

Genetic Variation of Populations *Scutellaria slametensis* sp. nov. (Lamiaceae) on Mt. Slamet, Central Java, Indonesia



Scutellaria sp.
pop. Baturraden

Scutellaria sp.
pop. Kaligua

Scutellaria sp.
pop. Kaliwadas

S. discolor pop.
baturraden

SUDARMONO

CENTRE for PLANT CONSERVATION-BOGOR BOTANICAL GARDENS

INDONESIAN INSTITUTE OF SCIENCES

Previous taxonomic treatment (Keng, 1978)

Three species :

1. *Scutellaria discolor* →

Flowers 3 (rarely 2 or 4)



2. *S. indica* →

Flowers 2

Calyx 1-1,5 mm long

Leaves ovate and obovate



3. *S. javanica* →

Flowers 2

Calyx 3-4 mm long

Leaves lanceolate or oblongate



MORPHOLOGY

CHARACTERISTICS

	<i>Scutellaria S. indica</i>	<i>S. javanica</i>	<i>Scutellaria sp.</i>
Corolla color	Blue, light blue, dark purple	Pink light-dark	Blue or white
Corolla length	10-12 mm	14 mm	14-16 mm
Leaves	Ellipsoid - ovate	Radical, obovate	Lanceolate, obovate-oblongate
Others	Height 20-100 cm Densely glandular hairy (Var. <i>cyrtopoda</i>)	Height 20-30 cm	Height up to 100 cm
			Pale purple, white purplish 11-23 mm
			oblongate
			Height to 57.5 cm

1. *Scutellaria discolor* :

- *Var. cyrtopoda*

-Endemics to Java (Mt. Malabar)

-1600 - 3200 m

-Stem hairy glandular densely.

- *Var. discolor*

-Distributed widely in Malesia

-500 - 3200 m

-Corolla blue, light blue, light pink and dark pink, 10-12 mm length.



SCUTELLARIA SP. NOV.

-Corolla light purple-
white pinkish

-Leaves acute, margin
dentate and
chartaceous

-Height to 57.5 cm

-Growth on 900 – 2500
m (Mt. Slamet)



Questions?

- ◆ Is *Scutellaria* sp. distinguished by genetic differentiation of *S. discolor* .
- Is *Scutellaria* sp. as endemic species within Mt. Slamet.

Objectives of this study :

To know

1. Genetic variation within and between populations *Scutellaria* sp.
2. Genetic distance among *Scutellaria* and relatives (Lamiaceae).
3. Conservation management of *Scutellaria* on Mt. Slamet, especially *Scutellaria* sp. nov.



Allozyme used to clarify genetic variations

Sample *Scutellaria* collected

- 6 pops. *Scutellaria* sp.

- 1 pop. *S. discolor*

>10 individuals per population

Living collections planted in Pembibitan G-9 Kebun Raya Bogor,

Dry specimens kept in Herbarium Bogoriense (BO) and Herbarium Kebun Raya Bogor (HBBO?)

Method

1. Morphological characteristics and chromosome observations

2. Allozyme analysis

Four enzyme system :

-Esterase (EST)

-Aspartate aminotransferase
(AAT)

-Malate dehydrogenase
(MDH)

-Peroxidase (PER)

