MORPHOLOGICAL CHARACTERIZATION OF CEPLUKAN (NICANDRA SPP.) FAMILY SOLANACEAE IN BROMO TENGGER SEMERU BIOSPHERE RESERVE, EAST JAVA INDONESIA.

A NEW RECORD AND REVIEWS

Jati Batoro
Biology Department Faculty of Mathematics and Natural Sciences Brawijaya University Address: Jl. Veteran Malang 65145, East Java, Indonesia. Tel-fax: +62-341-575841 http://biologi.ub.ac.id, email: biology@ub.ac.id. Email: jati_batoro@yahoo.co.id; j_batoro@ub.ac.id
(Date of Receiving: 22-06-2021; Date of Acceptance: 27-08-2021)

ABSTRACT

The purpose of this study was to morphologically identify the genus of ceplukan which also called apple-of-Peru (Nicandra physalodes (L.) Gaertn). The distribution of genus based on the altitude of the location and revealed knowledge, which is utilized by the local community in the Bromo Tengger and Semeru Biosphere Reserves. This research is based on examination of the herbarium material from herbarium specimens (MUBR). Survey of fresh materials from the environment of the Bromo Tengger Semeru (BTS-NP) East Java Biosphere Reserve community. Local knowledge is carried out through structural interviews, open interviews and direct observations. Nicandra physalodes spread in arable land e.g. waste place, rice fields, cultivated ground, road side, beach, fields, and forest. It has local name called ceplukan (in Java). Distribution of these types with a height of about 550-2000 above sea level (ASL). The identification of the specimens are found in the Bromo Tengger Semeru Biosphere Reserve (BTS-NP) is of one species, namely Nicandra physalodes (L.) Gaertn. The results of this study are important to be used as basic information of genus Nicandra in biospher environment Bromo Tengger Semeru-Arjuno, East Java Indonesia. Nicandra physalodes is important to know because of its biological and pharmacological properties.

Keyword: Nicandra, morphology, biospher reserve environment (BTS-NP)

INTRODUCTION

Nicandra is a monotypic genus belonging to the subfamily Solanoideae, family Solanaceae ordo Solanales and classis Dicotyledoneae. The charaterization this family are flowering plants, nightshade family containing the single species Nicandra physalodes (L.) Gaertn. This specieis known by the common names apple-of-Peru, shoo-fly plant, physalis blue flowers, originally to have been native western South Americato Peru. The Genus is named for Greek poet Nicander of Colophon who wrote about plants, growth at the home garden and first identified by Michel Adason.

The genus Nicandra Adans. nom. cons. has characteristics such erect stem and almost bare. Leaves spiral arranged and the flowers are solitary next to the leaves. Actinomorphic; calyx deeply 5 partitate; lobes ovate-cordate-sagittate, with recurved, pairwaise mutually appressed or coherent margins forming longitudinal wings, much enlarge in fruit. Corolla-tube very short; limb widely campanulate, shallowly 5 lobed; lobes broadly rounded. Stamens 5, in apical part of corolla tube. Hairy in base filament. Anthera oblong-sagittatus. Style is short. Stigma lobed. Ovary ovoid. Fruit berry, pendulous; embryo curved (Backer and Van Den Brink, 1968). Backer & Bakhuisen Van Den Brink reported Nicandra is from Peru and is spread in the Dieng plateau (Dieng Plateau) central Java and environs of Tengger 400-2100 m dpl, rarely lower, roadsides, potato, maize field and sugar plantations.

Nicandra physalodes is spread over the Bromo Tengger Semeru Biosphere Reserve (BTS-NP) and the Perhutani environment. Perhutani are responsible for protecting forest functions such as hydrological regulators. Various former land including agroforestry, forest production, natural forest, etc. Vernacular names of the genus Nicandra spp. are called as ceplukan, as a toxic plant in Java (Backer and Van Den Brink, 1968; Keng, 1989). The Nicandra and Physalis genera, including the Solanaceae family, it has close relationships and has almost the same characters (Batoro & Arumningtyas, 2018; Mastuti et al., 2019). In the present study of morphological characters genus Nicandra distribution in the Bromo Tengger Semeru East Java Biosphere Reserve community was conducted to clarify the confusion. There is no basic information about variation genus Nicandra spp. in Malang city and Probolinggo city, East Java.

