

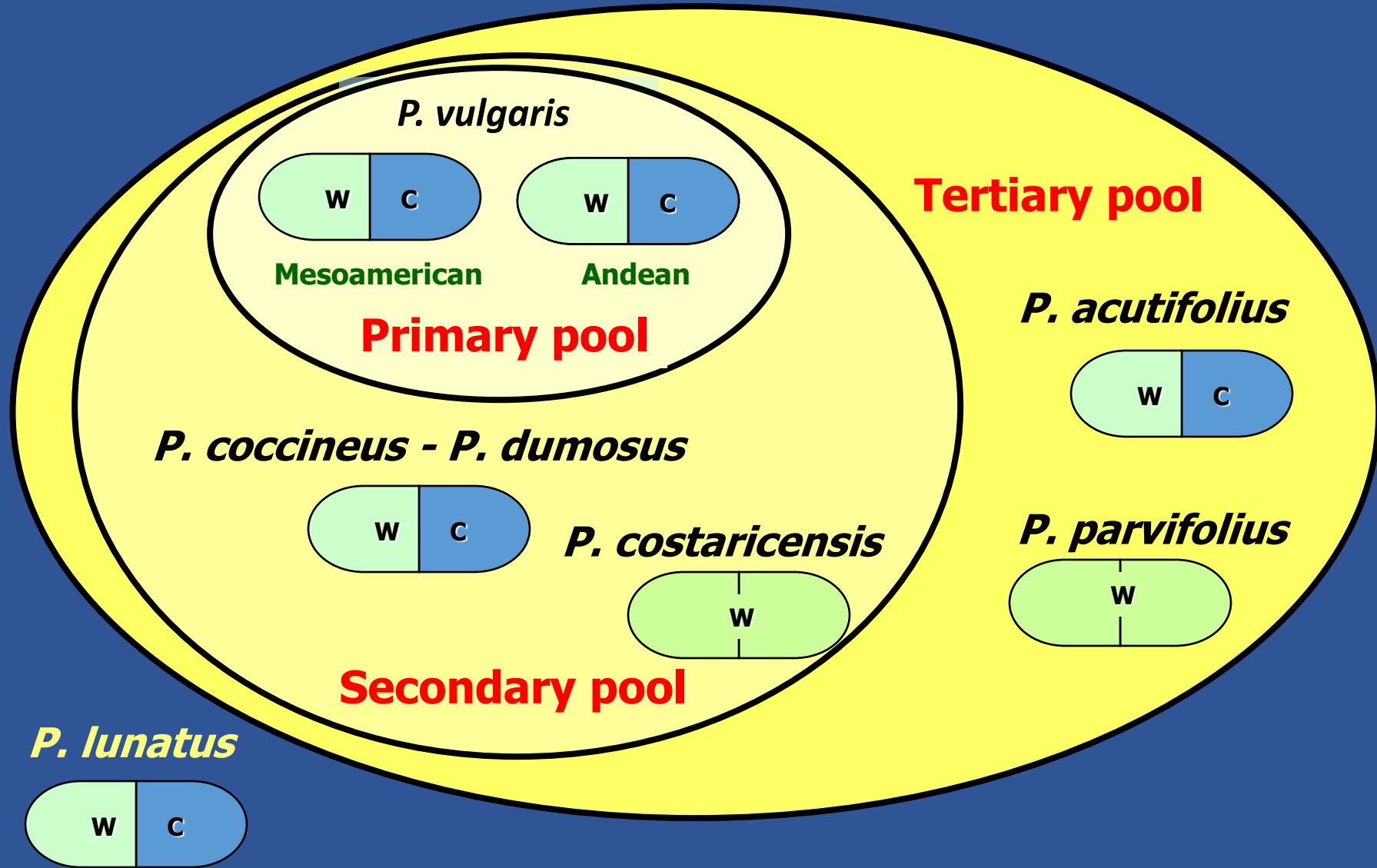
The Phaseolus spp. Core  
Collection of the Secondary  
Gene Pool



The largest collection  
in the world of genus  
*Phaseolus*

- *Phaseolus vulgaris*
- *Phaseolus coccineus*
- *Phaseolus dumosus*
- *Phaseolus acutifolius*
- *Phaseolus lunatus*
- Wild species

