

Genetic structure and diversity of *Citrus medica* in natural and domesticated populations in the Eastern Himalayan region of Northeast India

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***Citrus medica* (Citron)**

Evergreen, shrubs/ small tree

Southeast Asia

Family: Rutaceae

Sub-family: Aurantioidae

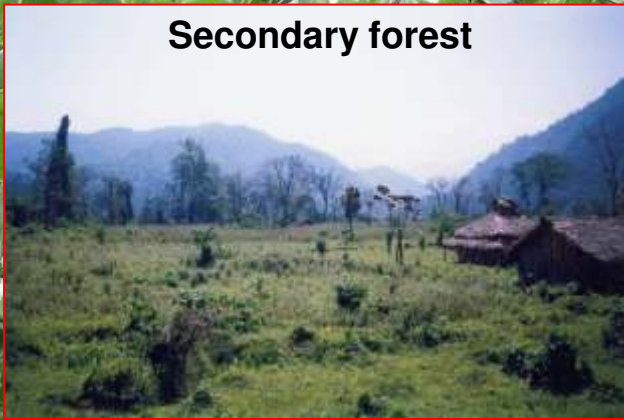
Tribe: Citreae

Sub-tribe: Citrinae



Habitat diversity of *C. medica* in the NE India

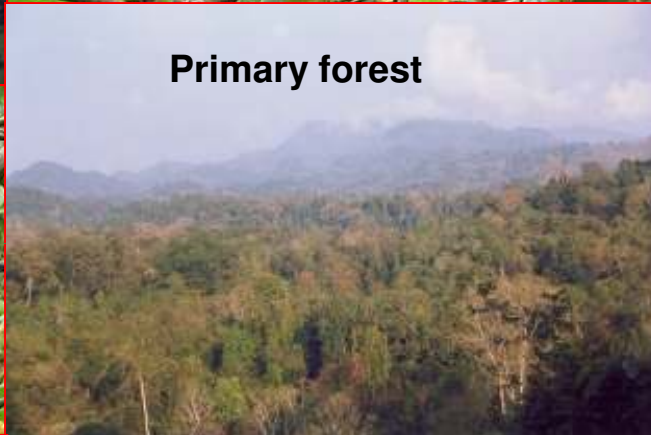
Secondary forest



Agroforestry-system



Primary forest



Abandoned-land



Home-garden

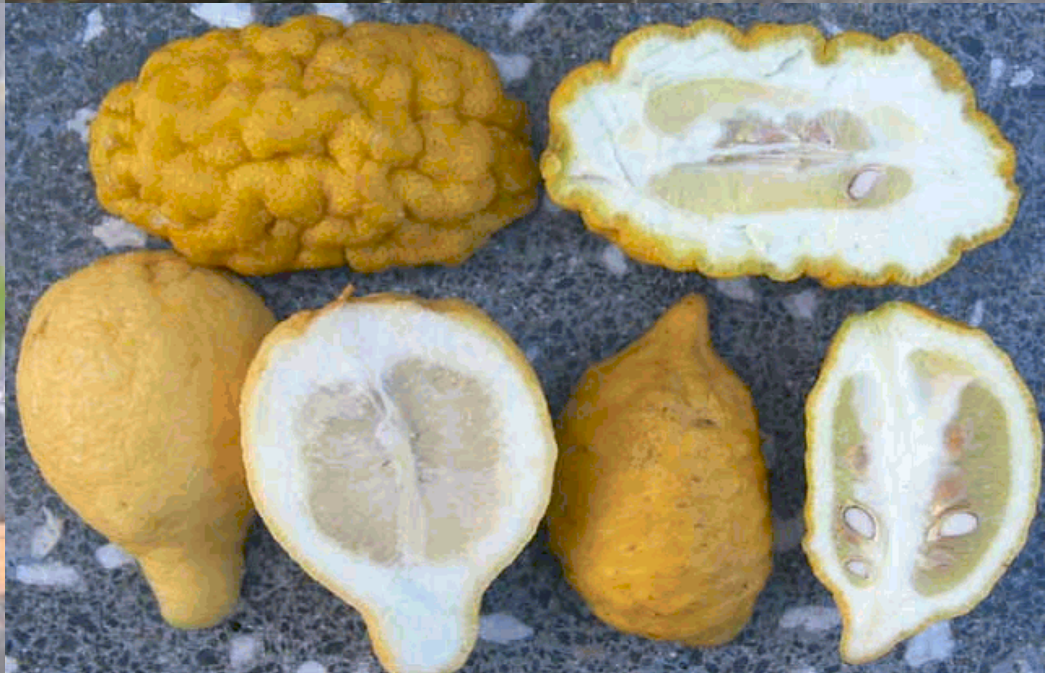


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***C. medica* fruit variations**



***C. medica* fruit variations**





Research ???

✓ Genetic diversity?

✓ Spatial structure?

