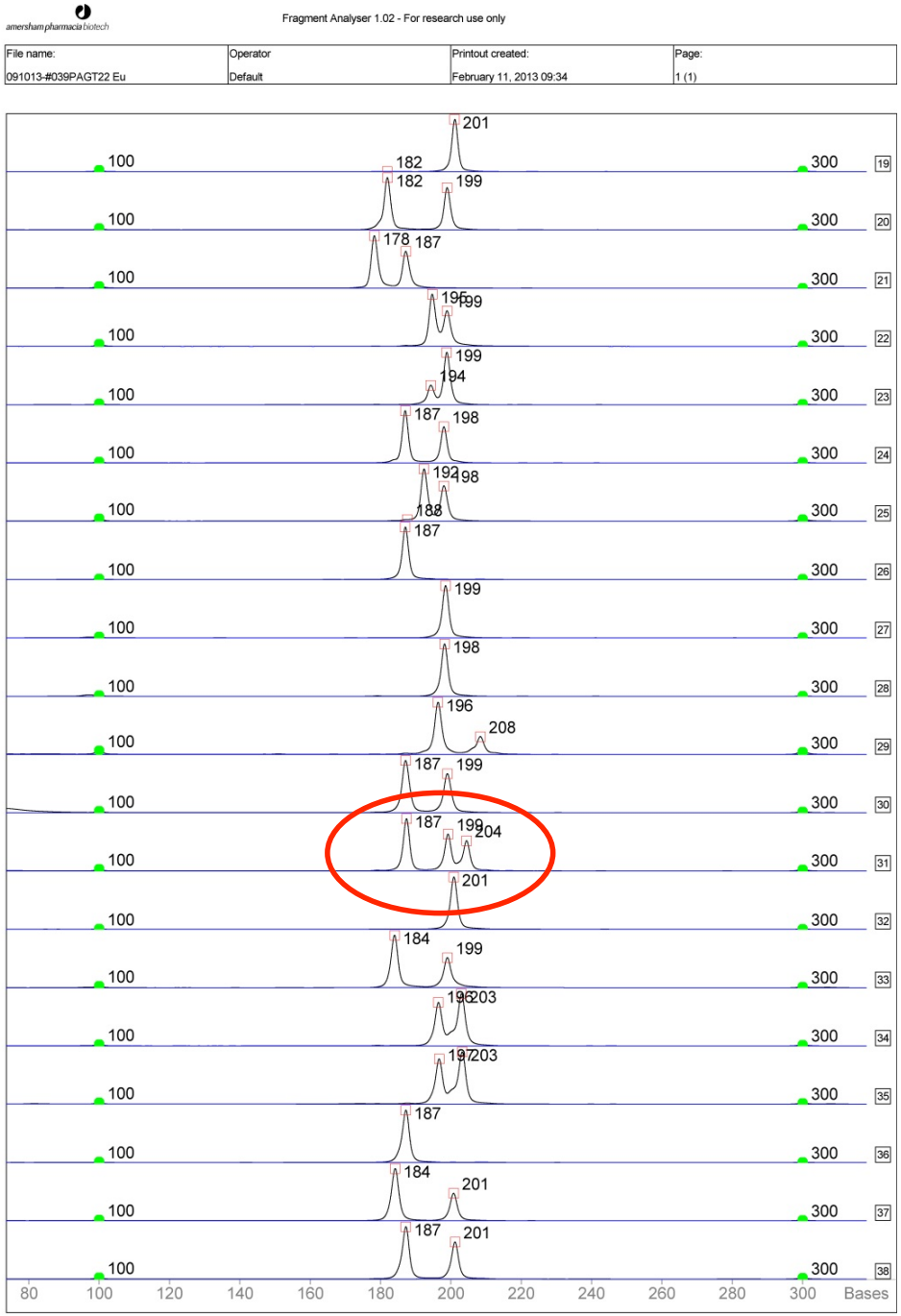
AARHUS UNIVERSITY

Phylogeography within the cosmopolitan genus *Phragmites*. A global approach to understand genetic diversity in *P. australis* populations.

Carla Lambertini and Hans Brix

PLANT BIOLOGY

Does it matter where *Phragmites* comes from?



Genetic diversity in wild populations (in Europe)

- Several different alleles
- Often more than two alleles
- Variation within population

AMOVA:

% of variation		Italy	UK	CZ
Among populations		15	36	6
Within populations		85	64	94
Fixation index	Fst	0.15	0.270	0.06
	p-value	<0.01		<0.01

