

## SPECIES DIVERSITY OF TRICHOSANTHES IN GUNUNG HALIMUN NATIONAL PARK

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### ABSTRACT

Inventory *Trichosanthes* L. in Gunung Halimun Nasional Park have been conducted. Seven species recorded occurring in TN Gn. Halimun namely, *T. montana*, *T. ovigera*, *T. pubera*, *T. quinquangulata*, *T. tricuspidata*, *T. villosa*, and *T. wawrae*. These species are found mostly in humid area in edge forest, or along river sides. *Trichosanthes wawrae* was found in Cikaniki, whereas the other six species found in Corridor Cianten. *Trichosanthes quinquangulata* has widely distributed, it has found in Cibanteng and Leuwijamang as well. Exploration is still continuing to study the distribution of this genus in Gn. Halimun, to recollect the rare species and to do phylogenetic analysis.

**Key words:** *Trichosanthes*, Gunung Halimun National Park

### INTRODUCTION

*Trichosanthes* is one of the largest genus belonging to the family Cucurbitaceae with about 100 species distributed in Eastern Asia, Malesia and Tropical Australia to Fiji and Subtropical Eurasia. The center of diversity of this genus still uncertain may be in China or SE Asia. In Malesian region, 39 species (divided into 5 sections namely *Trichosanthes*, *Cucumeroides*, *Foliobracteola*, *Involucraria* and *Edulis* have been recorded (Rugayah and de Wilde, 1999), some of them have been used as medicine (*T. cucumerina* var. *cucumerina* dan *T. tricuspidata*, *T. villosa*) or as vegetable (*T. edulis*, *T. ovigera*, *T. cucumerina* var. *anguina*, *T. villosa*) by the local people. However, they have not been used intensively like the Chinese, who used 33 species of 51 species occurring in Chinese herbal medicinal and sold in the Chinese drug shops under the popular name "Xua-lou" and "Tlen-hua-fen" (Yueh dan Cheng, 1974). One important species *T. kirilowii* has been studied for FITV-inhibiting properties.

In Java, Backer and Bakhuizen v/d Brink Jr. (1963) described eight species and recently Rugayah and de Wilde (1997) revised the genus and accepted ten species namely, *T. coriacea*, *T. cucumerina*, *T. globosa*, *T. montana*, *T. ovigera*, *T. pubera*, *T. quinquangulata*, *T. tricuspidata*, *T.*

*villosa* dan *T. wawrae*. *Trichosanthes montana* was proposed as a new species. *Trichosanthes coriacea* is a rare species, only ones collected in Gn. Salak and from West Sumatra (in Pariaman and Bukit Sebelah). The other species like *T. montana* and *T. quinquangulata* in Jawa only found in West Jawa especially in mountain area (Situ Gunung, Gn. Gede Pangrango, Gn Salak, Gn. Halimun), and *T. cucumerina* var. *cucumerina* and *T. pubera* also rarely found in this area as well.

The present study is to cover the species diversity of *Trichosanthes*, and to recollecting the Javanese rare species of *Trichosanthes* in Taman Nasional Gunung Halimun. DNA analysis will be done for the future study to support the delimitation of the sections which only based on the morphological character, and also to analyze the relationship between the species.

### METHODS

Inventory of *Trichosanthes* have been conducted by studying the herbarium specimens which deposited in 'Herbarium Bogoriense' and exploring the plant in some places of Taman Nasional Gunung Halimun, like corridor Cianten, Cikaniki, Leuwijamang, Ciptarasa and Cibanteng (1998 - 2001). Fertil plants were collected for herbarium specimens. Young leaves also collected

in silica gel for DNA analysis. Plant collection is still continuing in other areas especially for recollect the rare species and to study the distribution of these species.

**RESULT**

There are seven species have been recorded from five locations (corridor Cianten, Leuwijamang, Cibanteng, Ciptarasa and Cikaniki) in Gunung Halimun National Park, namely *T. montana*, *T. ovigera*, *T. quinquangulata*, *T. pubera*, *T. tricuspidata*, *T. villosa* and *T. wawrae*.

Most species are dioecious (except *T. quinquangulata* and *T. montana*, are monoecious),

they are climber, flower white (only *T. pubera* reddish) with delicate fimbriate, mature fruit mostly red or orange-red (only *T. villosa* green-yellow) with various shape, seed imbedded in mostly greenish-black pulp rarely in white or orangered. Usually in some species (*T. quinquangulata*, *T. montana*, *T. ovigera*) they die off after fruiting. *Trichosanthes ovigera*, *T. montana* and *T. quinquangulata* was found in rainy season, whereas the other species *T. tricuspidata*, *T. pubera*, *T. villosa* and *T. wawrae* can be found along the year.

In taxonomical point of view, these species can be recognized by this following identification key.