# Gene pools of Common Bean



 = Wild and cultivated forms

# *Phaseolus* spp. originated in contrasting environments



**HUMIDO-SUB HUMIDO**

## **SECONDARY gene pool**

- coccineus
- dumosus
- costaricensis

Large biomass

Low harvest index

Fungal resistance

**SUB-HUMIDO**

## **PRIMARY gene pool**

- vulgaris

**ARIDO**

## **TERTIARY gene pool**

- acutifolius
- parvifolius

Small biomass

High harvest index

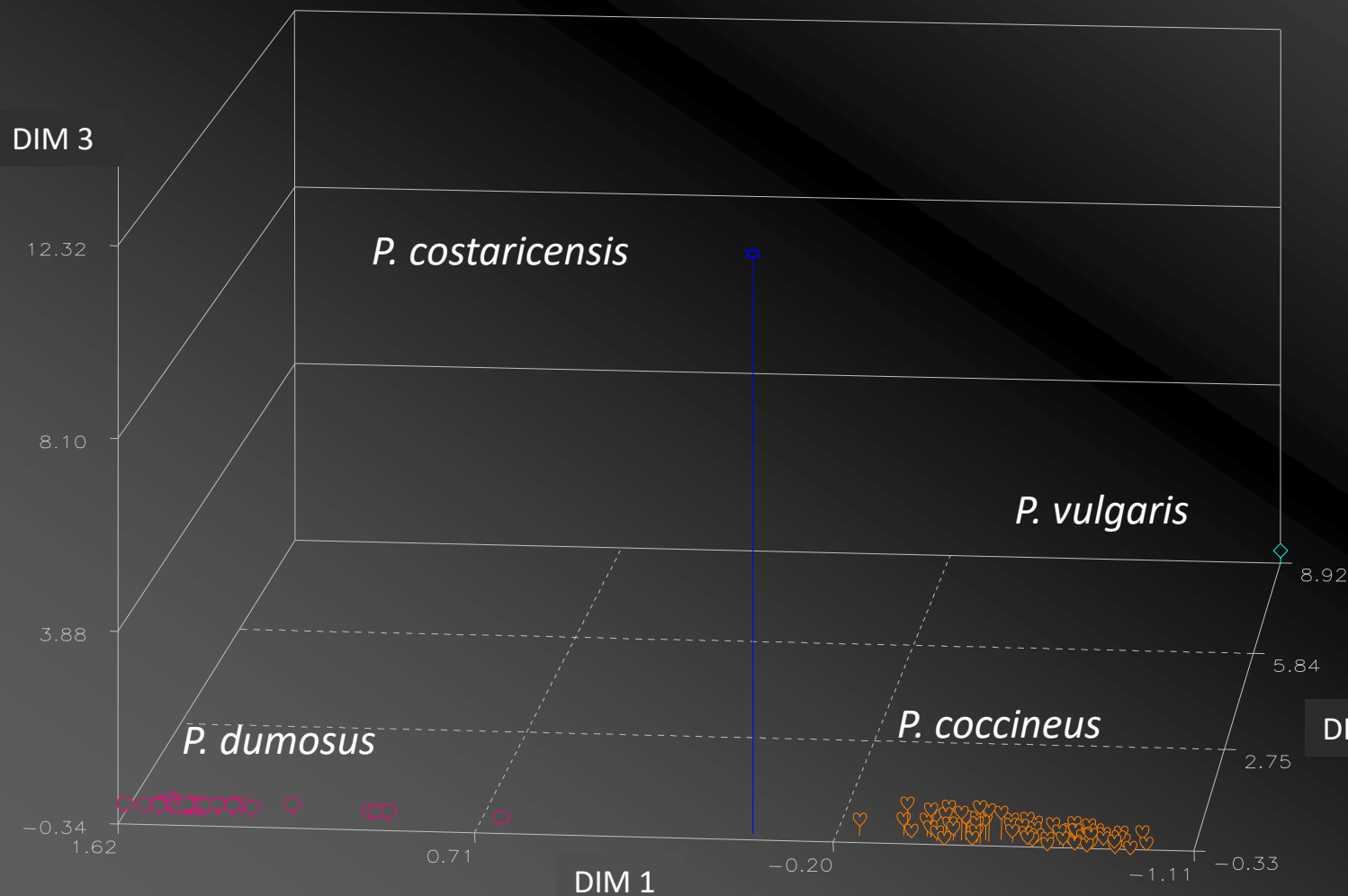
Heat / drought tolerance

# Why Core Collections?

- Complete collections are too large for systematic study
- A core gives a window on the entire collection
- Major alleles will be captured, alleles at very low frequency may be overlooked.

# The Core Collection of

*P. costaricensis*, *P. coccineus*, and *P. dumosus*



✓ *P. costaricensis*  
intermediate  
between *P.*  
*coccineus* and *P.*  
*polyanthus* (Schmit  
et al., 1993)

*P. coccineus*...