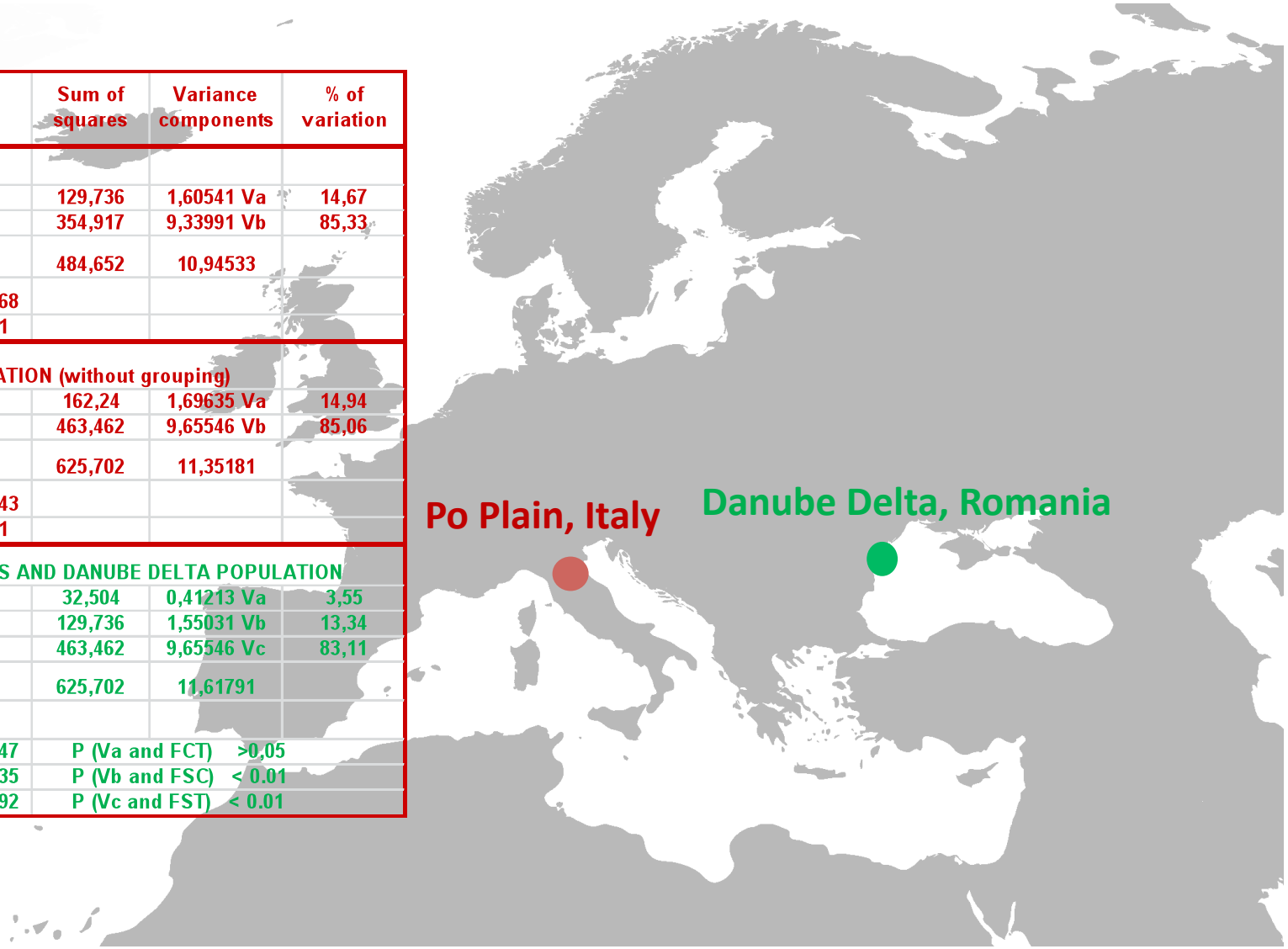
Italy: Lambertini et al., 2008
UK: Paul et al., 2011
CZ: Fer and Hroudova, 2009

- Genetic distances do not increase with geographic distances

Comparison among distant wild populations (in Europe)

Source of variation	d.f.	Sum of squares	Variance components	% of variation
1) PO PLAIN POPULATIONS				
Among populations	7	129,736	1,60541 Va	14,67
Within populations	38	354,917	9,33991 Vb	85,33
Total	45	484,652	10,94533	
Fixation index FST =	0,14668			
P (Va and FST)	<0.01			
2) INCLUDING DANUBE DELTA POPULATION (without grouping)				
Among populations	8	162,24	1,69635 Va	14,94
Within populations	48	463,462	9,65546 Vb	85,06
Total	56	625,702	11,35181	
Fixation index FST =	0,14943			
P (Va and FST)	<0.01			
3) 2 GROUPS: PO PLAIN POPULATIONS AND DANUBE DELTA POPULATION				
Among groups	1	32,504	0,41213 Va	3,55
Among populations within grou	7	129,736	1,55031 Vb	13,34
Within populations	48	463,462	9,65546 Vc	83,11
Total	56	625,702	11,61791	
Fixation indexes:				
FCT =	0,03547	P (Va and FCT)	>0,05	
FSC =	0,13835	P (Vb and FSC)	< 0.01	
FST =	0,16892	P (Vc and FST)	< 0.01	

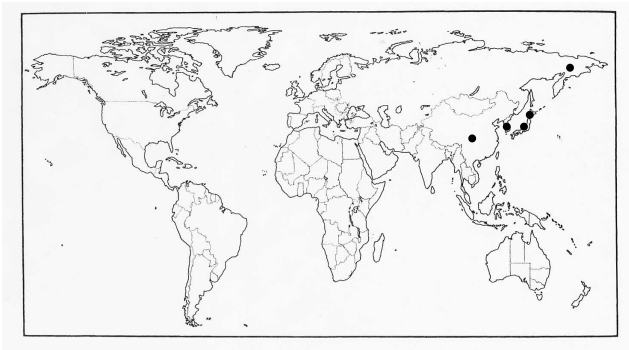
Lambertini et al., 2008



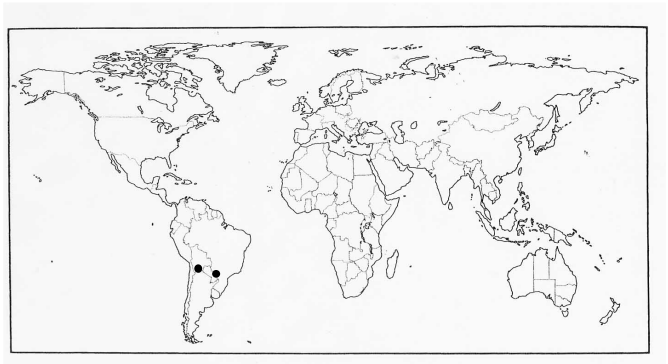
A global approach to understand genetic diversity in wild *Phragmites* populations