Key To The Species

- I a. Leaves three foliolate; fruit ovoid brightly red with yellow flamed at the apex.....*T. wawrae*
- b. Leaves simple; fruit globose or ovoid, red colour (*T. villosa* green -yellow).....2
- 2a. Young leaves reddish tinged; petals pinkish at the apex.....*T. pubera*
- b. Young leaves green; petal white.....3
- 3a. Leaves densely villose hairs; tendrill 5 (9-10 in young stages).....*T. villosa*
- b. Leaves glabrous or sparsely hairy, tendril 2-3.....4
- 4a. Leaves 5(-7) angular; fruit globose.....*T. quinquangulata*
- b. Leaves unlobed or lobed (3-5); fruit ovoid, subglobose rarely pear-shaped.....5
- 5a. Leaves unlobed, rarely with 2-3 lobed, hairy; petal ovate; seed barrel shaped.....*T. ovigera*
- b. Leaves 3-5 lobed, glabrous, petal obovate-rhomboid; seedflate.....6
- 6a. Leaves 3 shallowly lobed; fruit ovoid-oblong (5-)-7-9 x (4-)-5-6 cm.....*T. tricuspidata*
- b. Leaves 5 lobed (entire or 3 lobed in young stages); fruit subglobose rarely pear-shaped 10-14 x 8 cm.....*T. montana*

*Trichosanthes montana* Rugayah

Climber to 12 m tall dioecious or monoecious; early glabrescent, at first with uberulous hairs. Probract membranous or somewhat fleshy. Glands absent or few near the base of leaves. Tendril 2-4 branched. Leaves simple, 5(-7) lobed (unlobed injuvenil stages), membranous or chartaceous or subcoriaceous, 10-28 x 10-26 cm, base cordate with broad or narrow sinus, apex acute-acuminate, margin sometimes deflexed, entire or irregularly shallowly dentate. Male raceme 15-40 cm long,

peduncle 2-6 cm long, 3-7 min thick, rachis thickened densely set with flower 20 or more, 5-20 mm diameter including stout bract-scars, bract subcoriaceous, rhomboid or broadly obovate 45-60 x 20-30 min, margin coarsely dentate, sometimes with three main lobed. Male flower: pedicel c. 10 min long receptacle tube 30-45 min long, at apex 7-10 min diam; sepal triangular-lanseolate, margin entire or with few narrow lobes. Female flower solite and sometimes coaxillary with male raceme, or in the male raceme. Fruit subglobose or

pear-shaped 10- 14 x 8 cm, orange-red or red, pulp greenish black, fruiting pedicel 3-5 cm long, 10-25 min thick. Seed brown-black, flate, base obtuse 1.9 - 2 x 0.5-0.8 cm.

Distribution and Ecology: in Java only found in West Java (Situ Gunung, Gn Halimun, Gn. Gede-Pangrango). The species usually grow at forest edges or along river side. In Gn Halimun, the species found in corridor Cianten,

#### *Trichosanthes ovigera* Blume

Climber to 10 m tall, dioecious, pubescent rarely glabrous. Glands absent or several scattered at leaves only. Probract absent. Tendril 2(-3) branched. Leaves simple, unlobed or 3(-5) lobed. membranaceous or chartaceous, ovate or suborbicular, base cordate with broad or narrow sinus; apex obtuse or acute-acuminate, margin entire, finely remote dentate or coarsely dentate or undulate. Male raceme sometimes coaxillary with solitary male flower 5-12 cm long, densely or sparsely pubescent; peduncle 3-8 cm long, 1-2 min thick; rachis not thickened, with 5-10 flowers; bract membranous, narrowly or broadly ovate or oblong 5-15 x 2-8 mm, entire or few-lobed or dentate. Male flower in a raceme, some times solitary co-axillary or solitary on the nodes; pedicel 2-15 min long; receptacle tube 20-25 min long, at apex 3-5 min diam.; sepal narrowly triangular 3-7 mm long, margin entire, petal ovate-oblong c. 10 by 4 mm. Female flower solitary rarely in a short raceme. Fruit almost globose or ovoid, ovoid-oblong, 3-10 by 2.5-3.5 cm, red, pulp whitish; fruiting pedicel 1.5-4.5 cm long, 1-3 mm thick. Seed dark, barrel shaped, 7-11 x 6-8 min, 3-4 thick.

Distribution and ecology: Widespread in S.E Asia and throughout Malesia to Australia and Solomon Islands. In Gn Halimun, it was found at corridor Cianten, in edge forest.

