Mar

- *1)Life* *dies, St. Au*
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Supervisor-F

CENTRE DE LA SCIENCE DE LA BIODIVERSITÉ DU QUÉBEC
QUEBEC CENTRE FOR BIODIVERSITY SCIENCE

Genetic diversity of hotpepper (Capsicum chinense) in the Neotropics

Not black pepper

Biogeography and diversity of Pepper

Pepper belongs to the:

Family: Solanaceae
(along with melongene, tomatoes and potatoes)

Genus :Capsicum
from the Greek word ‘capsicon’ derived from the Latin root ‘kapetin’ meaning to bite

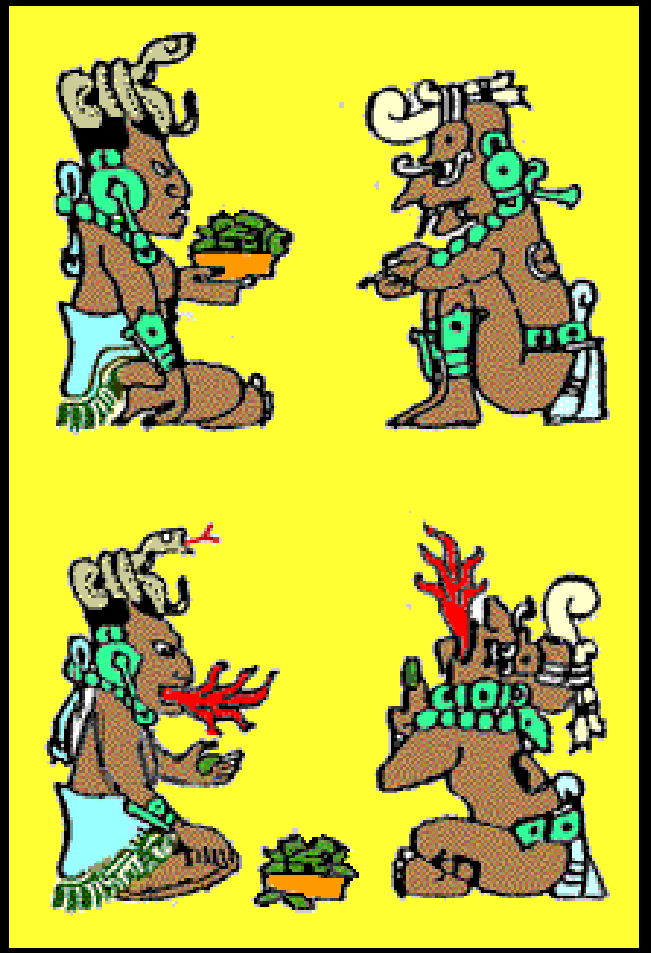
Centre of origin for all peppers is Bolivia in South America (McLeod,1982)