Phragmites species

P. frutescens

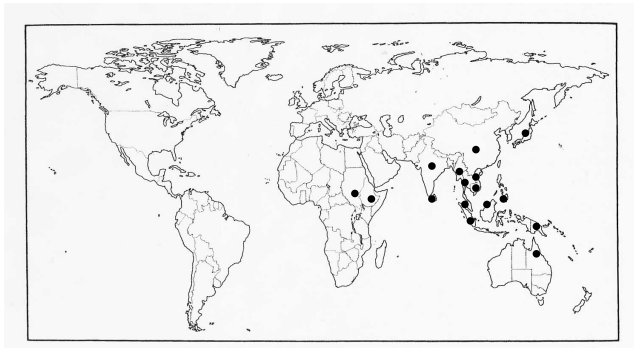


P. japonicus



P. dioicus

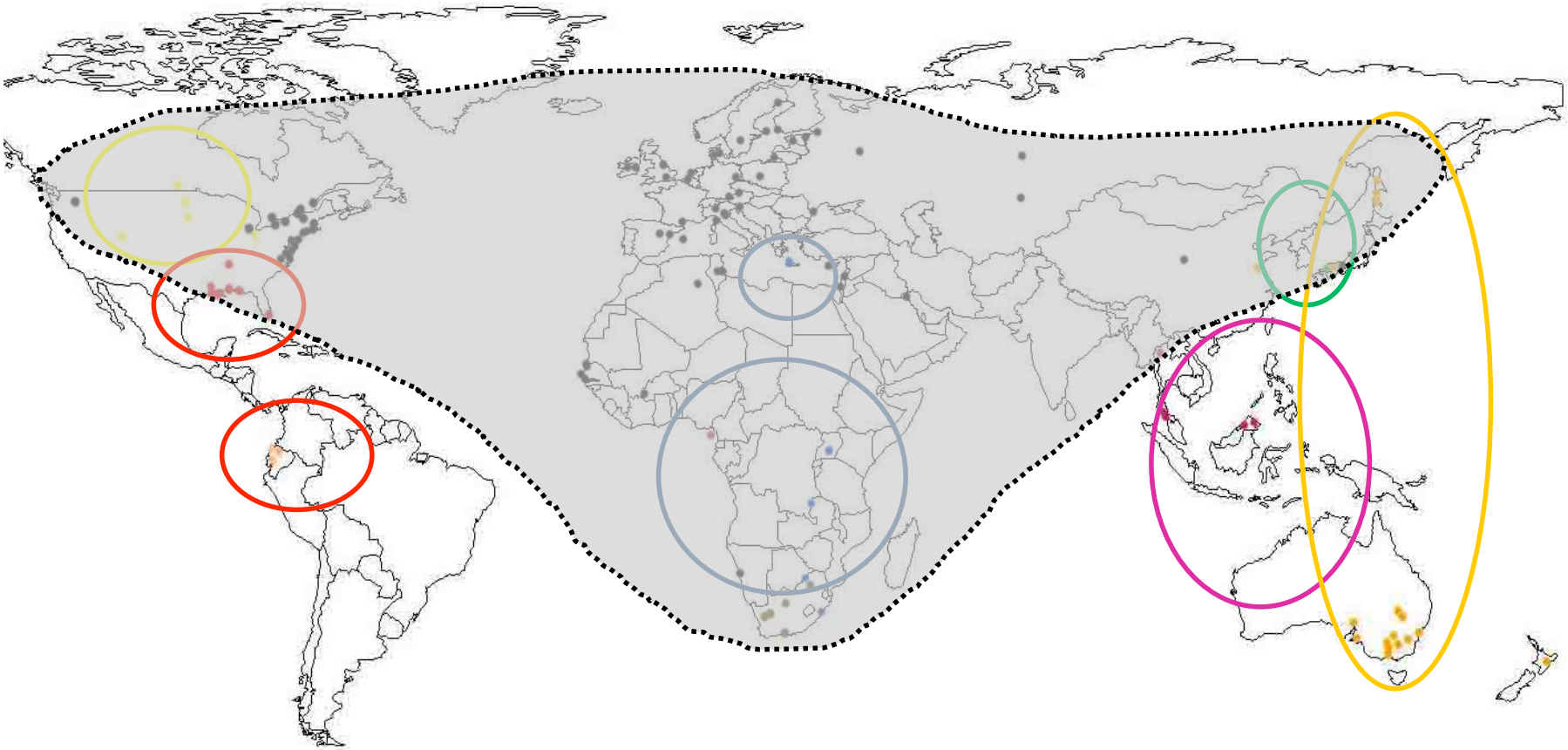
P. mauritianus



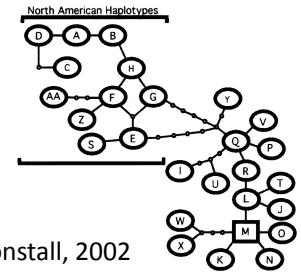
P. karka

Phragmites genetic diversity (AFLPs)