✓ Genetic relationships?

✓ Domestication reduced....genetic diversity?



Study site

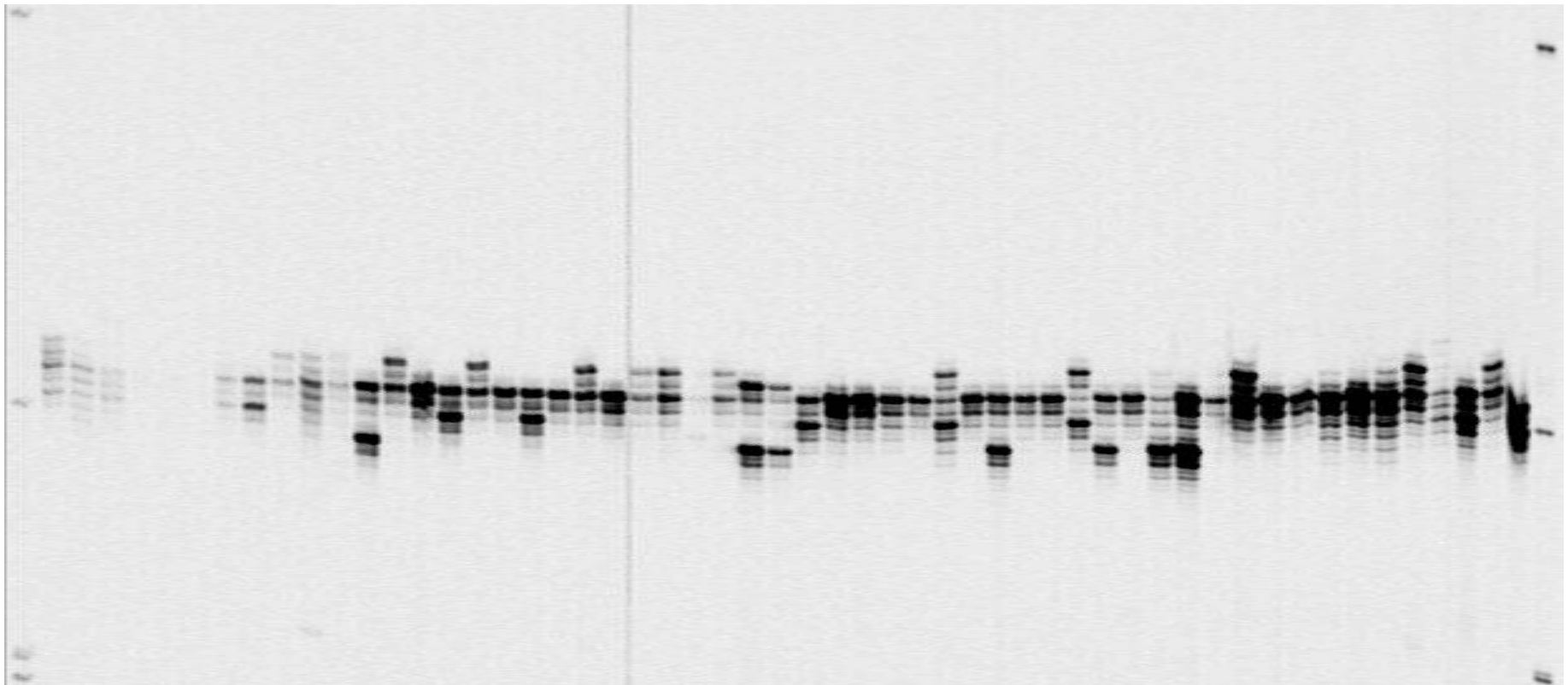
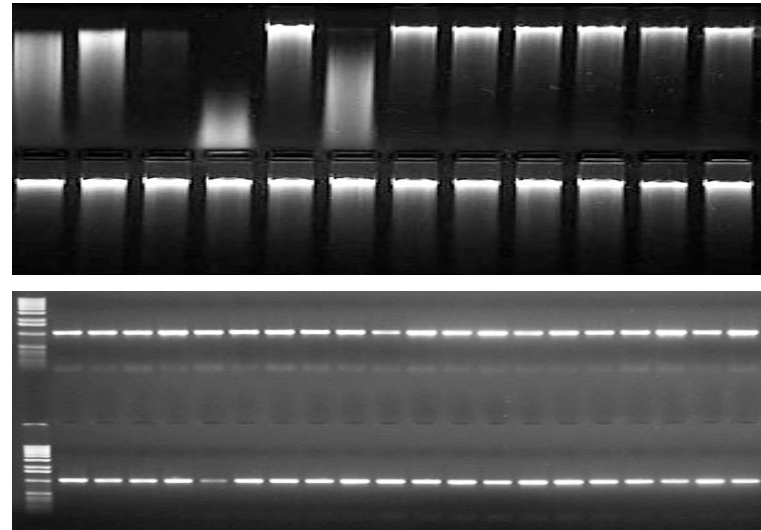