MATERIALS AND METHODS

This study is based on the examination of the material from Herbarium Biology of Brawijaya University (MUBR),
library search, and collecting fresh material from Biosfer Reserve BTS-NP areas (Fig. 1), East Java Indonesia. Standard plant specimen collection techniques were employed. From the collection studied by the author, details, and descriptions from dried material, except for floral and fruit sizes, which were based on dehydrated materials (boiled in water). Terminologies follows (Backer and Bakhuizen Van Den Brink, 1968; Bell, 1991; Harris & Harris, 2003) and methods follows by Vogel (1987). The research was conducted using structural and open ended interview, referent and direct observation (Cotton, 1996; Hoffman & Gallaher, 2007).

RESULTS AND DISCUSSION

Based on studies of herbarium specimens in MUBR one species of Nicandra spp. recorded from Malang Regency, Probolinggo, East Java. One species recorded name is Nicandra physalodes (L.) Gaertn.

Species description.

1. Nicandra physalodes (L.) Gaertn

Nicandra Adans. nom cons.


Terrestrial, herbaceous, erect, branched, 0.5 - 0.8 m high. Rootstock woody, phinx color, diameter 0.6 - 1.1 cm, branched, rectangular sharply ribbed, number 5, hollow, hole thickness 1.5-3 mm, surface brown-green, smooth to pubescent. The length of the knuckles is 8-11 cm, the nodes of the emergence of shoots, leaves and flowers. Petiole 8-9 x 0.4-0.6 cm long, short-winged, leaf blade elongated ovate-lanceolate, with a pointed tip, flat to jagged edges with different heights, 16-17 x 10-12.5 cm. Smooth hairy stalk surface (pubescent); pointed leaf bases at a distance of up to 0.3 - 1 cm; leaf bones 4-5 pairs, palmate-pinnate, leaf veins scalariform, upper leaf surface light green, upper surface dark green. Flower stalks round, erect with rounded nodding ends, 1.5 cm x 1.5 mm. Petals round elongated, green adhering, 5-slit, sharing a triangular shape at the tip, 1 cm taper, ribbed, green. Bell-shaped crown, light blue; Yellow pollen comes out of the side holes. The pistil is smooth, round 6 x 1 mm with a yellow button-shaped pistil. Buni fruit, round slightly elongated 0.7-0.8 x 0.8-1 cm, smooth, shiny, the tip of the fruit has an indentation, green when young, green-yellow when ripe. The white-brown seeds are ovate-ovobate in clusters.

Field notes: Ceplukan racun, Apple of Peru, apple os Sodom, peruvian bluebell (Nicandra physalodes (L.) Gaertn). This species with small habitus, herb, branched stem and white-green color; margin of leaf serrate, apex acute.

Specimen examined: no. 35. Sawojajar, Pakis district, Malang Regency; no.36. Ngadisari, Probolinggo, Sukapura Regency East Java.

Distribution: Terrestrial, Malang Regency, Perhutani forest and BTS-NP, 544-2100 m A.S.L., Tropical America (Peru), in Java naturalized 400-2100 m A.S.L., rarely lower; roadsides, potato, and maize plateau, environs of Tengger (Backer & Van Den Brink, 1968). This species, host plants, waste places, including cultivated ground, grow well around gandum, corn (Zea mays), pohong, cassava (Monihot esculenta), kerinyu (Eupatorium inulifolium), kacang brol, kacang tanah, peanut (Arachis hypogaea L.), kentang, potato (Solanum tuberosum), mbote (Calocacia esculenta (L.) Schott, gedang, banana, (Musa paradisiaca), alang-alang (Imperata cylindrica), and telekan (Lantana camara L.). Sawojajar have altitude 452 m dpl. S.07.97111”; E.112.66428”. In the Tengger community, Ngadisari village with an altitude of 1800 m above sea level, scattered among potato plants(Solanum tuberosum), bawang prei (Allium fistulosum), kobis (Brassica oleracea), gandum, local corn (Zea mays), tomat, tomato (Solanum lycopersicum), pepaya
gunung, (*Carica punescens*) and cemara gunung (*Casuarina junghuhniana*). Like the genus *Physalis*, *Nicandra physalodes* prefers fertile soil, highlands and wetlands, scattered among vegetable crops.