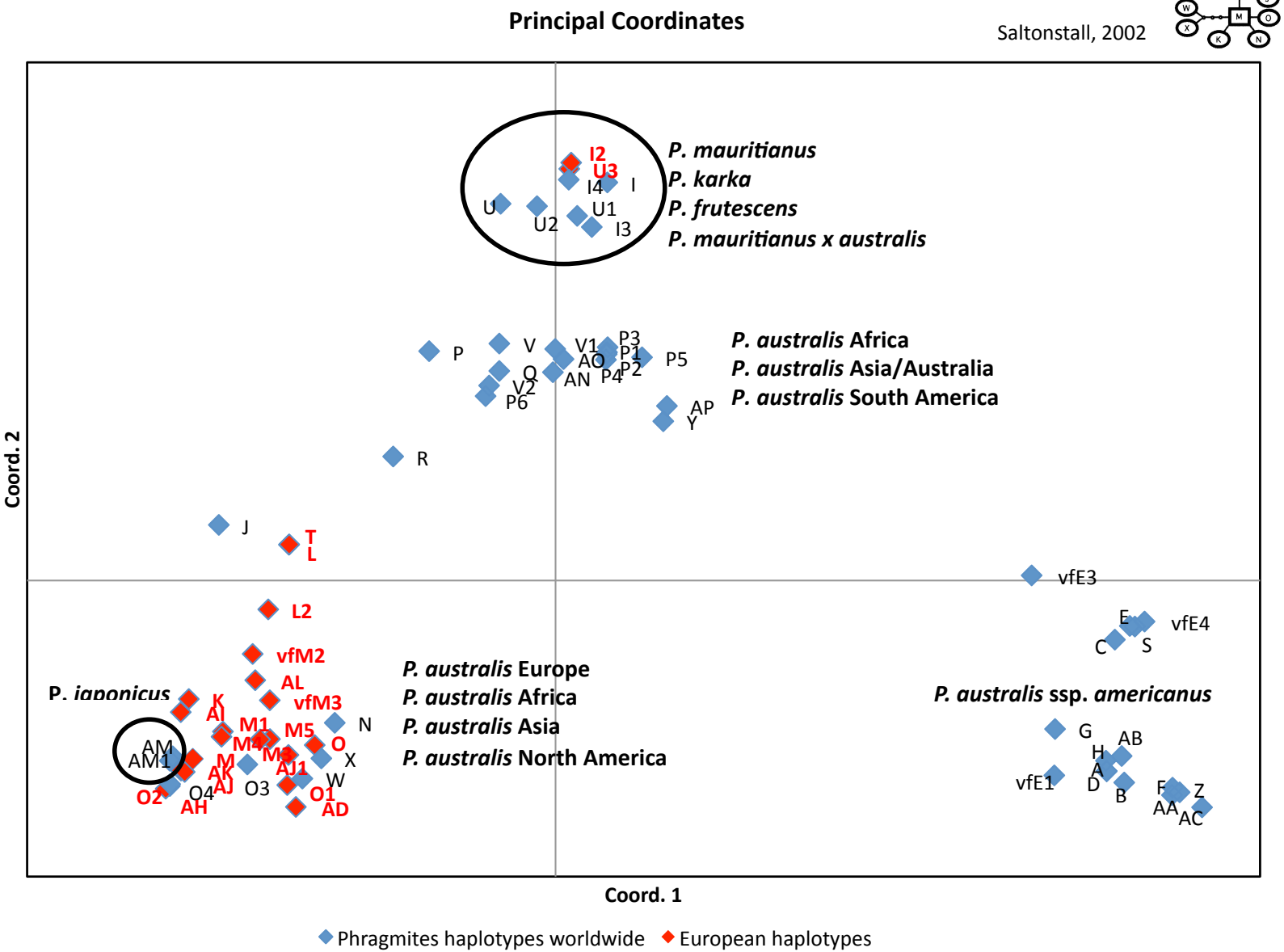
P. mauritianus (P. frutescens)
P. karka
P. japonicus
P. australis Asia/AU
P. australis ssp. *americanus*
P. australis var. *berlandieri*
P. australis South America
P. australis Europe



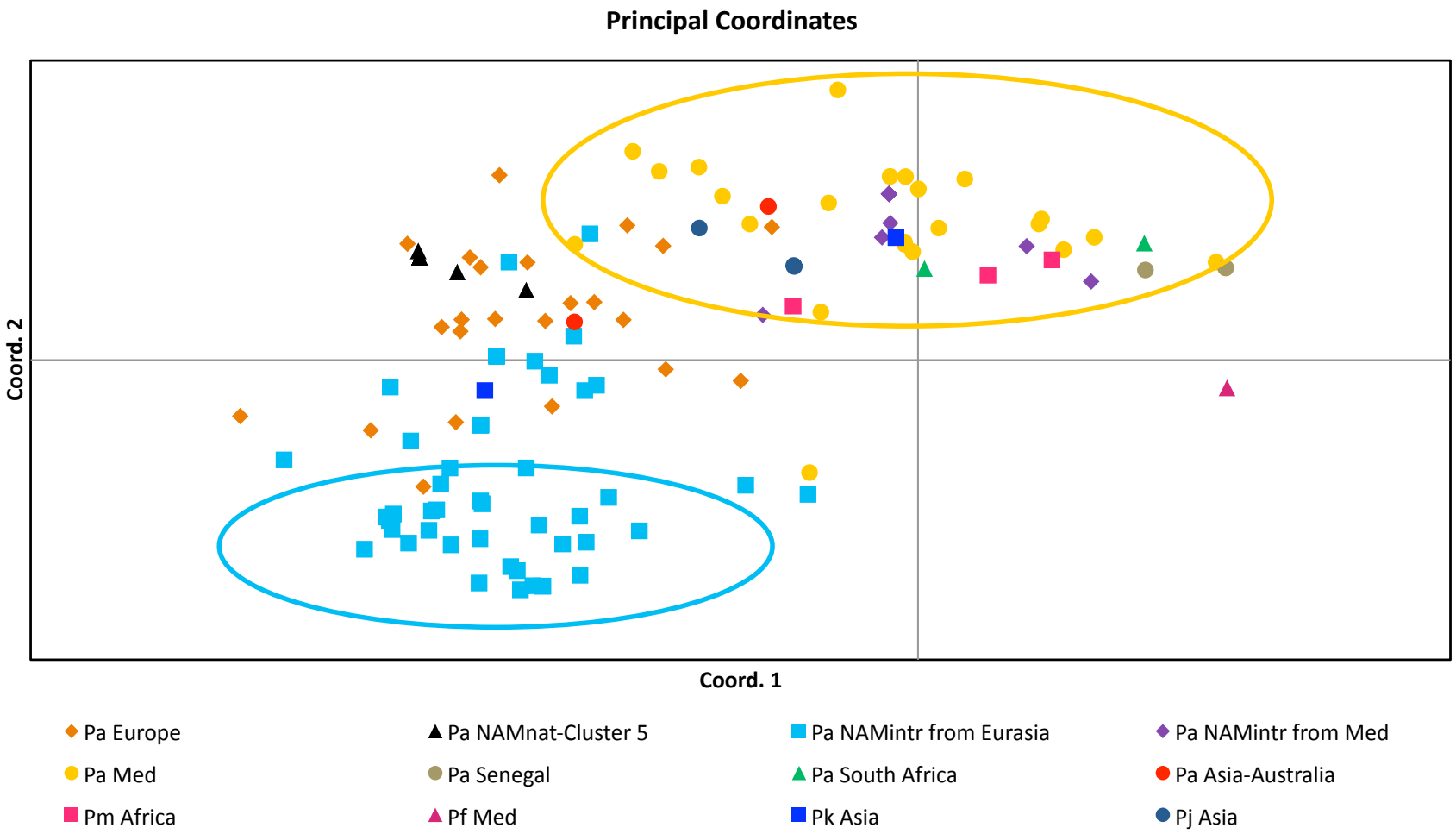
Phragmites cp-DNA lineages (*trn*T-*trn*L + *rbc*L-*psa*I)