C. medica populations localities:

- 1 Assam-Tinsukia (W)
- 2 Assam-Banskandi
- 3 AP.-Itanagar
- 4 Mizoram-Aizawl
- 5 Mizoram-Sairang (W)
- 6 Mizoram-Sairang
- 7 Assam-Motinagar
- 8 Assam-Motinagar (W)
- 9 Assam-Lakhipur
- 10 Assam-Sonai
- 11 Assam-Neairgram
- 12 A.P.- Namsai

Methodology

- ➔ DNA extraction
- ➔ PCR amplification
- ➔ Genotyping



Methodology:

➡ Genetic diversity

- Mean number of alleles (MNA)
- Allelic richness (A_R)
- Observed heterozygosity (H_o)
- Expected heterozygosity (H_e)

➡ Nei's genetic distance

➡ F-statistics

➡ Population structure

Results & discussion

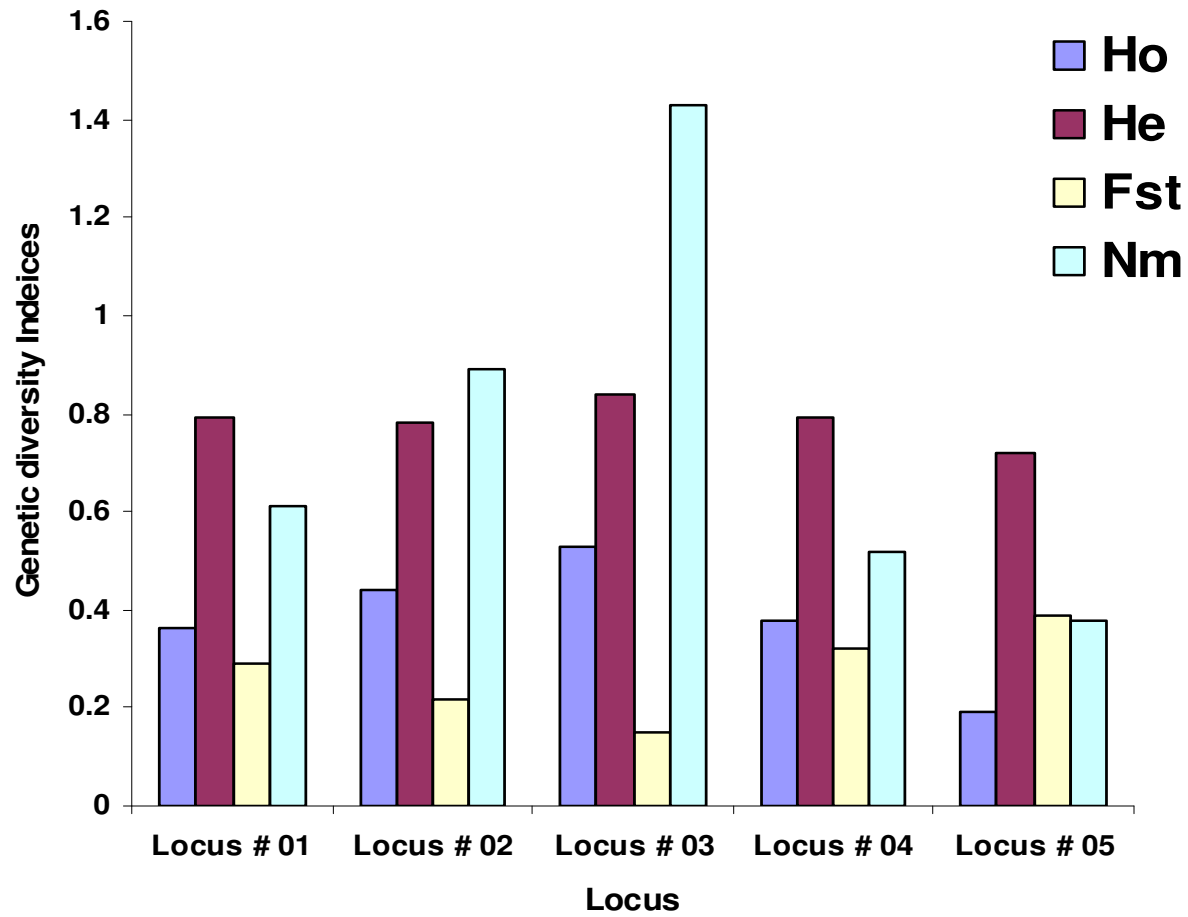
SSR markers used for *C. medica* populations study

Locus	Repeat motifs	No. of allele
GT03	GT	12
CiBE3298	(AG)15	9
CiBE3936	(TC)16	20
CiBE4796	(AG)10	8
CiBE0753	(AAT)13	18

