

Short Communication

A NEW RECORD OF THE CREEPING CUCUMBER, *Melothria pendula* L. (CUCURBITACEAE) FROM HALMAHERA, NORTH MALUKU, INDONESIA

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ARTICLE HIGHLIGHTS

- Botanical inventory in Halmahera island, North Maluku has found the species *Melothria pendula* for the first time.
- In Indonesia, the species *Melothria pendula* is previously known only from Java, Sumatra, Sulawesi, and Lesser Sunda Island.
- DNA barcodes for the species *Melothria pendula* from Indonesia firstly deposited in NCBI GenBank.

ABSTRACT

This study was conducted to explore *Melothria pendula* on Halmahera Island. Previously, the species is known to occur in Bali, Sulawesi, Sumatra, Java (Indonesia), Malay Peninsula, Sabah (Malaysia), as well as the Philippines. Results of this study improved insights into the current knowledge about geographic distribution of *Melothria*. Moreover, the description of the species, habitat, critical taxonomic notes, color plates, distribution map, and DNA barcode were also presented in this study.

Keywords: Cucurbitaceae, Halmahera, Maluku, *Melothria pendula*, new record

INTRODUCTION

The genus *Melothria* is part of the tribe Benincaseae in the Cucurbitaceae, a family of vines, shrubs, and herbs. This genus, commonly known as "melonettes" or "mouse melons," was first described by Linnaeus in 1753. *Melothria* species are small to medium-sized herbaceous climbers, with simple leaves, usually small, yellow or white flowers, and berry fruits having smooth surface. The fruits contain a large number of highly compressed seeds, and the testa is typically smooth, white, and often covered with long, appressed hairs (de Wilde & Duyfjes 2010). These plants require warm weather to thrive and are typically grown as annual crops. Due to rapid growth and spreading habit, the plants are well suited for use on trellises or in hanging baskets. Furthermore, the abundant fruit production throughout the growing season makes the plants to be favored by horticulturists (Sinha *et al.* 1996; Mahr 2014).

Approximately 10 *Melothria* species have been found in the New World, including *M. pendula* L. This species is considered a weed and indigenous to the Caribbean, Mexico, Central America, and was reported as locally invasive in West Africa and tropical Asia (de Wilde & Duyfjes 2010). *Melothria pendula* has been reported as widely distributed in the Malesian region, including Indonesia (Bali, Java, Sumatra, Sulawesi), Sabah (Borneo), Peninsular Malaysia, the Philippines (de Wilde & Duyfjes 2006, 2010; Mustaqim & Putra 2020; Husaini *et al.* 2024).

Melothria pendula occurs in a variety of habitats, including moist and seasonal dry tropical woodlands, oak woodlands, cloud woodlands, scrub/thicket, and disturbed areas, at altitudes from 0 to 2,050 m. This species blooms and bears fruits throughout the year (Guerrero-Torres *et al.* 2022) and in the Philippines, the herb has been traditionally used in treatments of several ailments, including inflammation, constipation, burns, and wounds. In Mexico, the plant has been used for treating anemia, headaches, gonorrhea,

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and hemorrhoids, as well as for the relief of heart pain. Additionally, the fruits and leaves are edible and can be used in the preparation of a variety of sauces. The medicinal properties of the species are attributed to the phytochemical content, such as alkaloids, anthraquinones, quinones, saponins, steroids, terpenes, and xanthoproteins (Raju *et al.* 2021).

Halmahera is the largest island of the Maluku Islands, covering an area of 17,780 km² and a part of North Maluku Province. From a biogeographical stand point, Halmahera is also part of Wallacea, which is known for unique flora and fauna. Wallacea region is rich in minerals, including nickel, cobalt, copper, gold, and silver elements (Konopka *et al.* 2022). Currently, there are numerous mining projects underway in Halmahera that pose a serious threat to the biodiversity of the island (Voigt *et al.* 2021), underscoring the need for botanical surveys to understand the species at risk (Struebig *et al.* 2022). This study was conducted to explore and enumerate the species present at Aketajawe Lolobata National Park and adjacent areas. Furthermore, distribution of *Melothria pendula* was evaluated to update the geographic distribution range. Selected taxa were also barcoded to provide the sequences in the GenBank.