Saltonstall, 2002

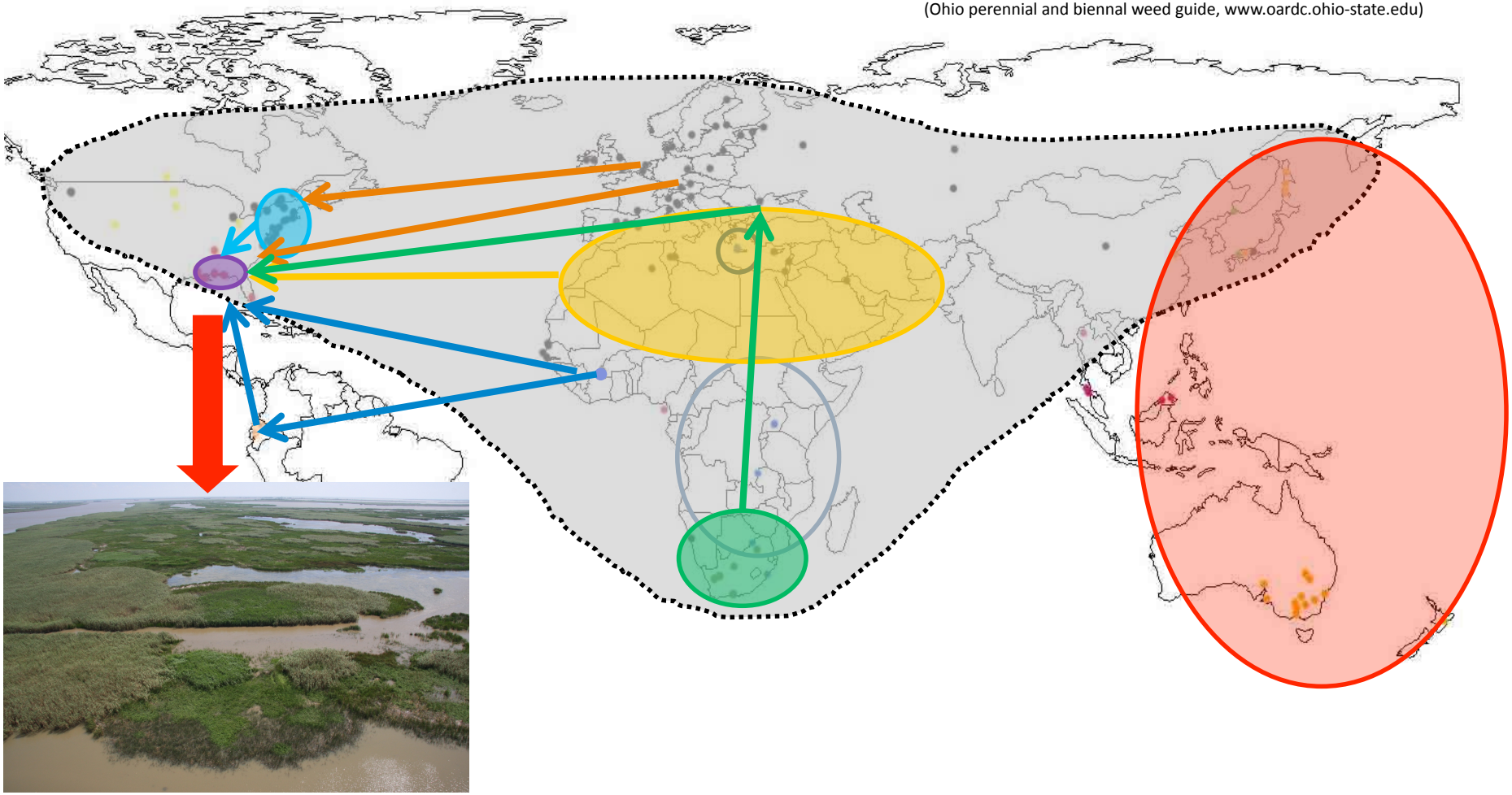


SSRs identify two groups within European *Phragmites*

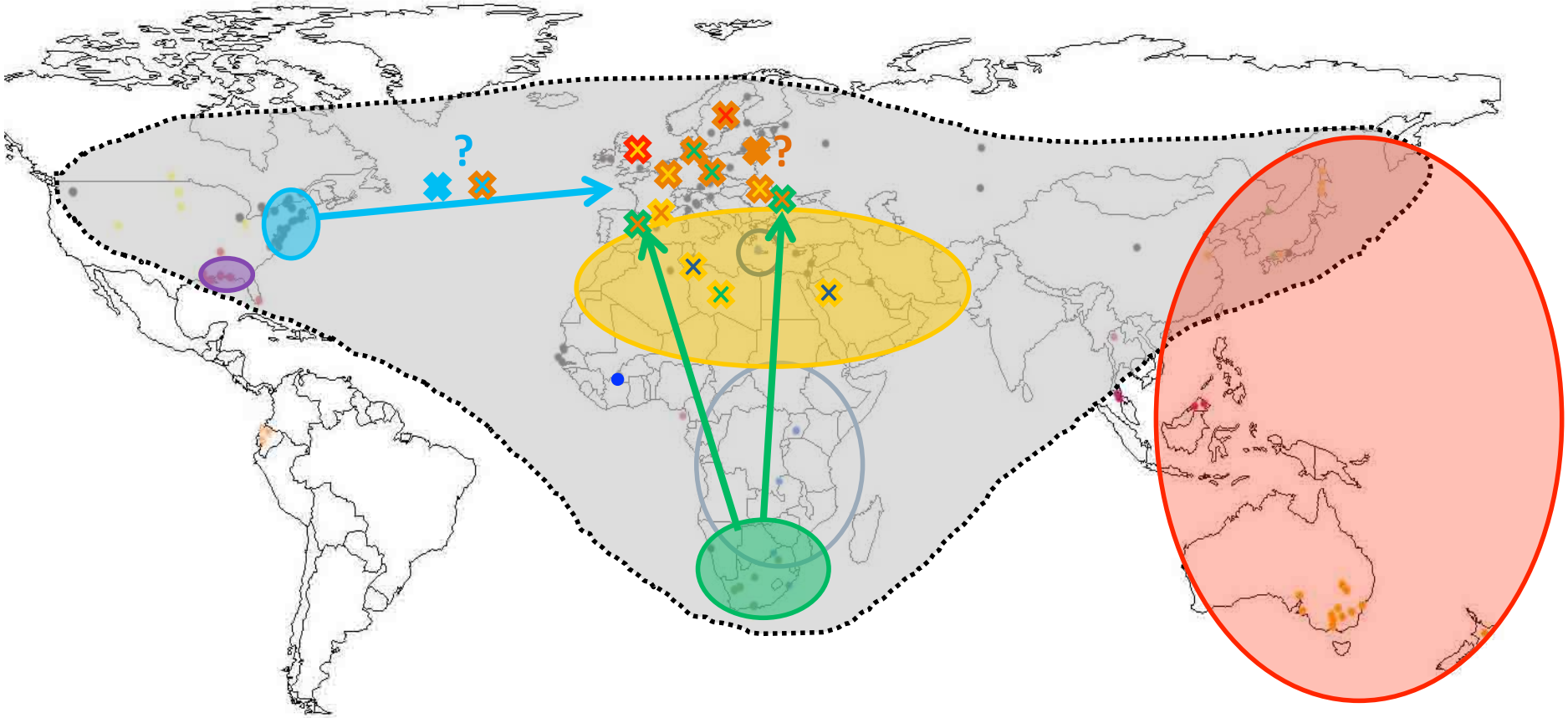


Structure within European *Phragmites*

(Ohio perennial and biennal weed guide, www.oardc.ohio-state.edu)