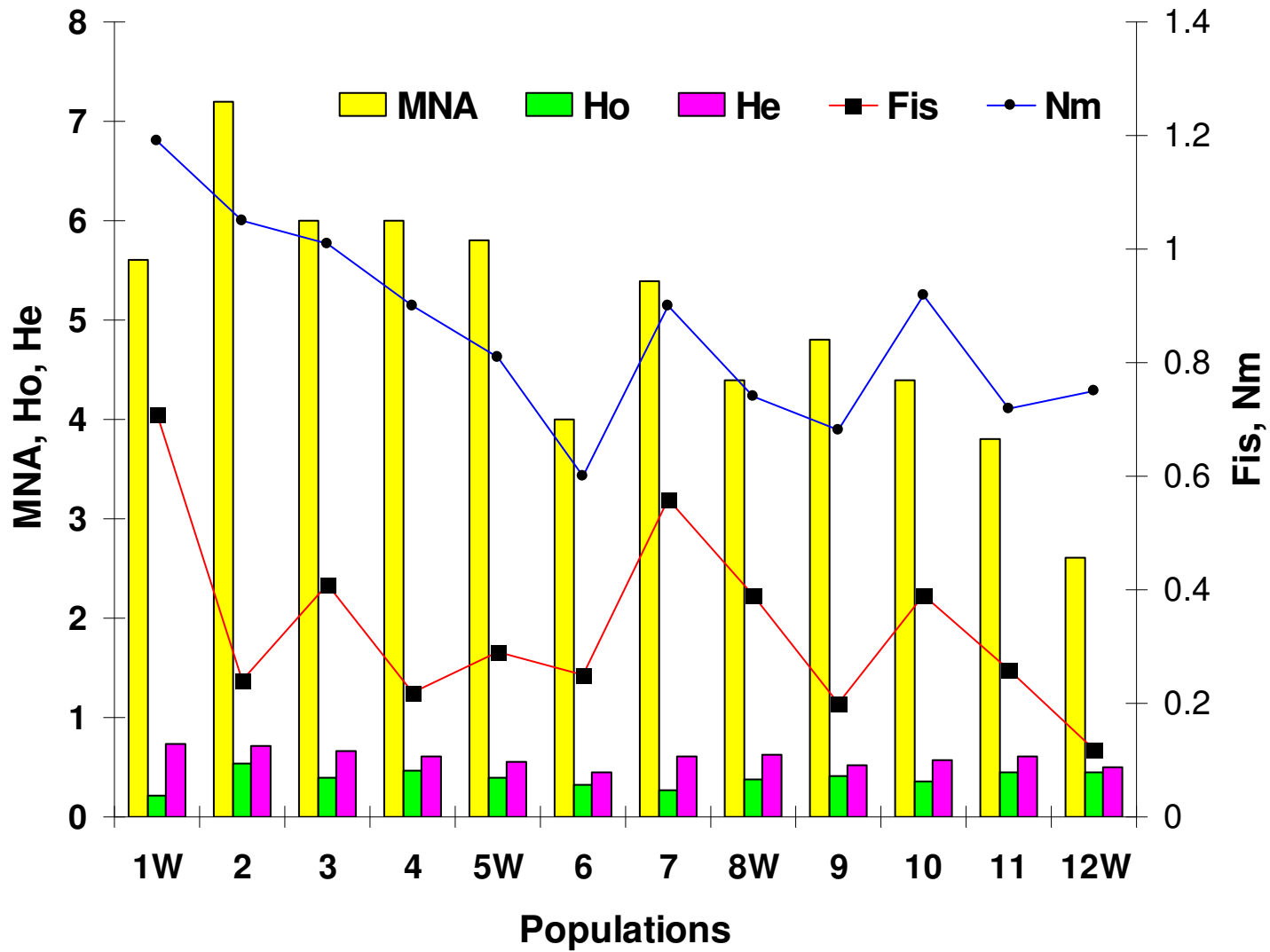
Barkley et al. 2006, 2009; Ghanbari et al. 2009; Ollitrault et al. 2010