Based on

- Electrophoretic evidence
- ethnobotany

Center of origin

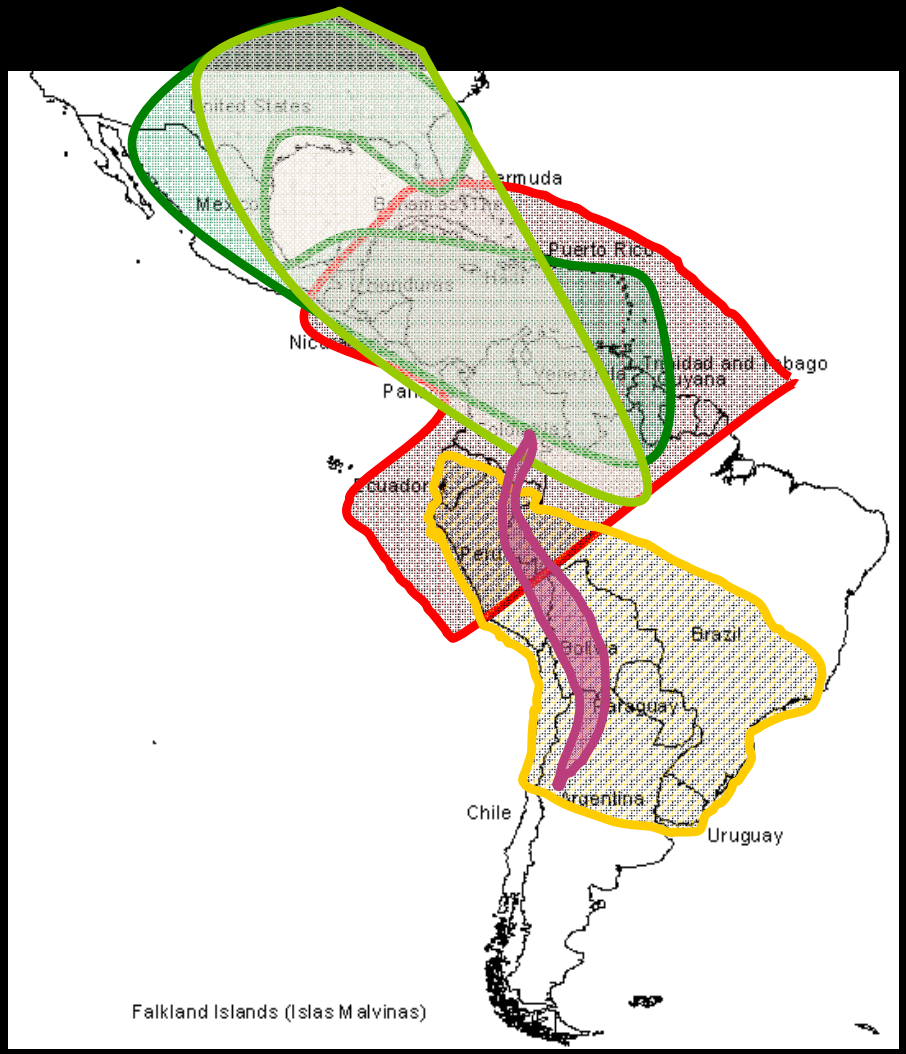
- An ancient neotropical crop species
  - archaeological find over 6000 yrs. old (Perry,2007)
- Brought to the old world by Columbus
- Within 50 yrs spread as far as India



Capsicum species

There are five domesticated species which include:

- Capsicum pubescens in Andes
- *Capsicum baccatuum* in middle South America
- *Capsicum frutescens* (bird peppers) in Central and South America
- *Capsicum annuum* (chile & bell peppers) in Mexico
- *Capsicum chinense* (hot peppers) in northern South America and Caribbean



Capsicum pubescens

- Native to Andean highlands of South America
- Distinctive black seeds
- Rocoto variety is most prominent

Ecuadorian light green

Inca hot

Capsicum frutescens (bird peppers)

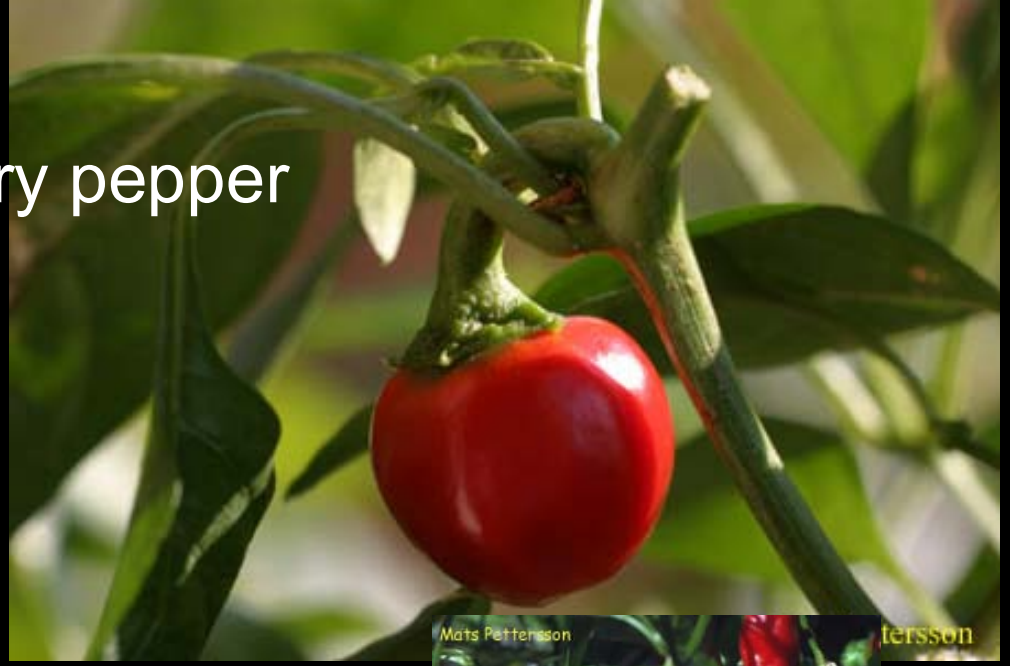
- Louisiana's Tabasco variety is the most famous of its varieties
- Commercial variety

Capsicum annuum L.