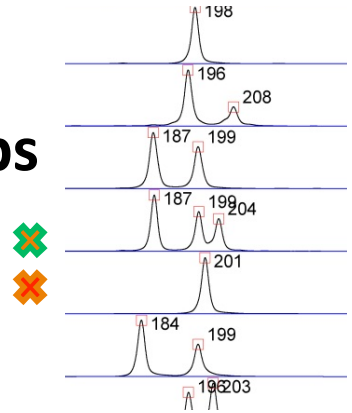


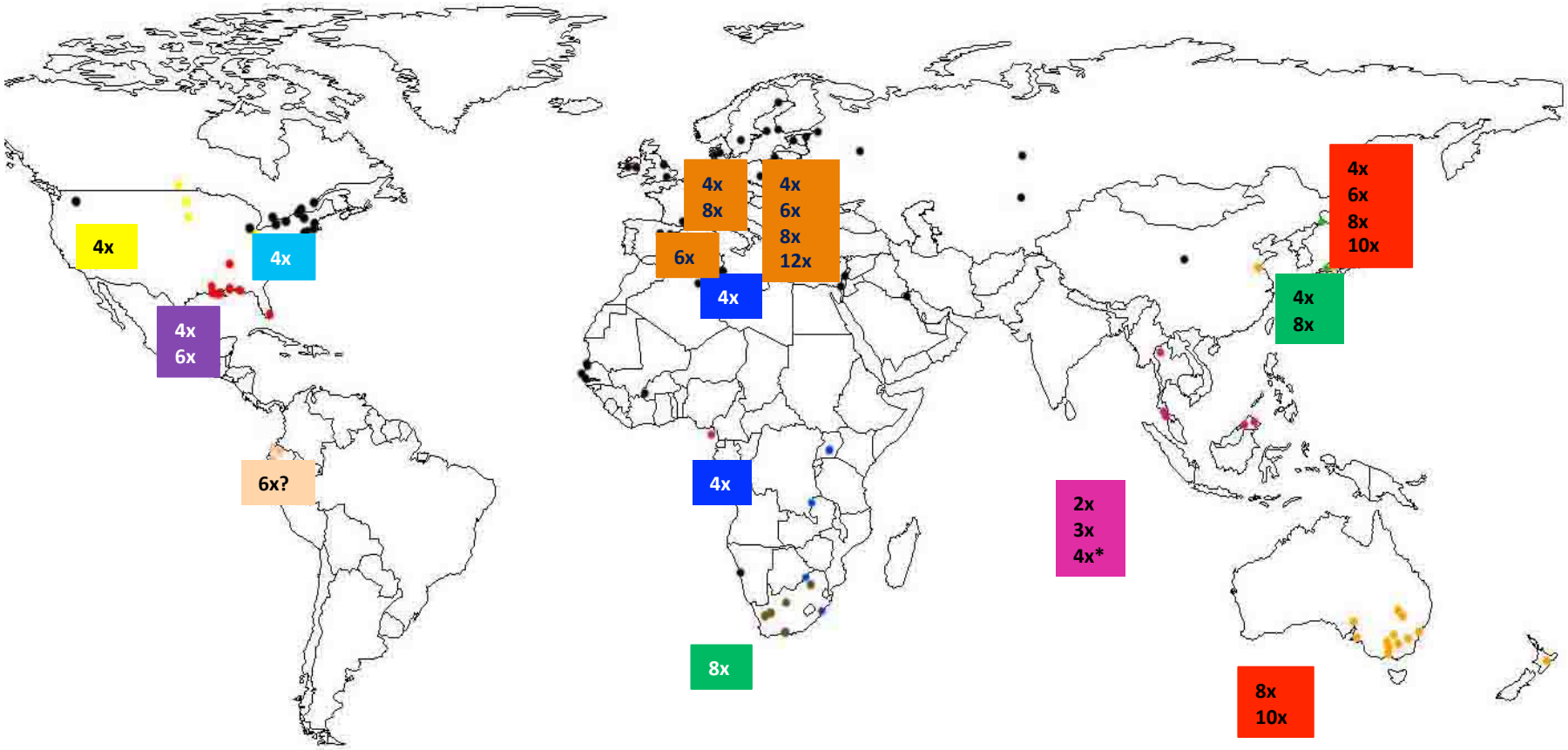
Long distance dispersal and interbreeding



Cytological variation is within phylogeographic groups

(based on Clevering and Lissner, 1999)