Results & discussion

Diversity: 5 SSR loci



Genetic diversity & population differentiation

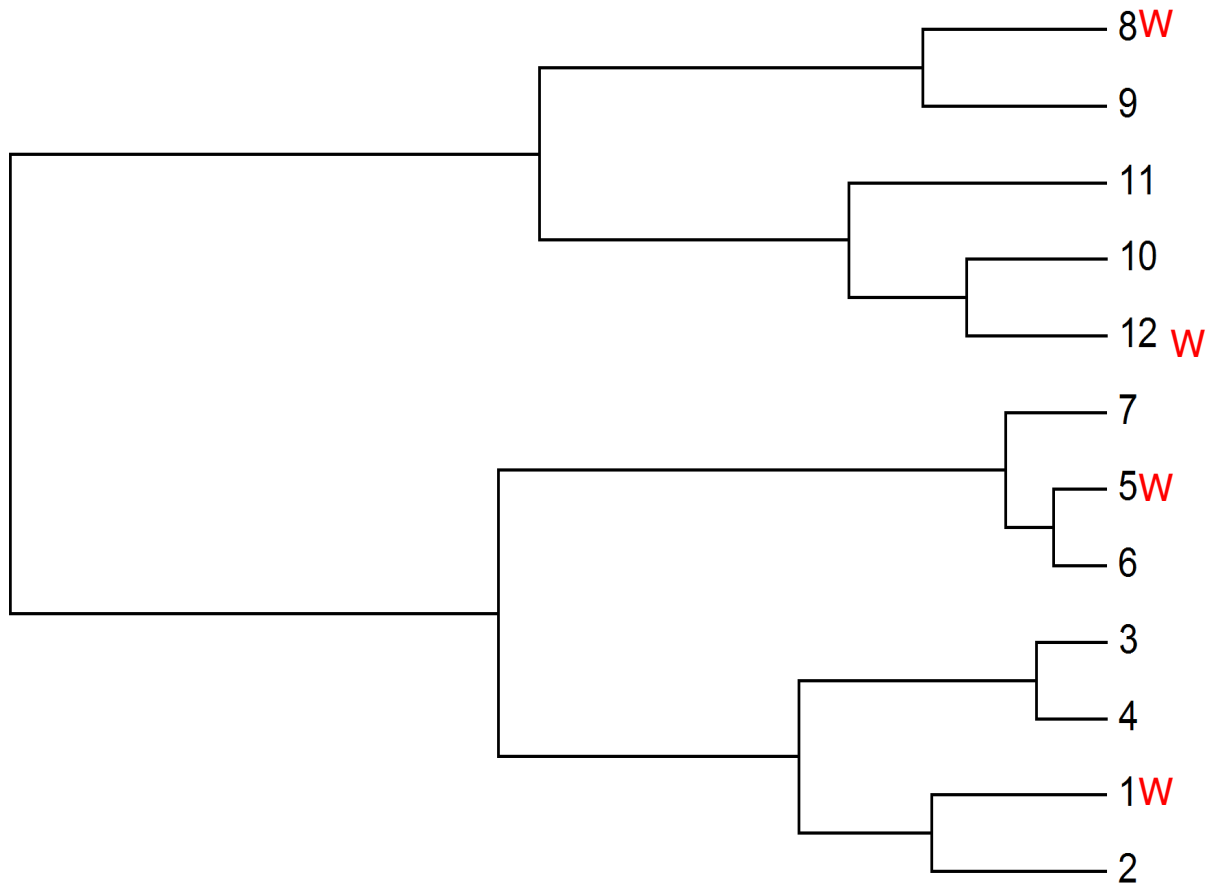


Results & discussion

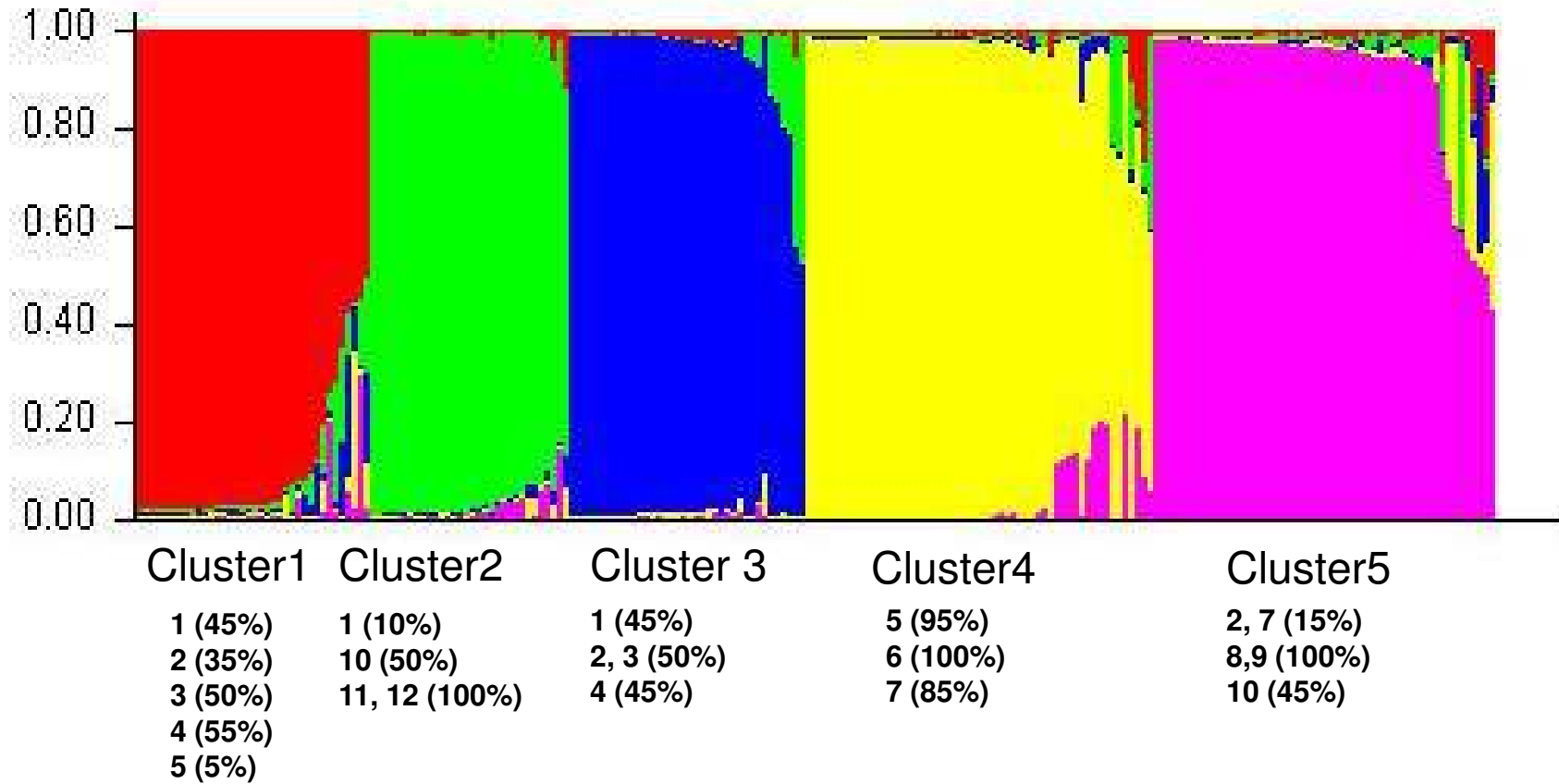
Populations differentiation