- Economically the most important pepper species world wide
- Best researched pepper globally

serrano

Cherry pepper



Cayenne

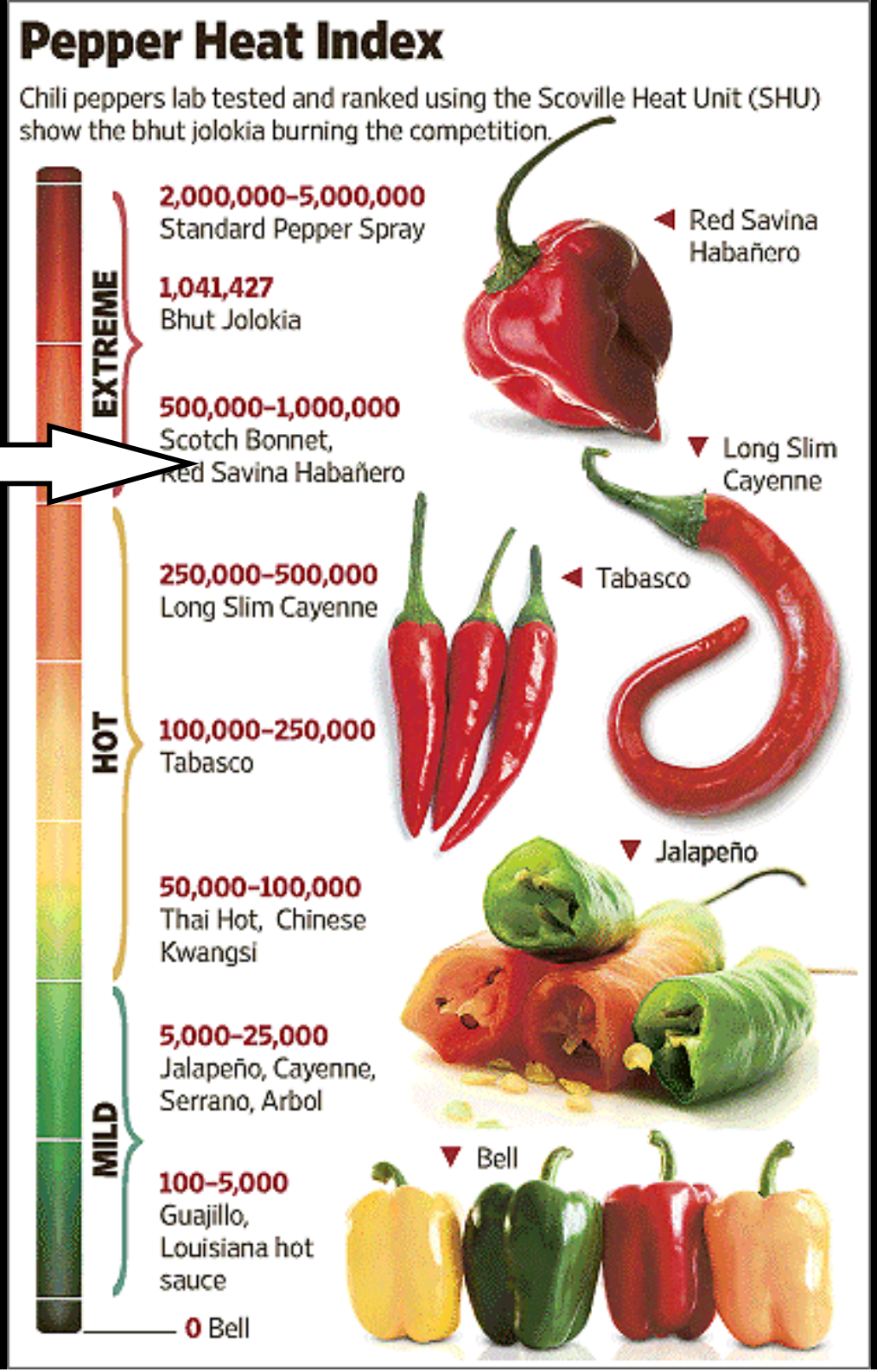
Sweet pepper

jalapeno

Jamaican Scotch Bonnet

(most famous of the Caribbean varieties)

Scotch Bonnet



West Indies Red

Another famous Caribbean selection

CARDI

Pimento Pepper

- Also a distinctive Caribbean genotype first found in Paramin, Trinidad.
- Known for its unique taste and used as a seasoning pepper.