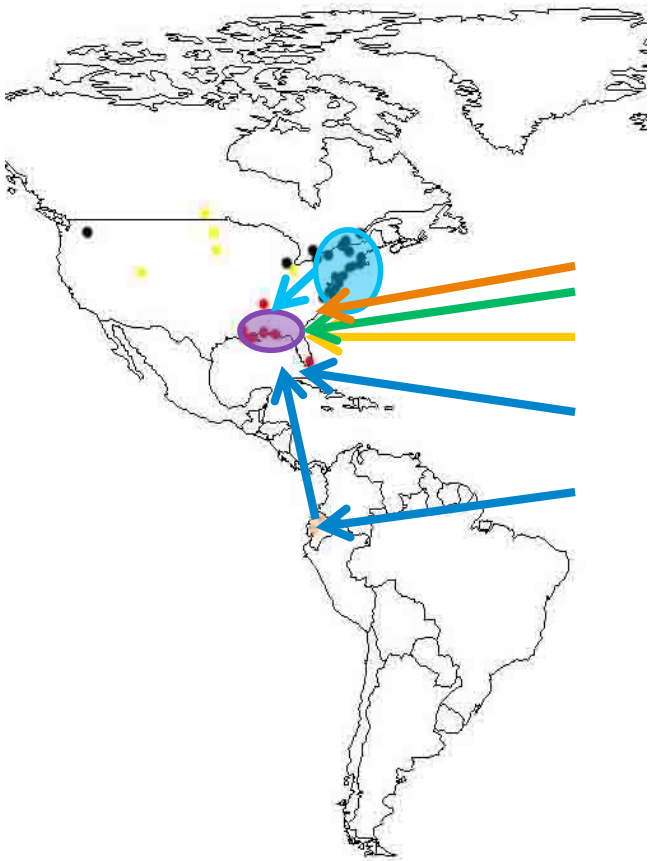


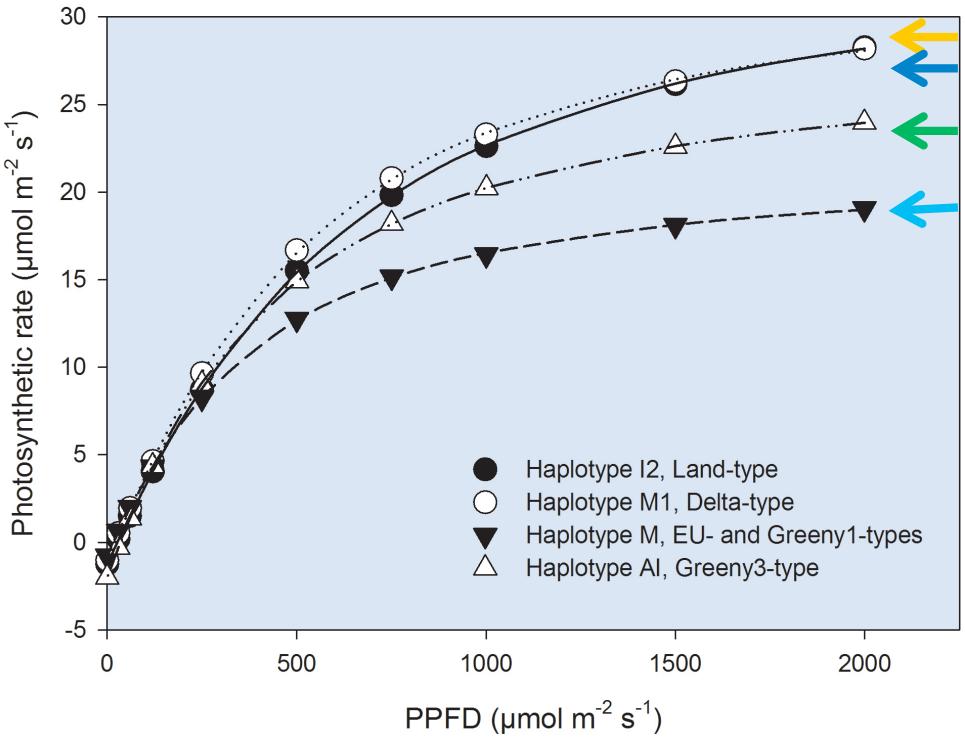


P. mauritianus (P. frutescens) *P. karka* *P. japonicus* *P. australis* Asia/AU

P. australis ssp. *americanus* *P. australis* var. *berlandieri* *P. australis* South America *P. australis* Europe

How does genetic diversity affect ecophysiology?