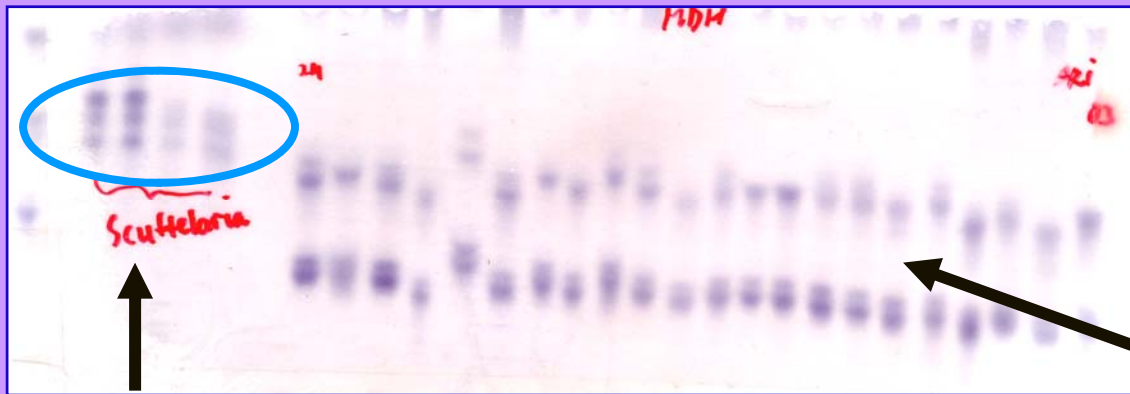
Key to Species in Indonesia

- 1a. Distal flowers often in spiral-like clusters or almost so, 2–4 flowers per node, radially spreading; inflorescences terminal; mericarps with acuminate papillae terminating in a ring of hooks; bracts minute . *S. discolor*
- 1b. Flowers opposite, 2 per node, erect to suberect; inflorescence lateral or terminal; mericarps lacking hooked papillae; bracts leaf-like 2
- 2a. Herb up to 0.3(–0.4) m high, usually prostrate, often unbranched; leaves mostly radical, broadly ovate to rounded or reniform, base truncate to cuneate, often cordate; flowers with pedicels almost patent to rachis *S. indica*
- 2b. Herb 0.4–1.5 m high, usually erect and branched; leaves spaced along stem, narrowly ovate, base shortly attenuate or broadly cuneate; flowers with pedicels obliquely erect to rachis 3
- 3a. Leaves with lamina 3–40(–50) mm long, 15–20 (–30) mm wide, base broadly cuneate, apex caudate-acuminate; corolla dark purple, 14–31 mm long
S. javanica
- 3b. Leaves with lamina (46–)50–155(–186) mm long, 25–40(–45) mm wide, base shortly attenuate, apex acuminate; corolla distally pale blue to pale purple, 11–18(–23) mm long *S. slametensis*