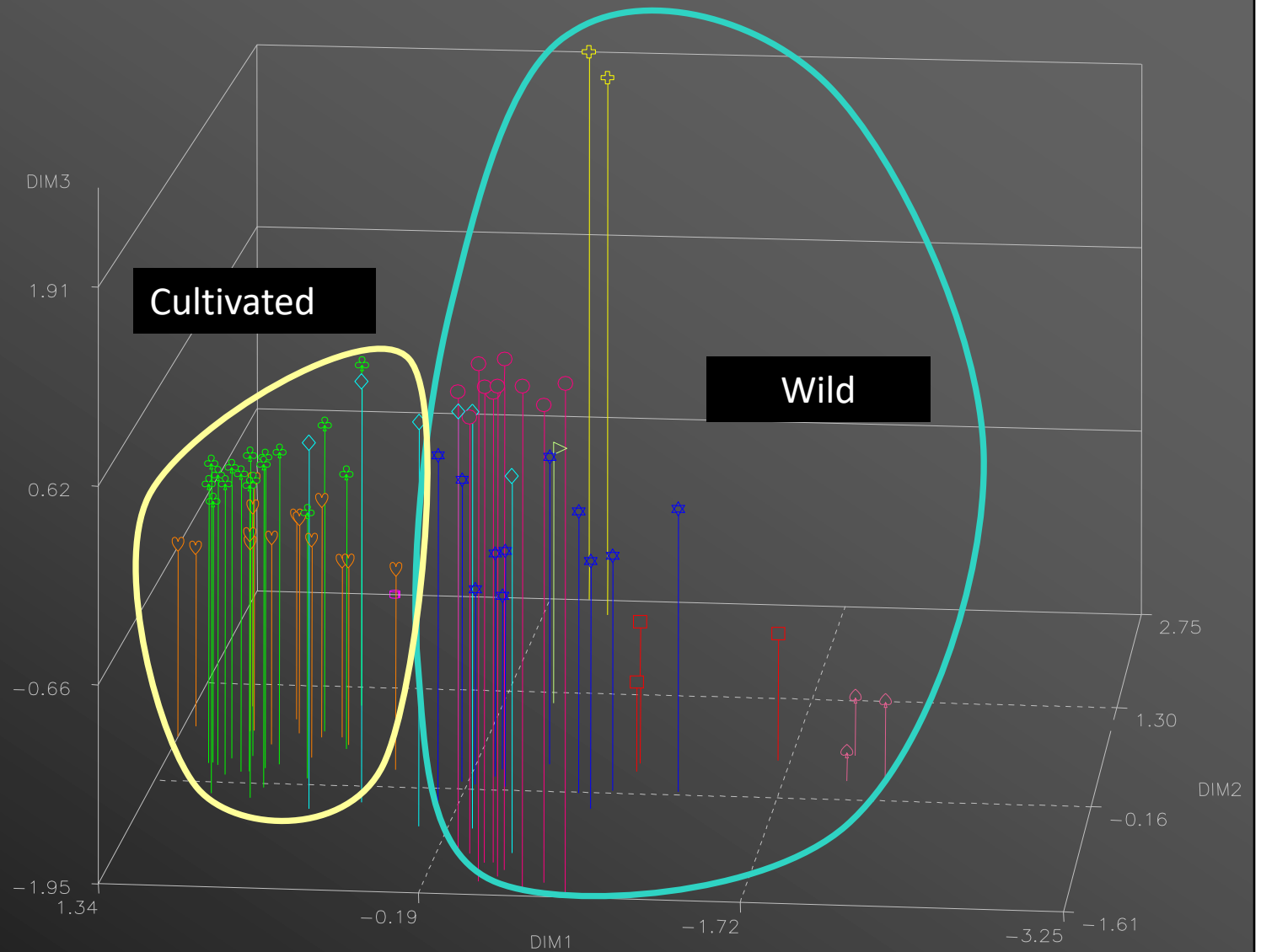
- Large leaf area
- Long racemes
- Few pods
- Strong roots