#### *Trichosanthes pubera* Blume

Climber to 20 m tall; dioecious; grey-rusty pubescent, partly glabrescent; young twig and

leaves reddish tinged. Glands present, several and scattered at basal leaves. Probract lanceolate or linear, 10-20 min long. Tendril 2 or 3 branched. Leaves simple, 35(-7) lobed, membranous scabrous above, broadly ovate or orbicular 9-23 x 8-22 cm, base shallowly or deeply cordate with broad or narrow sinus; apex acute-acuminate; margin dentate. Male raceme 15-22 cm long, rusty pubescent; peduncle 7-15 cm long; 2-3 min thick, rachis not thickened, with 5-15 flowers; bract membranous obovate-rhomboid 2-5 x 2-3.5 cm, margin irregularly insiced or slenderly lobed. Male flower: pedicel 5-10 min long; receptacle tube 4-5 cm long, at apex 8-10 min diam, sepal long-triangular or oblong-lanceolate, margin with few side lobes, petal obovate, white and pinkish at apex. Female flower solitary. Fruit ovoid-ellipsoid 5-10 x 4-6 cm, orange-red; pulp greenish black; fruiting pedicel 2-5.5 cm long, 3-4 thick. Seed blackish brown, flat, elliptic-oblong to obliquely obovate 8-13 x 4-4.5 min, thick 1-2 min, rounded at both ends or with slightly cuneate base.

Distribution and ecology: West Malesia: N, C and S. Sumatra, E. Kalimantan, whole Java, but rarely found. Growth secondary forest edge, river side in wet sites. In Gn. Halimun, the species grow hanging on other tree in the road side along the road ca. 1 km before Cianten tea plantation.

#### *Trichosanthes quinquangulata* Asa Gray

Climber to 20 m tall; monoecious 1 glabrous or early glabrescent. Glands present at leaves, probract and bract. Probract obovate-oblong 5-10 min long. Tendril (2) 34(-5) branched. Leaves simple, with 5 (-7) angular, membranous, scabrous above, suborbicular, 8.5-24 x 8-21 cm; base deeply cordate with rather broad sinus apex acute-acuminate, margin entire. Male raceme 5-20 cm long sometimes with 1 or 2 female flower, glabrescent, peduncle 2-8 cm long, 2-3 min thick., rachis not thickened, with 5-10 flowers; bract membranous obovate-elliptic or rhomboid, 1-3 cm long. Male flower: pedicel 2-5 mm long; receptacle

tube 40-50 mm, at apex 10 mm wide; sepal long triangular 12-20 mm long, margin usually with a few slender side-lobes; petal obovate. Female flower solitary or hermaphroditic in male raceme. Fruit globose, bright red, not flamed, pulp greenish black; fruiting pedicel 1.5-2.5 cm long; 3-5 mm thick. Seed flat, elliptic-oblong, apex rounded or acute, base cuneate.

Distribution and ecology: Widely distributed from Indo-China through Malesia, but not known from Central and East Java, Sulawesi and Lesser Sunda Islands. Grow at forest edge in disturbed forest, open area. In Gn. Halimun, the species found in corridor Cianten, Ciawitali (Ciptarasa), Leuwijamang and Cibanteng.

*Trichosanthes tricuspidata* Lour.

Climber to 20 m tall, dioecious, early glabrescent. Gland present at probract, leaves and bract. Probract fleshy, elliptic or obovate c. 5 mm long, entire. Tendril 2 or 3 branched. Leaves simple 3 shallowly lobed, membranous or chartaceous, broadly ovate 8-17 x 6-15 cm; base cordate with narrow or broadly sinus; apex acute or acute-acuminate; margin entire with remote very small dents. Male raceme 10-20 cm long, brownish pubescent, partly glabrescent, peduncle 2-10 cm long, 1.5-2 mm thick; rachis not thickened; bract membranous or chartaceous, obovate-elliptic or rhomboid, 10-30 mm long, margin dentate or scarcely lacinate. Male flower pedicel c. 5 mm long; receptacle tube 40-60 mm long, at apex 6-10 mm wide; sepal narrowly lanceolate, triangular, petal broadly obovate-rhomboid. Female flower solitary, rarely in the male raceme. Fruit ovoid or ellipsoid 5-9 x 5-6 cm, orange-red, not flamed; pulp green-black, fruiting pedicel 0.5-2 cm long, 3-4 mm thick. Seed dark brown, flat, obovate-elliptic or oblong 10 - 13 x 4-6 mm.

Distribution and ecology: Widespread. In Gn. Halimun found at edge forest or river side and easy to be found along the year.