Faria

- Large
- Blocky
- Thick pericarp
- Glossy skin

Cardi Green

A selection from the West Indies red variety. Note the thick outer walls and dark green colour when immature

Pepper- a new economic resources

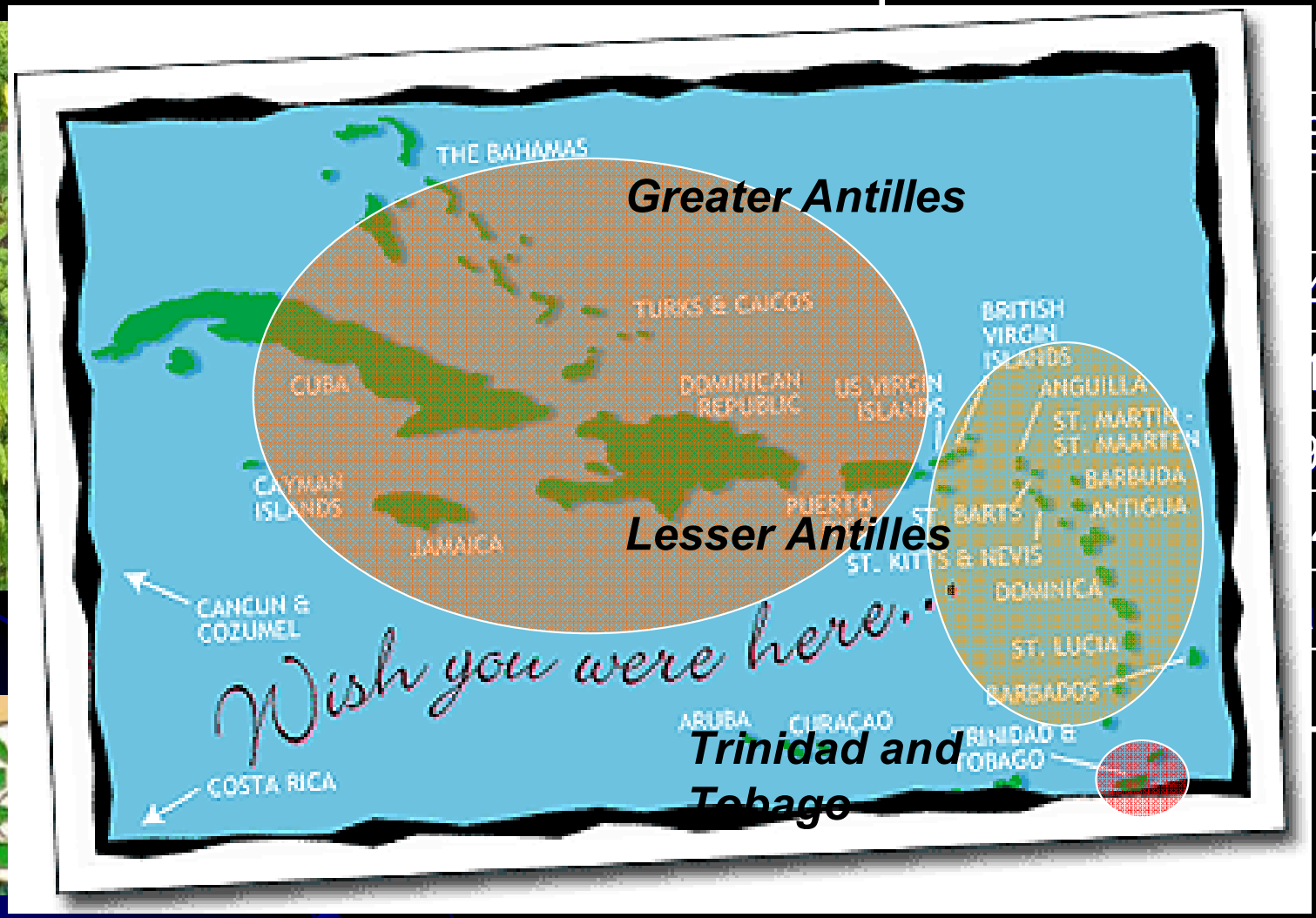
- Caribbean agriculture is based on traditional plantation crops
- Hot pepper identified as a non- traditional plantation crop