## 2. *P. coccineus*

### MCA

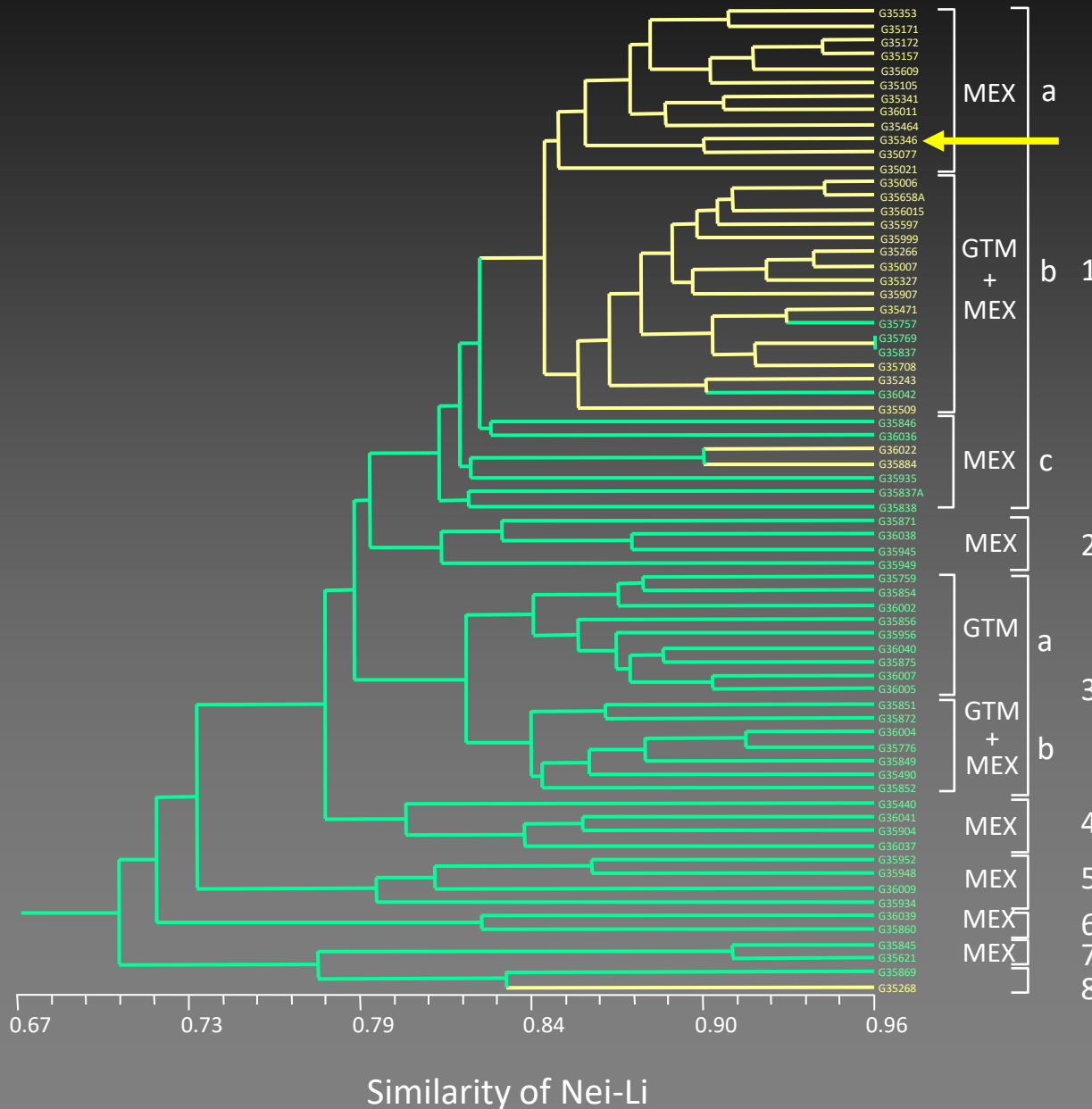
- ♥ Cultivated - México
- ♣ Cultivated Guatemala + México
- ◇ wild - Guatemala
- ☆ wild - México
- wild - Guatemala
- ✚ wild - México
- ▷ wild - México
- wild - México
- ♠ wild - México
- ◻ wild - México



First dimensión: separation by biological state.