A total of three specimens of small vines belonging to the Cucurbitaceae family were discovered and collected during a botanical survey in Halmahera Island, North Maluku Province. These vines have small yellow flowers and hanging elliptic fruits resembling small pickles. Locals refer to this plant as *timun tikus* in Halmahera language, which means mouse cucumber. These collections were gathered from two sites, namely an open, disturbed forest in the area of Geltoli Village, Maba Regency, and a roadside scrub in the area of Saramaake Village, South Wasile Regency, East Halmahera Regency. The plants were subsequently identified as *Melothria pendula* L. Comparison with literature and herbarium databases, including the Herbarium Bogoriense (BO), GDC, K, L, M, and S (retrieved from GBIF and JSTOR Global Plants), shows that *Melothria pendula* has not been previously identified. Therefore, this is the first record of the species from Halmahera Island, North Maluku Province.

MATERIALS AND METHODS

Fieldwork was carried out in October 2022 and using the standard herbarium technique described by Djarwaningsih *et al.* (2002). The flowering and fruiting specimens were collected, examined, preserved, as well as deposited in Herbarium Bogoriense (BO). The morphological description of this species was determined based on the examination of the fresh plants, the voucher specimens, and the literatures. To barcode this species, the internal transcribed spacer (ITS) region was used. Plant Genomic DNA Mini Kit from Geneaid was used to extract the DNA genome from silica gel dried leaves. A pair of ITS-5 (5'-GGA AGT AAA AGT CGT AAC AAG G-3') as forward primer and ITS-4 (5'-TCC TCC GCT TAT TGA TAT GC-3') as reverse primer was used for amplification of ITS regions according to White *et al.* (1990). Heat shock at 95 °C for 3 minutes was used to start the PCR process and amplification was performed for 35 cycles in three steps. DNA was denatured at 95 °C for 30 seconds and annealing was performed at 55 °C for 30 seconds. Furthermore, DNA extension was conducted at 72 °C for 90 seconds and the final extension occurred at 72 °C for 5 minutes. Purification and Sanger sequencing were performed by a company, 1stBase-Singapore, and sequences were deposited in GenBank.

RESULTS AND DISCUSSION

Melothria pendula L. - Figures 1 & 2.

Melothria pendula L., Species Plantarum Ed. 1 (1753) 35; de Wilde & Duyfjes, Flora Malesiana I, 19 (2010) 107. - Type: *Herb. LINN No. 51.1* (lecto *LINN n.v.*, designated by Wunderlin (1978). - *Melothria guadalupensis* (Spreng.) Cogn. in A.L.P.P.de Candolle & A.C.P.de Candolle, Monogr. Phan. 3: 580 (1881). - *Melothria fluminensis* Gardner in London J. Bot. 1: 173 (1842). - *Cucumis glaber* Walter in Fl. Carol.: 240 (1788).

Description. Monoecious, perennial herbs with fibrous roots and often a short woody taproot, trailing to procumbent, multi-stemmed at base, tendril on the upper side next to petiole, on fertile shoot next to pistillate flower and later staminate raceme in axil, unbranched, cylindrical, sparsely short-haired, aging glabrous. The stems are 5-ridged with rounded ridges, 2 mm in diameter but swollen at nodes, weak and flexible, striped,

internodes mostly 35-80 mm long, short-hairy aging glabrescent, and lack stipules. Furthermore, the leaves are alternate, entire, or with 3 or 5-shallowly lobed, petioles with 2-ridged with deep groove on upper side, a petiole shorter than blade, 1-1.7 cm long, striped light green, and dark green or reddish, often strongly bent at base and twisted, scabrous with short hairs, the hard hairs with persistent cystoliths; blade suborbicular, ovate to broadly ovate in outline, 1.1-4.7 x 2.0-6.5 cm, cordate to deeply cordate at base, acuminate apex; margin remotely dentate or shallowly undulate. Male inflorescences racemes, with 7-8 dense flowers, peduncle pubescent, 1-1.5 cm long, yellowish green. Male flowers have pedicels 1-2.7