HOT PEPPER WAX
READY TO USE
INSECT REPELLEN
For Fruits, Vegetables
Indoor & Outdoor Ornamentals
For Residential Use Only
Made From Hot Cayenne Peppers
Keep out of Reach of Children
CAUTION
Net Contents: 22 Fl. Oz.

HIGH POTENCY FORMULA 0.1% STRENGTH
Doctor Recommended
ARTHRITIS PAIN RELIEF
PURIFIED CAPSAICIN
Doctors recommend purified capsaicin more than all other topical analgesic ingredients combined for arthritis pain.
DEEP PENETRATING • ODOR FREE
HIGH POTENCY
CAPZASIN-HP
ARTHRITIS PAIN RELIEF
TOPICAL ANALGESIC CREME
Net wt 1.5 oz (42.5g)

PepperBall
PepperBall PAVA
Pepper Spray
PAVA (Capsaicin II)
WARNING: SEVERE IRRITANT
NON-TOXIC
NON-FLAMMABLE
OZONE SAFE
OIL FREE
CONE PATTERN
Net contents: 1.4 oz. (40 gm.)

Establishment of germplasm collection



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3)
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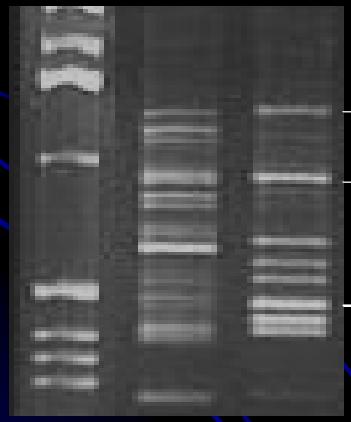
go (79)

Yellow pepper

Red pepper

How to measure genetic diversity?

DNA isolation and amplification procedures



BAND1

BAND 2

BAND 3

Band Scoring

Computer analysis

	BAND1	BAND2	BAND3
Yellow pepper	1	1	0
Red pepper	1	1	1

Yellow pepper

Red pepper

Diversity measures

Geographic regions	Nei's Diversity
Latin America region (89)†	**0.278**
Lower Amazon	0.28 (1)*
Upper Amazon	0.218 (3)
Guianas including Venezuela	0.208 (4)
Central America	0.192 (5)
Caribbean region (112)	0.218
Greater Antilles	0.257 (2)
Trinidad and Tobago	0.156 (6)
Lesser Antilles	0.152 (7)