# *P. coccineus*: Genetic similarity of Nei-Li

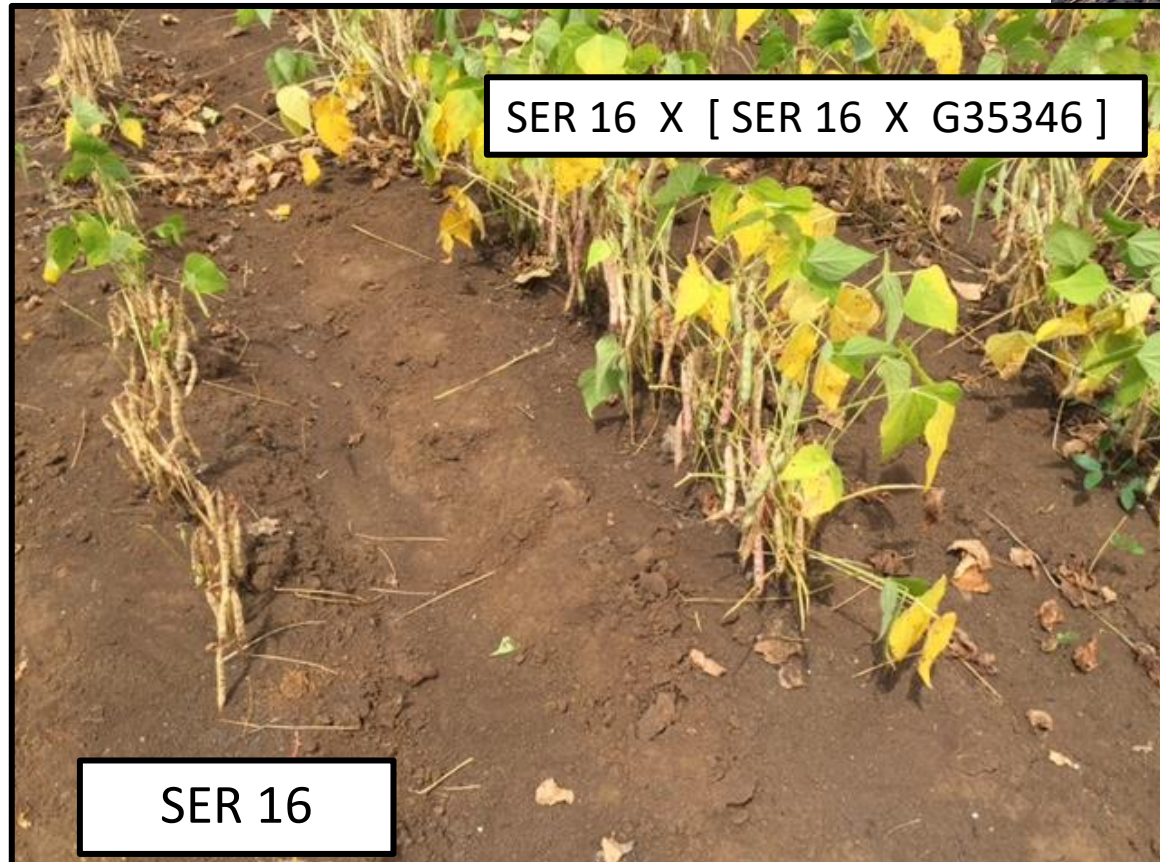
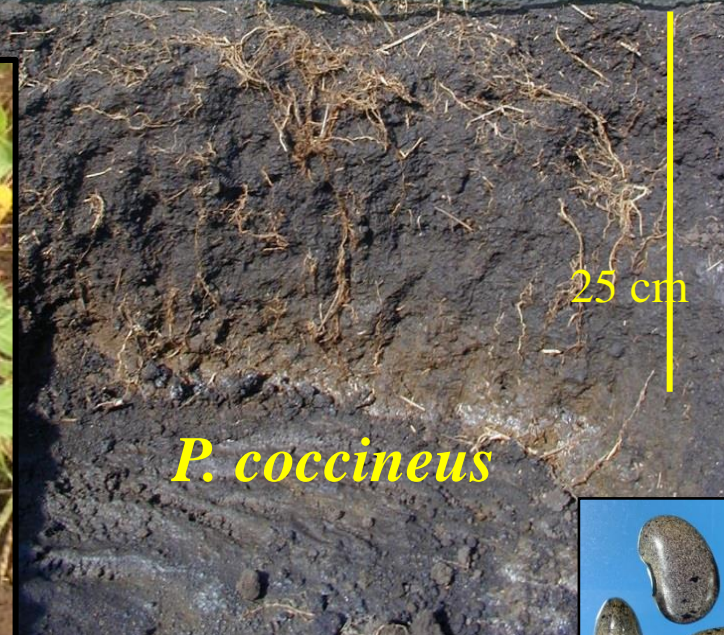


- Differentiation between wild and cultivated forms

- Groups form by geographic origin.

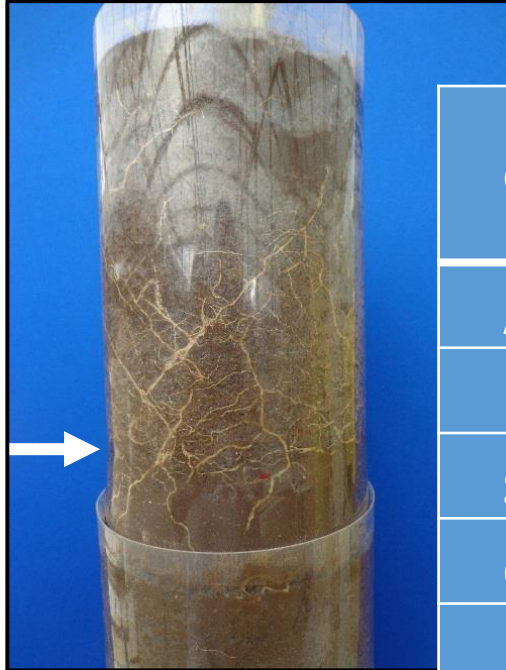
# Aluminum resistance:

Improving common  
bean with a wild  
*P. coccineus*\*



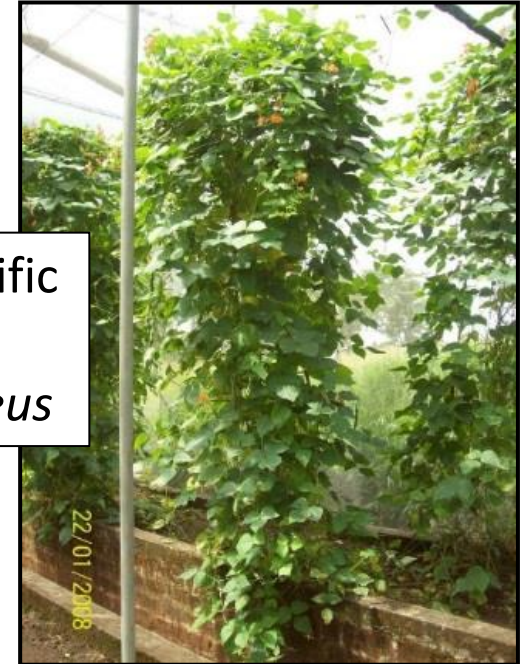
\* Ph.D. thesis, Louis  
Butare, RAB, Rwanda