*Trichosanthes villosa* Blume

Climber to 24 m tall; dioecious, grey-brown villose hairs. Glands present, few at the leaves and bract. Probract absent. Tendril 5-9(-10) branched. Leaves simple, unlobed or angular or 3(-5) shallowly lobed; membranous, broadly ovate to orbicular, 8-20x8-19 cm; base cordate with narrowly sinus; apex acute-acuminate; margin entire. Male raceme sometimes with solitary flower coaxillary, or with solitary male flower; raceme 20-30 cm long, pubescent, peduncle 5 -12 cm long 2-3 mm thick, rachis not thickened, with c. 10 flowers; bract broadly rhomboid or obovate 20-50 x 30-40 mm, margin entire or shallowly few-dentate. Male flower: pedicel 3-9 cm long, receptacle tube 20-30 mm long, at apex 8-10 mm wide; sepal narrowly triangular, 10-16 mm long, margin entire; petal obovate-rhomboid 15-20 mm long, Female flower solitary. Fruit ellipsoid-globose 9-14x7.5-11 cm, greenish yellow with pale yellow longitudinal lines; pulp white, sweet fruiting pedicel 3-6 cm long, 3-5 mm thick. Seed brown, flat, ovate-oblong, base truncate.

Distribution and ecology: In Malesia, it is distributed in Java, Sabah, Philippines and Lesser Sunda Island. In Gn. Halimun found in corridor Cianten and grow at edge disturbed forest, easy to be found a long the year.

*Trichosanthes wawrae* Cogn.

Climber to 5-10 m tall; dioecious; glabrescent. Glands few at leaves, bract. Probract chartaceous, ovate-lanceolate, 3-5 by 1.5-3 mm. Tendril 2 branched. Leaves trifoliolate, membranous or chartaceous, scabrous above, leaflet: middle leaflets obovate-lanceolate 4.5-10 x 2-3 cm, base cuneate, apex acute-acuminate, margin entire or remotely dentate; lateral leaflets unequal-sides, ovate-oblong. Male raceme 7-17 cm long, pubescent; peduncle 1-5 cm long, 2-3 mm thick, with 5-30 flowers, bract membranous, ovate-rhomboid, margin shallowly or deeply dentate - lanceolate, sometimes with 3 main lobes.

Male flower: pedicel 2-3 mm long; receptacle tube 20-70 mm long, at apex 5-7 mm wide; sepal narrowly triangular, 4-6 mm long, entire or few dentate. Female flower solitary, rarely in male raceme. Fruit ovoid 6.5-8x5-7 cm, orange-red, yellow flamed; pulp green-black. Seed brown-black, flate, broadly ovate or ovate-oblong 15-20x8-15 mm, 2-3 thick, truncate.

Distribution and ecology : Distributed only in West Malesia. In Gn. Halimun found in Cikaniki at edge forest, or river side.

## DISCUSSION

This study indicated that species diversity of this genus in Gunung Halimun National Park is rich compare with Javanese species of *Trichosanthes* (with 10 species), about 70 % found in the area. However, the species diversity is not easy to be monitored every 1-2 year, because some species will die off after fruiting and there is no information about the live cycle of the species. These species are found mostly in humid area in edge forest, or along river sides.

The result of tree time observations, firstly in 1998, most species were collected in corridor Cianten: *T. montana*, *T. tricuspidata*, and *T. villosa* found in sterile condition, *T. ovigera* and *Trichosanthes pubera* grow abundant and in flowering time, whereas *T. quinquangulata* in fruiting but no fresh leaves in its plant. In Cikaniki,

*Trichosanthes wawrae* was collected in fruiting.

The second field observation in the same place (corridor Cianten, 2000), the habitat of *T. pubera* (along the road near Cianten tea plantation) was in threatened condition. The local people have cutted all the big trees (habitat of *Trichosanthes*) and the area will convert into other plantation. The other species: *T. quinquangulata* only found in seedling, *T. tricuspidata* and *T. villosa* found in sterile condition, whereas *T. montana* and *T. ovigera* were difficult to be recollected at that time (in July, 2000).

The third field observations (in 2001), *T. wawrae* recollected in sterile condition in Cikaniki. *Trichosanthes tricuspidata* was collected also in sterile (along the river) and *T. quinquangulata* was found in seedling at Ciawitali (Ciptarasa), but the habitat also in threatened condition.

These observation indicated that, the annual species were not easily recollected at any time, so that further study especially in fenology is still needed.

## CONCLUSION

There are seven species have been recorded occurring in TN Gn. Halimun namely, *T. montana*, *T. ovigera*, *T. pubera*, *T. quinquangulata*, *T. tricuspidata*, *T. villosa*, and *T. wawrae*. The species diversity of this genus in Gunung Halimun National Park is rich compare with Javanese species of *Trichosanthes* (with 10 species), about 70 % found in the area. However, the species diversity is not easy to be monitored every year. These species are found mostly in humid area in edge forest, or along river sides. In that time, *T. wawrae* only found in Cikaniki, whereas the other six species found in corridor Cianten. *Trichosanthes quinquangulata*, however, it is widely distribute. Fenological study needs to be studied to know the live cycle of the species.

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