† No. of accessions

* numerical ranking of diversity in descending order

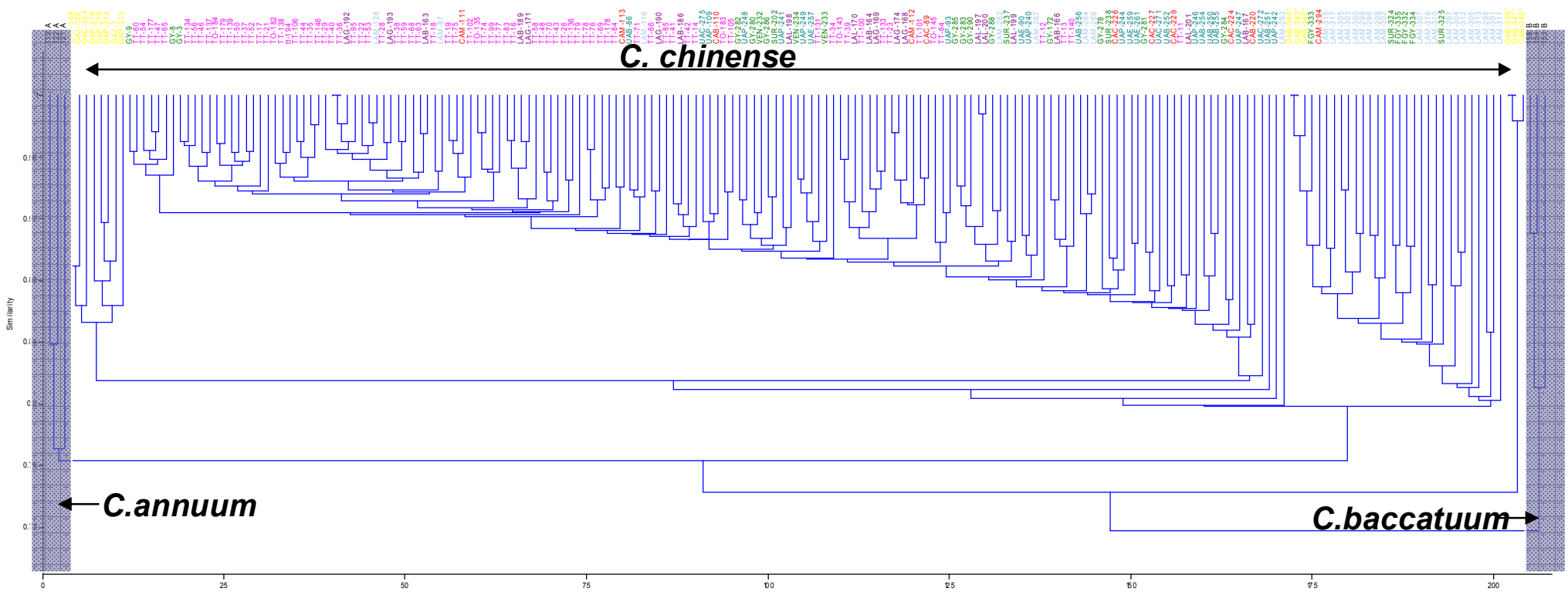
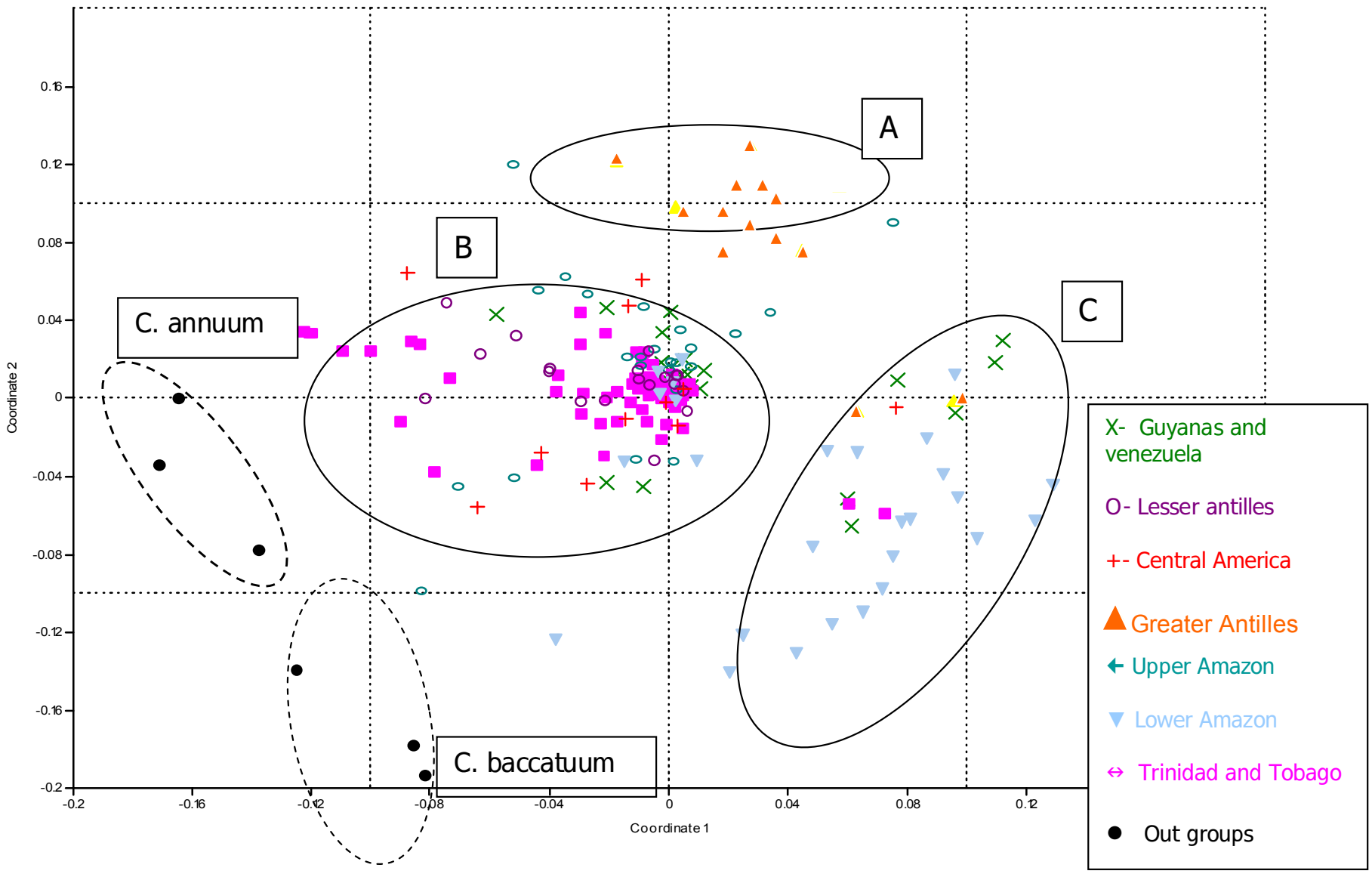