# Roots of an interspecific line penetrate a barrier



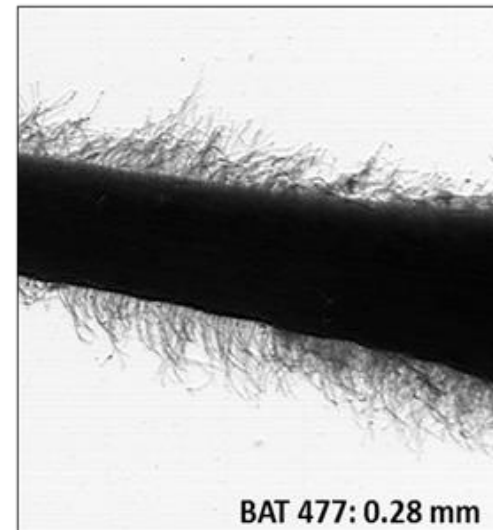
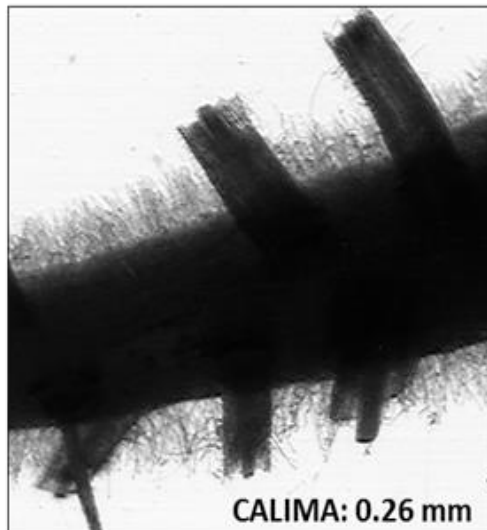
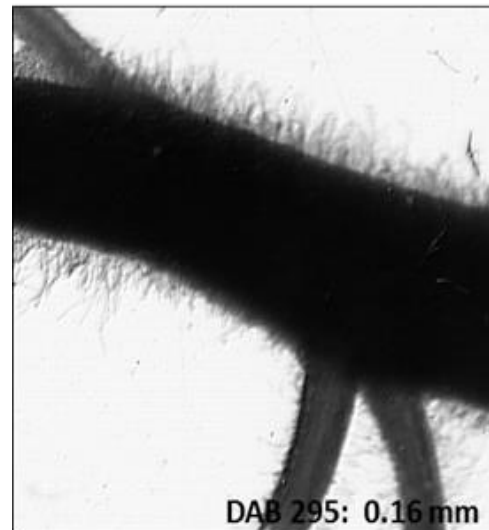
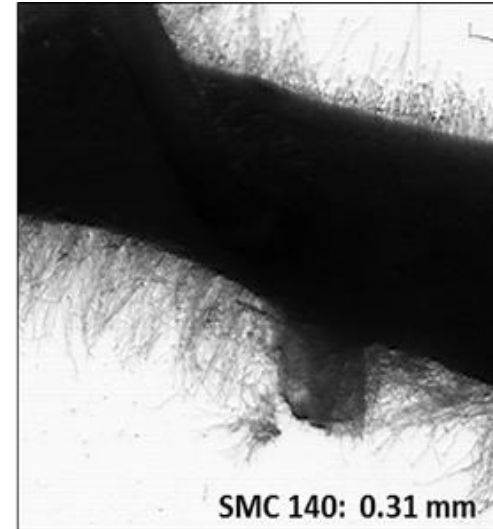
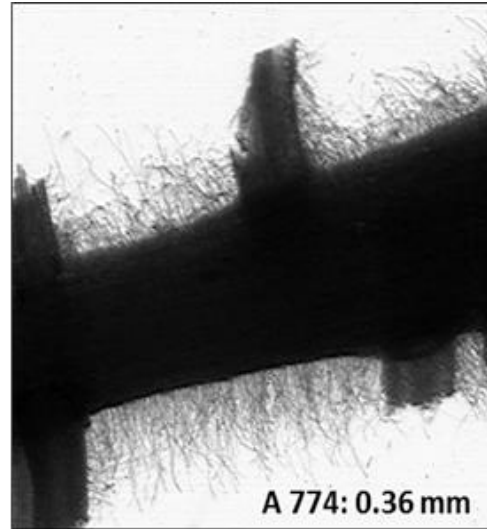
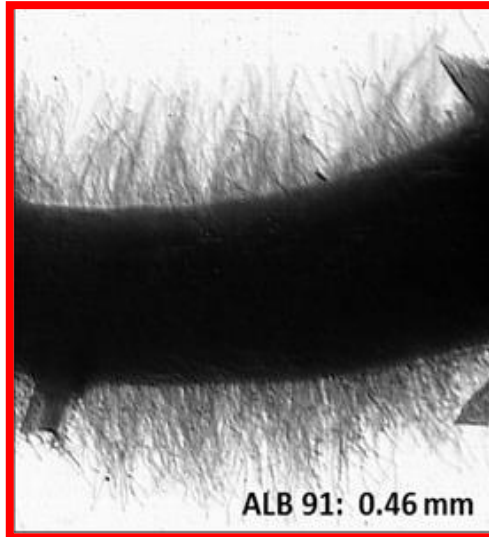
Genotypes	% ROOTS PENETRATING	
	IRRIGATED	DROUGHT
ALB91	46	41
DAB295	34	36
SMC140	32	30
CALIMA	25	23
BAT477	23	20
A774	18	15
Medio	30	28
C.V.	15	13
LSD <sub>0.05</sub>	8	6