mm, receptacle tube ca. 1.5 x 1 mm, sparsely hairy on the outside, sepals ca. 0.3 mm long, petals glossy, yellow, diameter ca. 5 mm, lobes 1-1.3 x 2-2.8 mm, recurved at the tips, stamens 3, filaments ca. 0.3 mm long, anthers ca. 0.8 mm long, and disks ca. 0.5 mm in diameter. Furthermore, female flowers are solitary, pedicel sparsely hairy, ca. 18 mm long, corolla ca. 6.5 mm in diameter, lobes ca. 2 x 3 mm, apex obtuse, shallowly recurved, ovary ca. 5 mm long, with ca. 1 mm neck, style ca. 1.2 mm long, stigmas about 1.2 mm long, with 3-lobes, and disk ca. 0.3 mm. Fruit berry, ellipsoid, ca. 1.5 x 1 cm, greenish when immature, purplish-black when ripe, sweet taste, while seeds are 15-24, obovate in shape, ca. 5 x 3 mm.

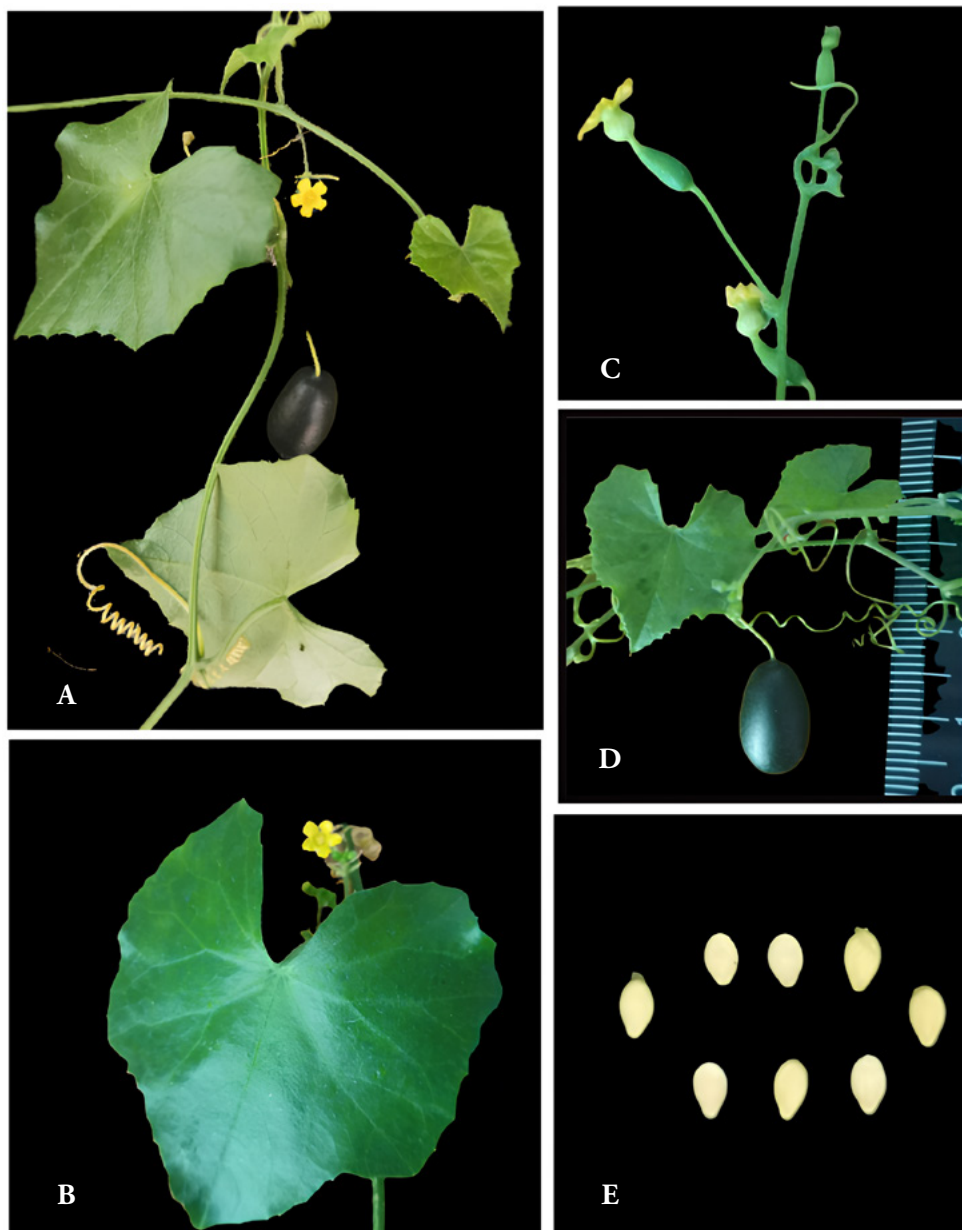


Figure 1 *Melothria pendula* in Halmahera, North Maluku Province

Notes: A. Living plant; B. Leaf with male flower; C. Female flower; D. Mature fruit hanging on stem; E. Seeds.
Photo: LD Sulistyaningsih.

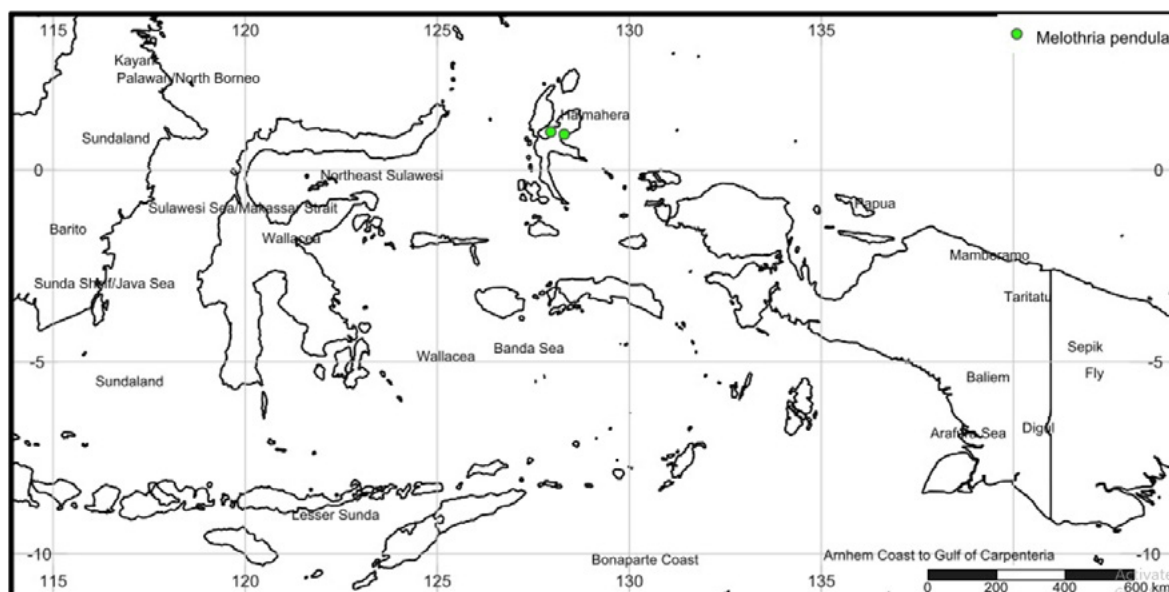


Figure 2 Distribution of *M. pendula* in Halmahera, North Maluku Province

Distribution. *Melothria pendula* grows naturally in America, from Texas up to Argentina. This species has been introduced, grown wild, and then naturalized in other regions, such as Asia and West Africa. The plants were previously recorded in Bali, Sulawesi, Sumatra (Indonesia), Peninsular Malaysia, Sabah (Malaysia), and the Philippines (de Wilde & Duyfjes 2010; Mustaqim & Putra 2020). This study confirmed that the species was present in Halmahera, North Maluku Province as shown in Figure 2. Considering *Melothria pendula* was not yet used by the local people at the time, it was postulated that the creeping cucumber was naturally dispersed from Sulawesi to Maluku Islands through birds, animals, or ocean currents. The species is also found growing in Bogor Botanical Garden and in Cibinong Science Center Botanical Garden as well as in adjacent areas of Bogor Regency, West Java (Husaini *et al.* 2024).