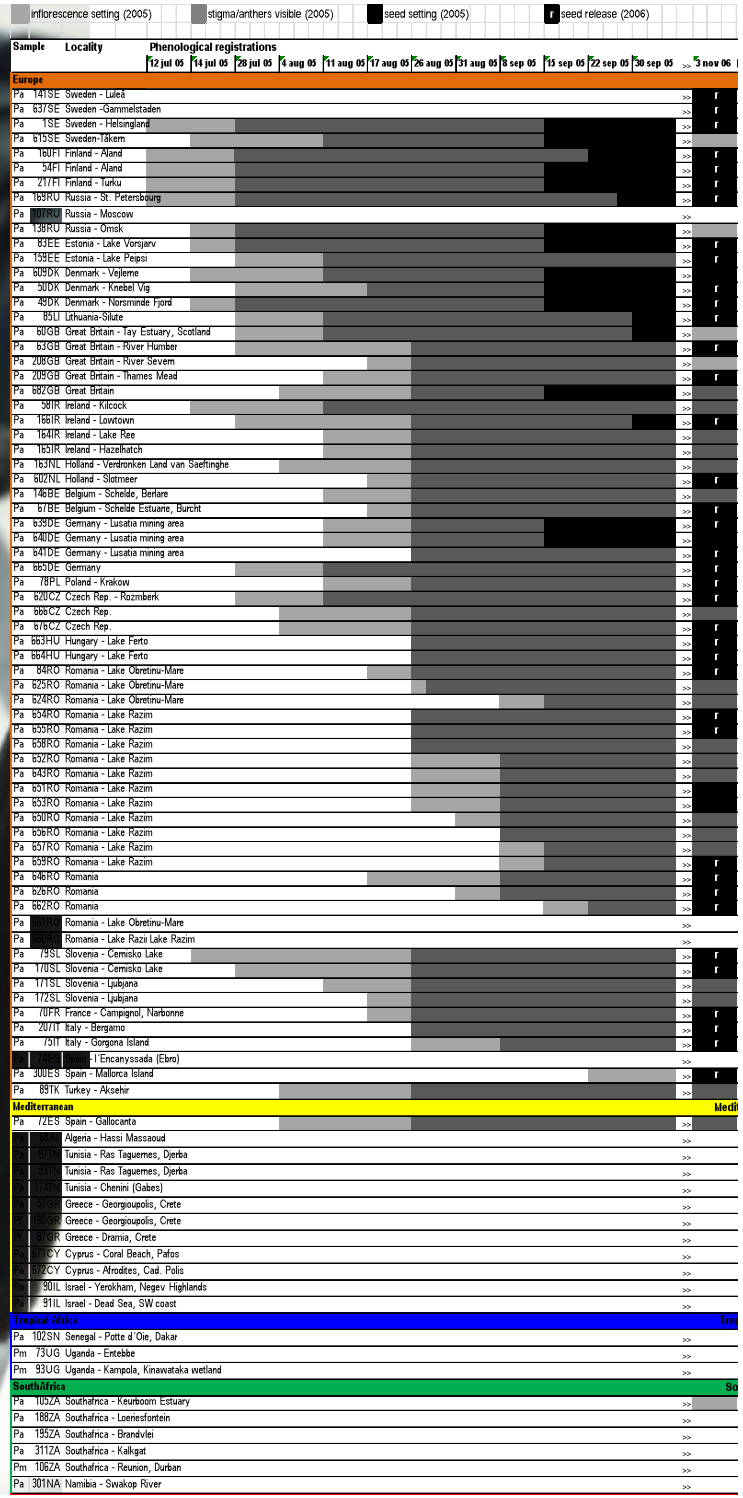
Can the different types be recognized morphologically?

P. mauritianus **(Africa)?**

Mediterranean *P. australis* ?

Southafrican *P. australis* ?
(Greeny)

Phenology can help identify "foreign" genotypes



Does it matter where *Phragmites* comes from?

Yes!

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