Interspecific with *P. coccineus*



# Long root hairs increase soil exploration and absorption of nutrients

Interespecific  
with  
*P. coccineus*



The first bean variety developed for combined stress  
(Drought and Low P)

- BFS 81 = INTA Productivo Sequía

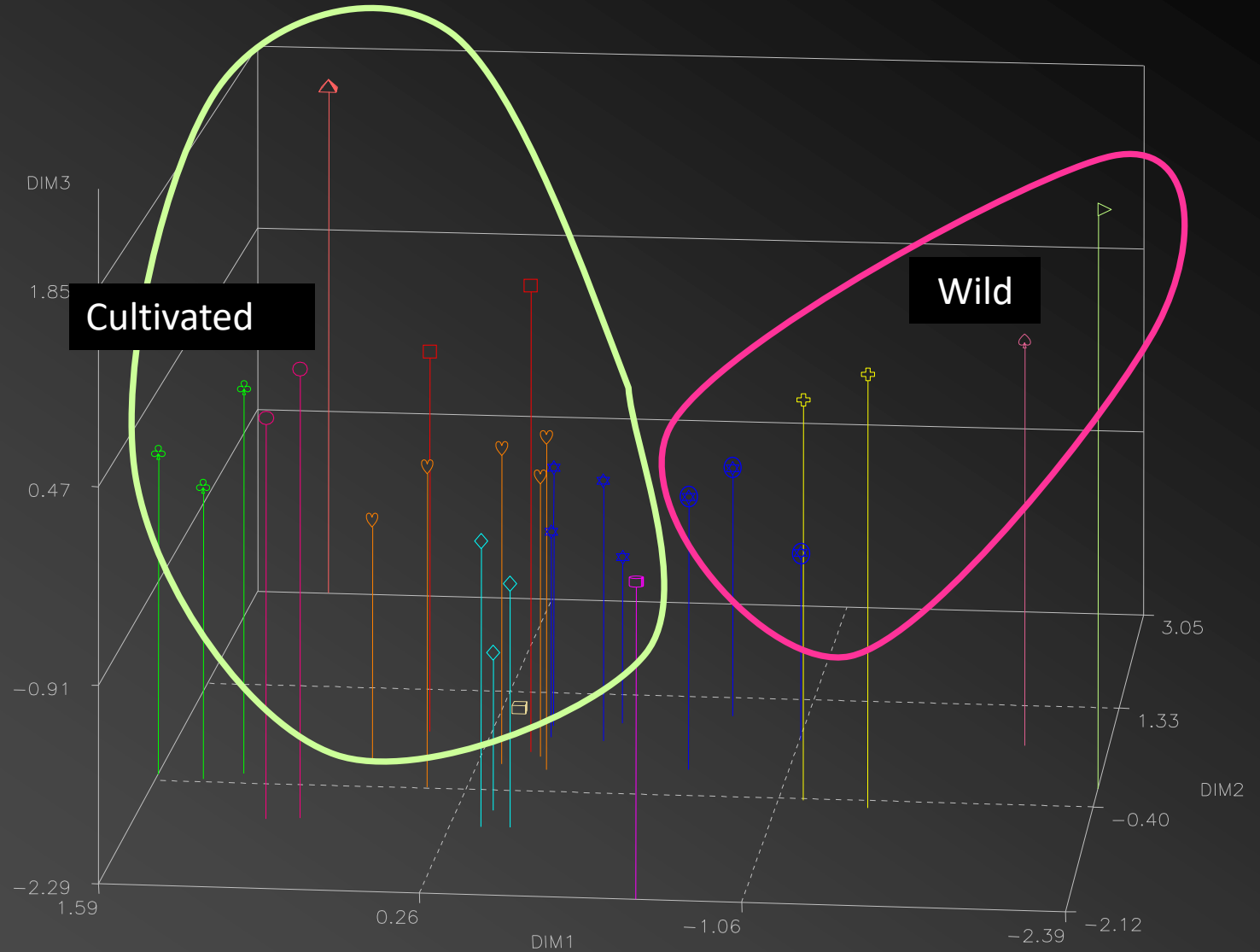
- ( SER 16 x RCB 593 ) x ( BFS 32 x **ALB 91** )

