February 2020



'Rijst proberi' Tropenmuseum Amsterdam  
(Sabi Suriname children's exposition)

Rijksmuseum Amsterdam  
Slavery exhibition September 2020  
Sapali rice grains exhibited





## Pictures, movies: Alice Bertin



restaurants?

tourists?

plant  
breeders?

other  
farmers?

in-situ  
conservation?

Hoe de Marrons rijst in hun haar verstopten

9.991 weergaven • 24 mei 2018

221 4 DELEN OPSLAAN ...



Tinde van Andel  
42 abonnees

[How the Maroon ancestors hid rice grains in their hair – YouTube](#)

Edith Adjako, van Marrons afkomst, laat zien hoe haar voorouders rijstkorrels in hun haar vlochten toen ze de van de plantages ontsnapten en het binnenland van Suriname in vluchtten. Gefilmd in



To be continued



In the end..... Maroons have to protect their own (agri-) cultural heritage.....