Variation	DF	Sum of squares	% of variation	Fixation indices	P value
Among populations	11	222.89	24.98	$F_{ST} = 0.249$	0.001
Within individuals	219	209.00	47.53	$F_{IT} = 0.524$	0.001

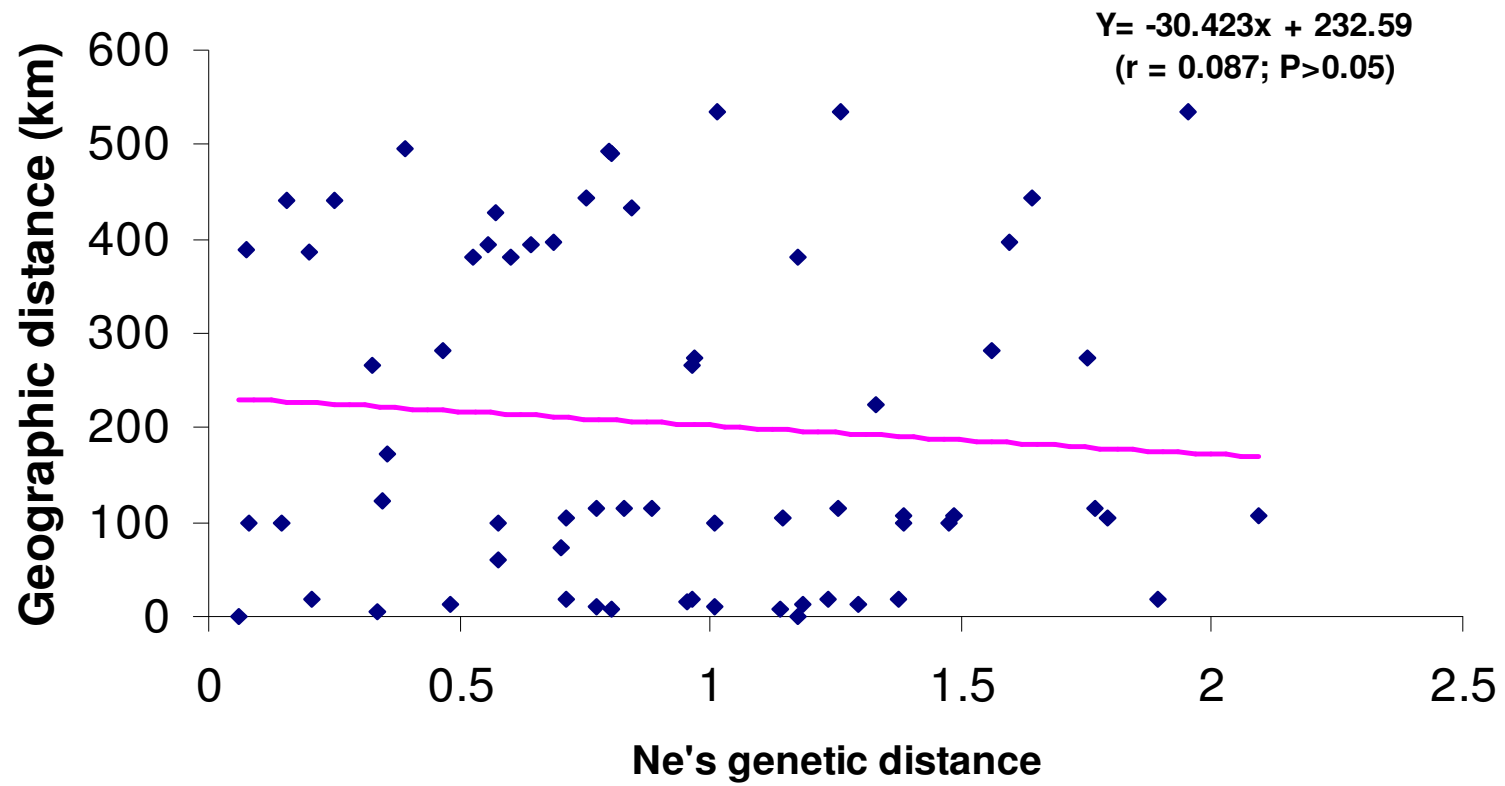
UPGMA dendrogram: Nei's genetic distances