Habitat and Phenology. *Melothria pendula* is typically found in disturbed areas, such as fields or roadsides as the native range. In Halmahera, this species grows on roadsides in open areas among shrubs, approximately 20 m above sea level (masl). Flowering and fruiting plants can be found at the same time (in October), throughout the year. In Cibinong, Bogor, the species grows well in open areas, but not in the shade.

Vernacular Name. Indonesia, Halmahera: *timun tikus* (mouse cucumber).

Uses. *Melothria pendula* is known to have medicinal properties, especially for diabetes. In Halmahera, this species is still being neglected.

Specimens Examined. Indonesia, Halmahera Island, North Maluku Province: East Halmahera Regency, Maba District, Geltoli Village, 0°55'36.7" N, 128°18'23.0" E, c. 20 m altitude, 19 X 2022, Arifiani *et al.* DA 2288; South Wasile District, Saramaake Village, 0°59'32.0" N, 127°57'19.5" E, c. 20 m altitude, 21 X 2022, Sulistyanyingsih *et al.* LDS 631; Arifiani *et al.* DA 2319 (BO).

Notes. *Melothria pendula*, known to thrive in favorable growing conditions, has the potential to become an alien invasive species when the plants lack natural predators or competitors that would keep the population in check. In Indonesia, the name *timun tikus* or mouse cucumber is also applied to another species, namely *Coccinia grandis* (L.) Voight. The two species are similar in fruit shape, but differ in flower color and size, as well as the tips of the corolla lobes (yellow and small flowers with obtuse-shallow retuse corolla lobe tips in *Melothria pendula* vs. white and larger flowers with acute corolla lobe tips in *C. grandis*). In addition, the fruit of both species are ellipsoid and differ only on size, color (in mature), and surface pattern. *Melothria pendula* has a smaller fruit (0.8-1.5 × 1 cm), no longitudinal pattern, purple-black when ripe, while the fruit of *C. grandis* is more elongated (5-10 × 1.5-3.0 cm) with white longitudinal stripes and purple-red when ripe. The seed size is almost the same for both species, but differ in color. *Melothria pendula* is 5 × 3 mm and a silvery color, while *C. grandis* 5-6 × 2-3 mm, creamy or light brown color.

Blasting Results

Table 1 Blasting results of *Melothria pendula* from Halmahera, North Maluku Province in NCBI GenBank (the top three)

Collection number	Species	Max score	Total score	Query cover (%)	Percentage of identification (%)	Accession number
DA 73 (=DA 2288)	<i>Melothria pendula</i>	1,083	1,083	100	99	AM981162.1
	<i>Melothria scabra</i>	1,068	1,068	100	98.67	GU799500.1
	<i>Melothria pendula</i>	1,050	1,050	100	97.85	AM981163.1
DA 74 (=DA 2319)	<i>Melothria pendula</i>	1,057	1,057	100	98.98	AM981162.1
	<i>Melothria scabra</i>	1,042	1,042	100	98.64	GU799500.1
	<i>Melothria pendula</i>	1,024	1,024	100	97.80	AM981163.1
LDS 631	<i>Melothria pendula</i>	1,075	1,075	100	98.84	AM981162.1
	<i>Melothria scabra</i>	1,061	1,061	100	98.50	GU799500.1
	<i>Melothria pendula</i>	1,042	1,042	100	97.68	AM981163.1

Accession Number

Table 2 Accession numbers of *Melothria pendula* from Halmahera, North Maluku Province

No	Collection Number	Primer	Accession Number
1	DA 73 (=DA 2288)	ITS 4-5	PP993840
2	DA 74 (=DA 2319)	ITS 4-5	PP993853
3	LDS 631	ITS 4-5	PP993858

CONCLUSION

The distribution of non-native alien species, *Melothria pendula* in Indonesia was recorded in Halmahera, North Maluku Province. This result broadened the distribution range from previous studies that have reported the occurrence of *Melothria pendula* in Sumatra, Sulawesi, Lesser Sunda Island, and Java. The study also improved the knowledge on geographic distribution of the genus, *Melothria*.

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