Fig.1 Dendrogram based on cluster analysis (UPGMA) of *C. chinense* accessions

*(The flanking out groups (grey) represent *C. annuum* and *C. baccatum*, respectively)

MDS plot of *Capsicum chinense* found in seven geographic regions



Future work

Microsatellite work

Has an advantage over the marker that I used in that

- Reliable scoring
- Co-dominant inheritance

Further investigations

Chloroplast genes and capsicum

- Byran, 1999. markers developed for mononucleotide repeats in chloroplast.
- Walt and Hoot 2001 used two non-coding regions: chloroplast spacer gene and waxy intron nuclear gene
- Rhzhova 2004 used six chloroplast micro satellites

ALL looked at INTERSPECIFIC phylogenetic relationships

Pepper Heat Index

Chili peppers lab tested and ranked using the Scoville Heat Unit (SHU) show the bhut jolokia burning the competition.

EXTREME

2,000,000–5,000,000
Standard Pepper Spray

1,041,427
Bhut Jolokia

500,000–1,000,000
Scotch Bonnet,
Red Savina Habañero

HOT

250,000–500,000
Long Slim Cayenne

100,000–250,000
Tabasco

50,000–100,000
Thai Hot, Chinese Kwangsi

MILD

5,000–25,000
Jalapeño, Cayenne, Serrano, Arbol

100–5,000
Guajillo, Louisiana hot sauce

0 Bell

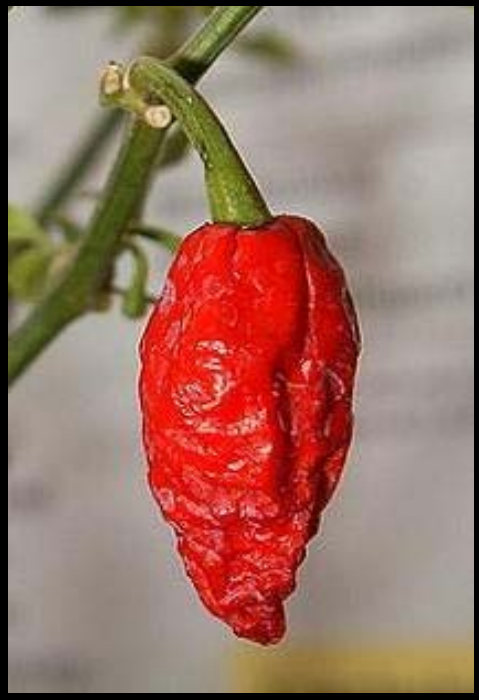
◀ Red Savina Habañero

▼ Long Slim Cayenne

◀ Tabasco

▼ Jalapeño

▼ Bell



Bhut Jolokia=
hottest pepper in the world???

Thank you!

Geographic regions	Cluster A	Cluster B	Cluster C
Lower Amazon	-	71%	29%
Greater Antilles	100%	-	-
Guianas	-	23%	77%
Trinidad and Tobago	-	3%	97%
Upper Amazon	-	-	100%
Central America	-	-	82%
Lesser Antilles	-	-	100%