Results & discussion



Results & discussion





Summary

✓ Rich genetic diversity

✓ Genetic diversity: Wild > Domesticated

✓ Domestic populations originated from the remaining wild populations

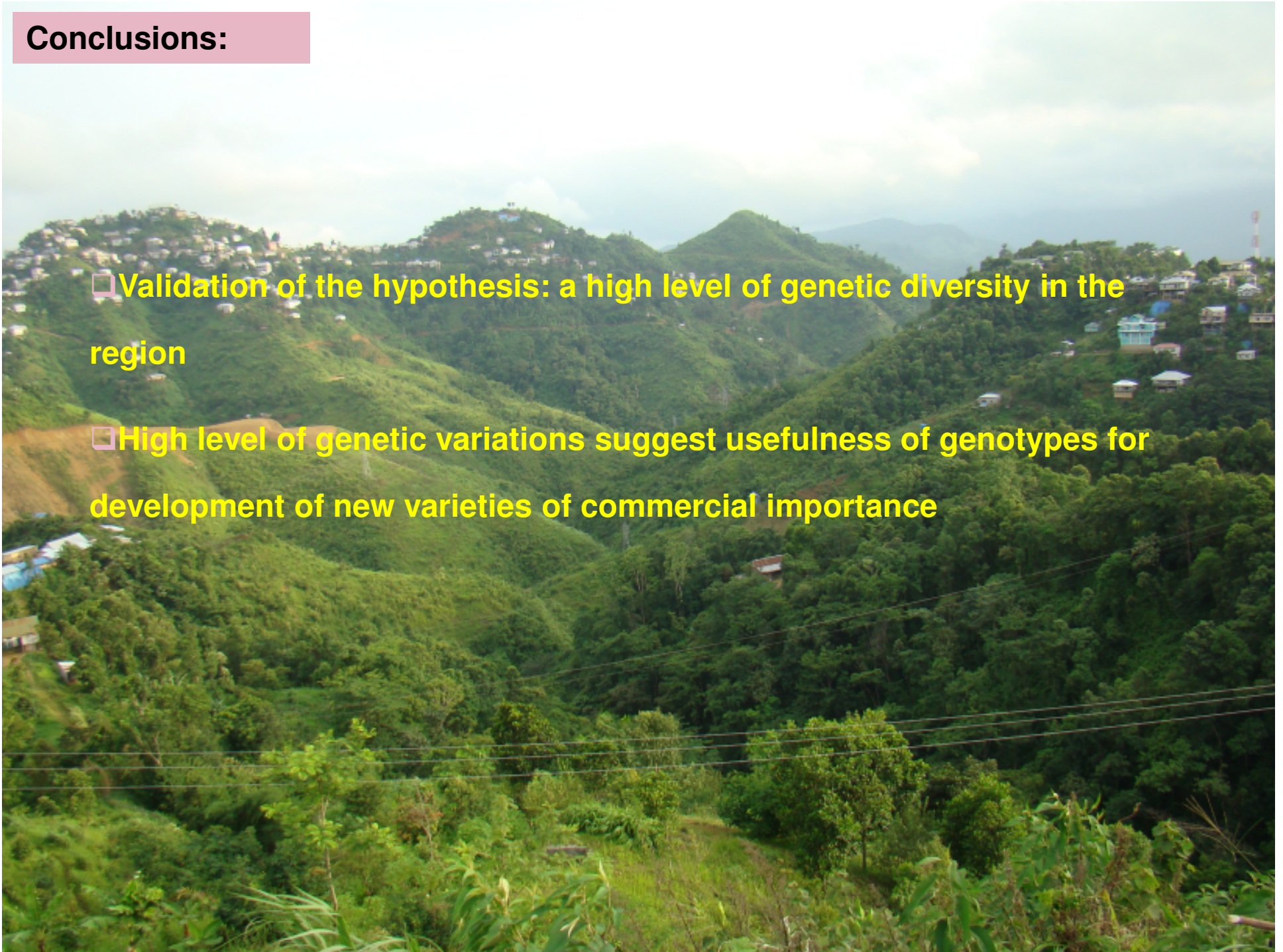
✓ Genetic differentiation: Significant AMOVA