**Local name:** Ceplukanracun (*Nicandra*)

**Benefits:** Drug (high blood medicine). It is a poisonous plant and is used in some parts of the United States of as a fly poison (Hogstad, 2012). The Tenggerese use *Nicandra physalodes* as organic fertilizer, while the Javanese recognize it as a poisonous plant. Utilization for high blood medicine by means of whole plant cleaned and boiled while the water can be drunk; fertilizer contain the tropane alkaloid hyoscyamine. Confirming the nutritional and medicinal potential of the fruit of *Nicandra physaloides* regarding its toxicity (Kahirsagar and Bhogaonkar (2015).

![Fig. 2: Nicandra physalodes (L.) Gaertn. in Pakis, Malang Regency](image1)

![Fig. 3: Nicandra physalodes (L.) Gaertn. in Ngadisari village, Sukapura District, among Allium fistulosum.](image2)

Traditional peruvian medicine uses many plant species in the treatment of various respiratory diseases: fever, cough, sore throat, flu, cold, pneumonia, whooping cough, and lung diseases including *Nicandra physalodes* (Paredes et al., 2021). Kahirsagar and Bhogaonkar (2015) reported *Nicandra physaloides* (L.) Gaertnfruits were rich in proteins, carotenoids, vitamin–A and vitamin–C, and screening of bioactive molecules showed the presence of alkaloids, steroids, tannins, and polyoses which impart medicinal potential to plant. *N. physalodes* in the village of Tengger is a type of wild plant as a weed. These secondary metabolites in this genus are widely known for their biological and pharmacological properties, such as cytotoxic, anti-tumor, immuno-suppressive, anti-microbial, anti-feedant, and anti-inflammatory. Carero and Pesscoa (2018) reported extract the leaf *Nicandra physalodes* five new with anolides, designated as 15-oxo-nicaphysalin B, 6β,7α-dihydroxynicandrenone 10, 24α,25β-dihydroxy-nicandrenone-2 and a mixture of the epimers 17-(1α/1β-methylpropanone)-nicandrenone, in addition to six known others. The chemical investigation of *Nicandra physalodes* afforded five new with anolide derivatives (1-3 and 4a/4b) and six known ones (5-10). Isolation and identification of *Nicandra physalodes* fruit indicates the presence three new glycosides (1-3) and 15 known ones (4-18). This species exhibited inhibitions on the NO release of LPS-induced RAW 264.7 cells with IC50 values from 26.9 to 47.5 μM.
Morphological characterization of ceplukan (*Nicandra* spp.) family Solanaceae in Bromo Tengger Semeru biosphere reserve, east Java Indonesia. A new record and reviews

Nicandra physalodes (L.) Gaertn., a single species, is a species of flowering plant family in subfamily Solanoideae, family Solanaceae. *Nicandra* Adans conserved (nom.cons.) against the homotypic synonym (Shenzhen ICN Art. 14.4 & App. III) *Physalodes* Boehm., rej. This species: *N. physalodes* (L.) Gaertner; *Atropa physalodes* L.A monotypic genus native to Peru, widely cultivated as an ornamental, and naturalised in Australia as a garden escape.

**CONCLUSIONS**

The genus *Nicandra physalodes* (L.) Gaertner is distributed in rice fields, fields, road sides, between cultivated plants and forests. The distribution of species in the Bromo Tengger Semeru Biosphere Reserve from Pakis sub-district to Tengger tribal villages with an altitude of about 550-2000 above sea level (ASL). This species has potential as an ornamental plant, medicinal ingredients including Covid-19, as well as organic fertilizer. Local people recognize the types of poisonous plants and use them as organic fertilizers.

**Acknowledgement**

The author would like to express his gratitude to Department Biology FMIPA Brawijaya University for financial supports during the research. The author would like thank to the Mr. Suyanto as alocal informan. The author also thank to Mr. Arifin as curator of the Universitas Brawijaya’s Herbarium (HBUR).

**REFERENCES**