2. Allozyme analysis

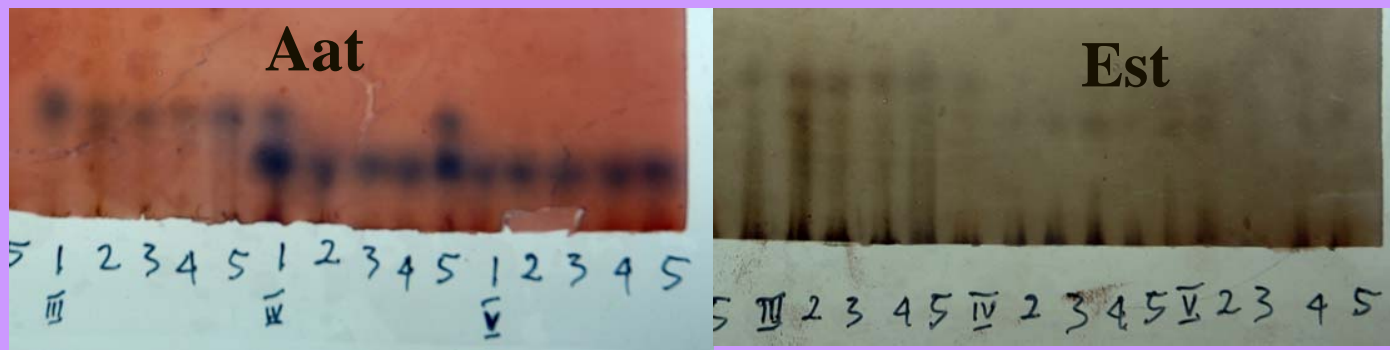
AAT, EST, MDH dan PER 1 locus

Mdh 2 loci as **Dimer**



Bands of *Scutellaria sp*

Bands of *Salvia spp.*



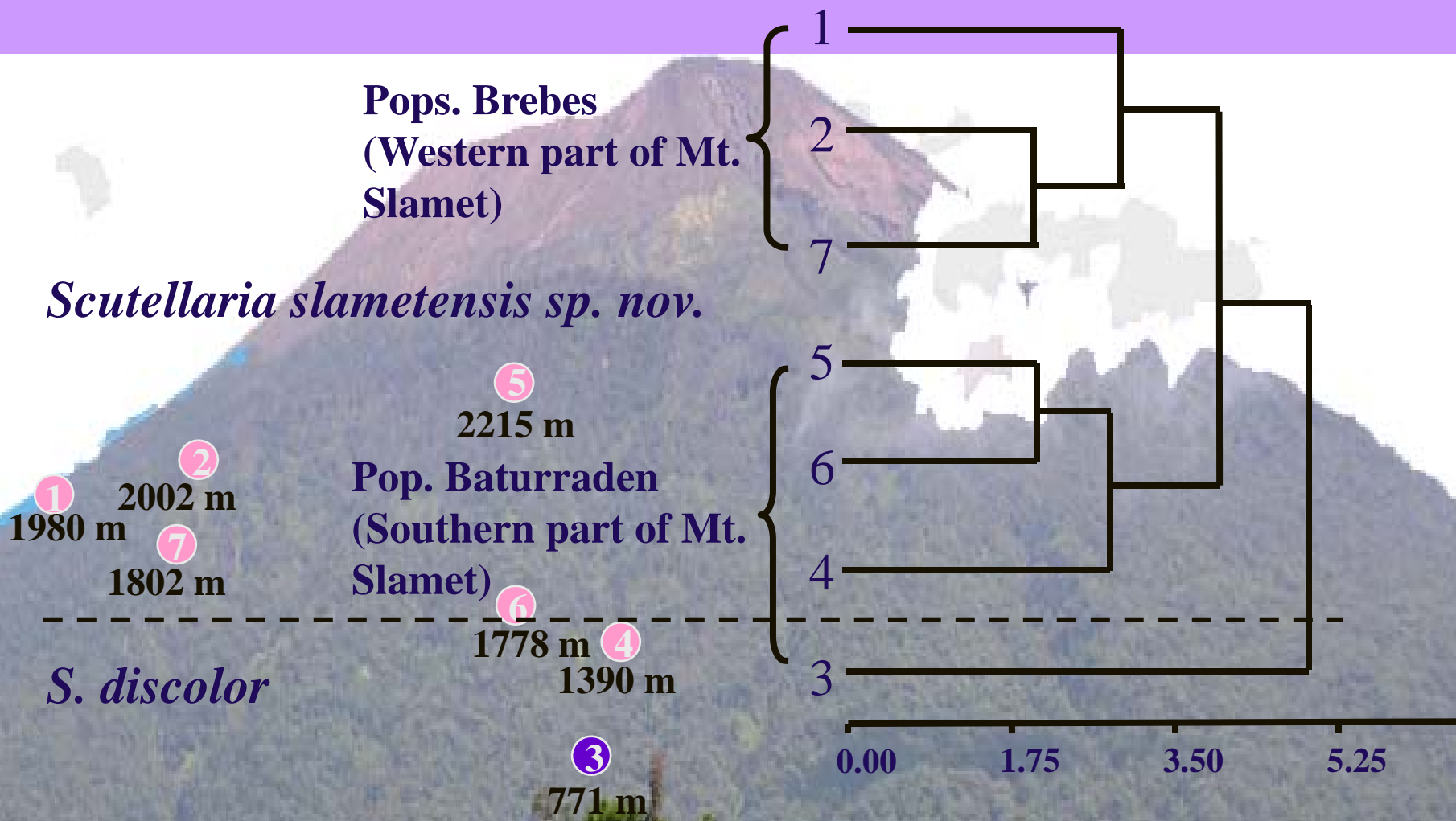
Pop. 3 Pop. 4 Pop. 5

Pop. 3 Pop. 4 Pop. 5

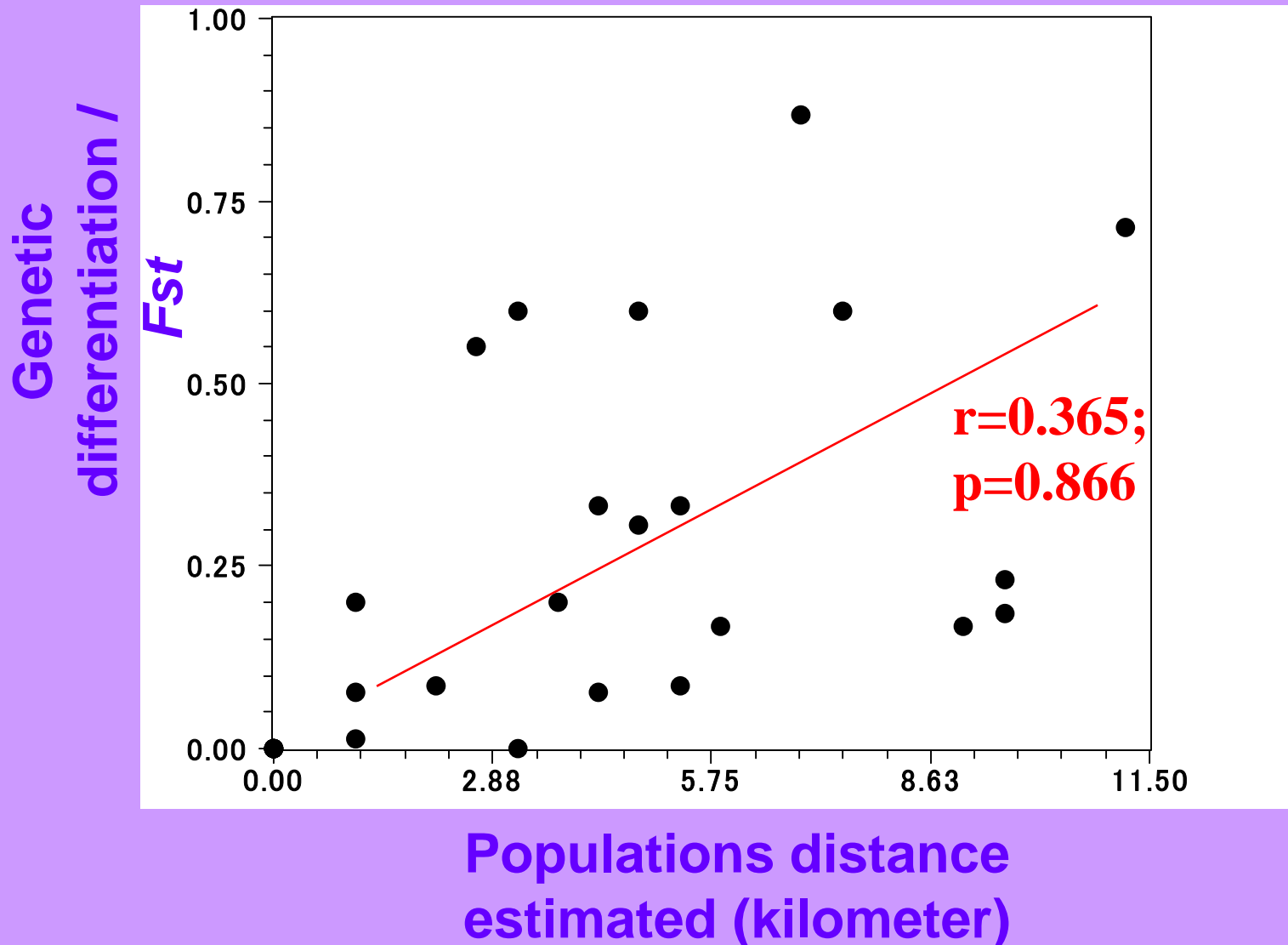
Genetic Variations at Pop. levels

Pop.		indiv.	P_p	A	H_e	
Pop. 1 / <i>Scutellaria sp.</i>	➔	10	75 %	1.75	0.417	high
Pop. 2 / <i>Scutellaria sp.</i>	➔	10	25 %	1.25	0.139	low
Pop. 3 / <i>S.</i> <i>discolor</i>	➔	10	0 %	1.00	0.000	low
Pop. 4 / <i>Scutellaria sp.</i>	➔	10	75 %	2.00	0.450	high
Pop. 5 / <i>Scutellaria sp.</i>	➔	10	75 %	1.75	0.417	high
Pop. 6 / <i>Scutellaria sp.</i>	➔	10	75 %	1.75	0.417	high
Pop. 7 / <i>Scutellaria sp.</i>	➔	10	50 %	1.50	0.278	low

Dendrogram Nei's genetic distance (1978) between 7 populations of *Scutellaria* spp. on Mt. Slamet, Central Java



Correlation between geographic distance estimated (kilometer) against genetic differentiation of populations *Scutellaria* spp.on Mt. Slamet



Conservation management

1. Herbarium specimens collected (Kept in Herbarium Bogoriense and Herbarium Kebun Raya Bogor),
2. *Ex situ* conservations in Bogor Botanic Garden / Cibodas Botanic Garden,
3. Seed development in Baturraden Botanic Garden and domestication in their habitats,
4. Recommended to conserve it on Mt. Slamet area (*in situ* conservation).

Conclusion

1. Pollination of *Scutellaria slametensis* sp. nov. are dominantly self-compatible,
2. Mean genetic variations of populations *S. slametensis* sp. nov. on Mt. Slamet is low based on regional distributed plants by Hamrick & Godt (1990),
3. Geographic isolation drifted genetic distance between western part and southern part of Mt. Slamet.