↑  
[ SER 16 x ( SER 16 x **G35346** ) ]

### 3. *P. dumosus*

#### MCA

- ▷ Wilds - Guatemala
- ♠ Wilds - Guatemala
- ✚ Wilds - Guatemala
- ⊗ Wilds - Guatemala
- ☆ Cultivated - Guatemala
- ◡ Cultivated - S. America
- ◊ Cultivated - S. America
- ♡ Cultivated - Guatemala
- ◻ Cultivated - Guatemala
- Cultivated - S. America
- ♣ Cultivated - S. America
- ▲ Cultivated - Guatemala

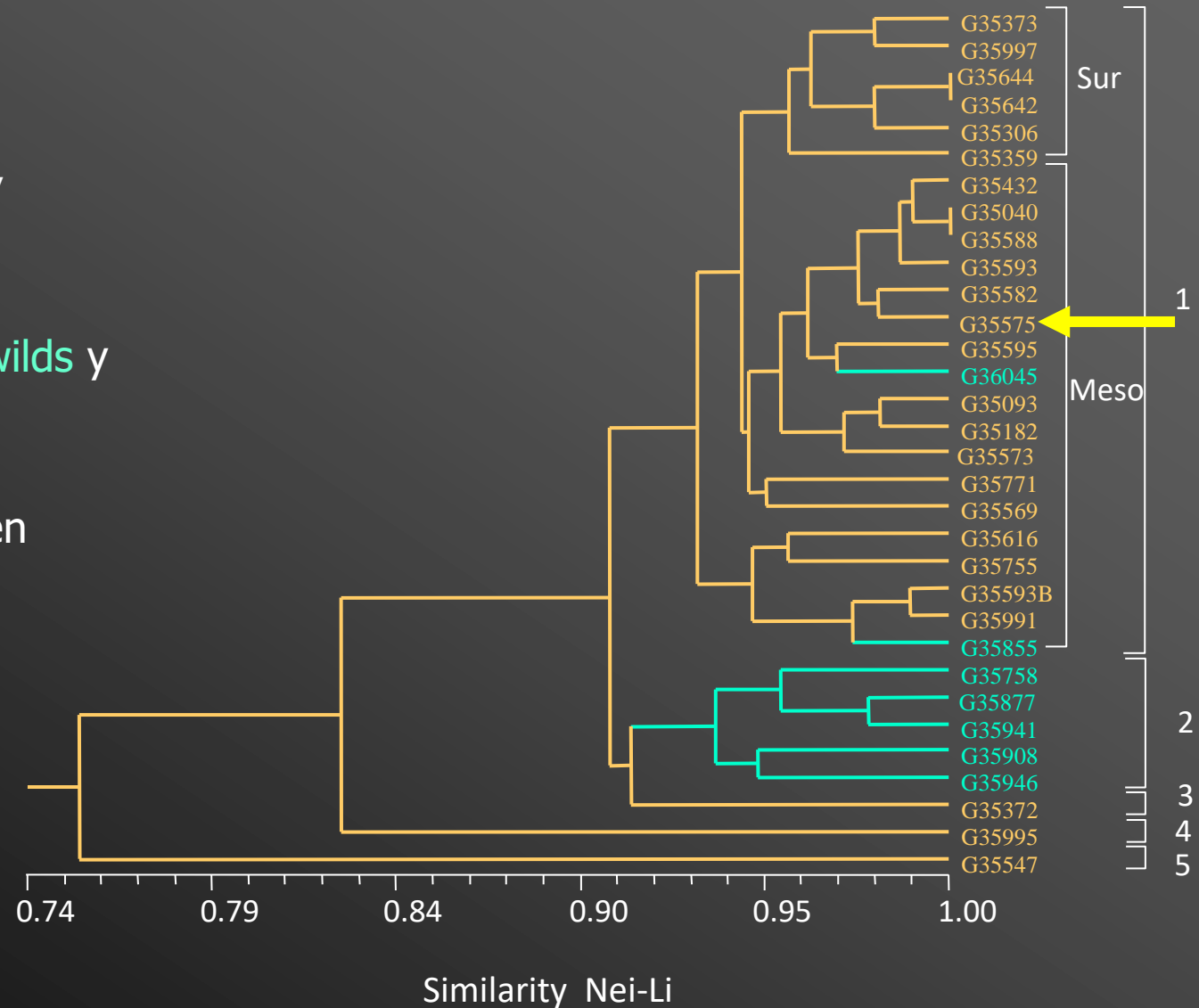


First dimensión: separation by biological state.

### 3. *P. dumosus*

#### A. Nei-Li Similarity Index

- Many accessions are very similar
- Differentiation between **wilds** y **cultivated**.
- Some separation between Mesoamerican and South American populations





**Common bean**

***P. dumosus***

**Interspecific  
crosses**





# Lines F5 with 30 ppm more Fe



FEB 226 (recurrent parent)



MIB 755 =  
FEB 226 x (FEB 226 x G35375)



- *Thank you*