✓ 5 putative populations

✓ Long-distance movement of germplasm

Conclusions:

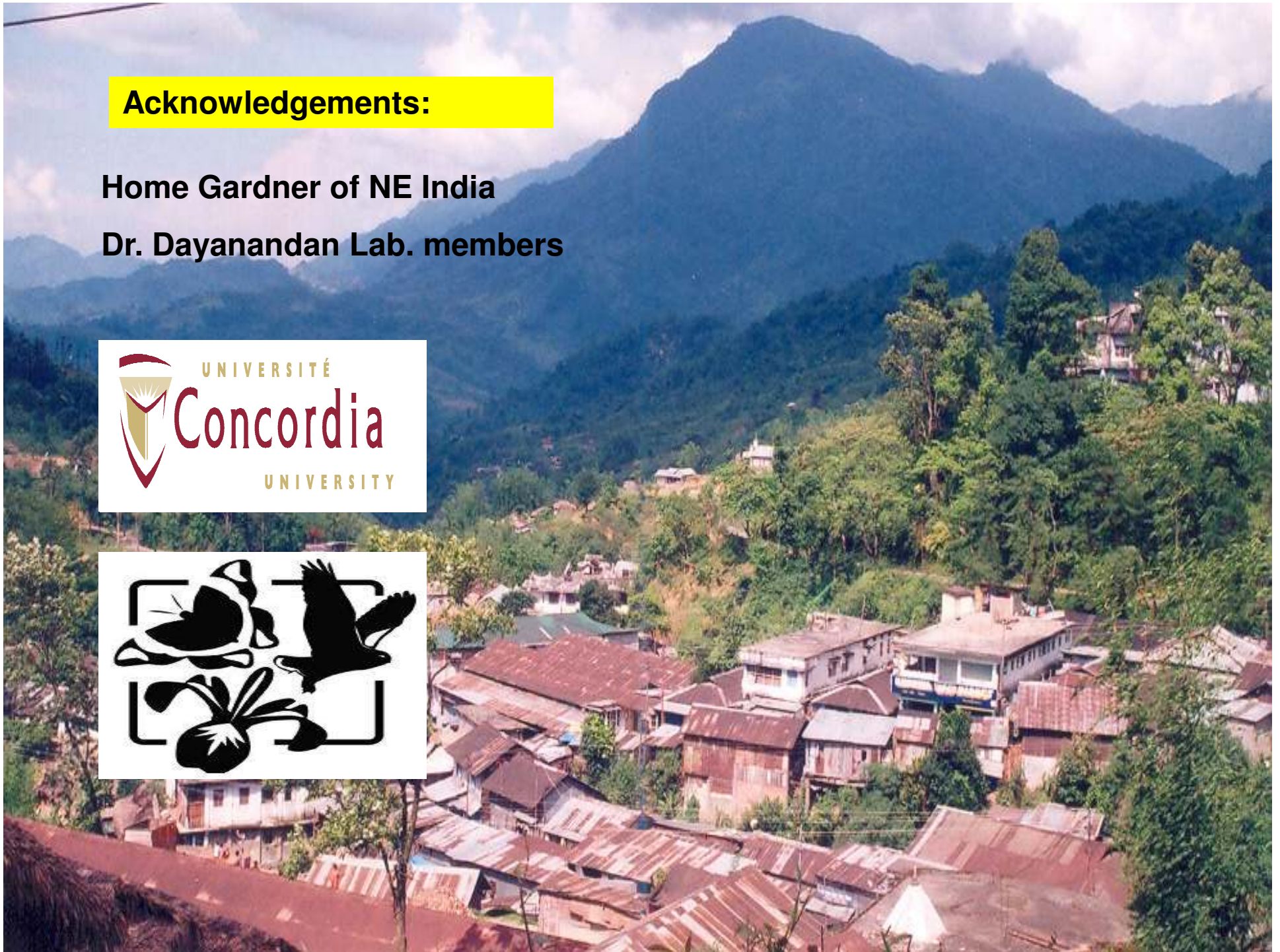
- ❑ Validation of the hypothesis: a high level of genetic diversity in the region
- ❑ High level of genetic variations suggest usefulness of genotypes for development of new varieties of commercial importance



Acknowledgements:

Home Gardner of NE India

Dr. Dayanandan Lab. members





Thank you

?????????????..... welcome