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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 Adress: Jl. Veteran Malang 65145, East Java, Indonesia. Telp-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

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ABSTRACT

The purpose of this study was to morphologically identify the genus of ceplukan which also calledapple-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 speciesis 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 andfirst identified by Michel Adason.

The genus Nicandra Adans. *nom. cons*. hascharacteristics 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, pairwise 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 Bakhuizen van den Brink, 1968). Backer & Bakhuizen Van Den Brink reported *Nicandra* is from Peru and is spread in the Dieng plateau (Dieng Plateu) 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 Probolinggocity, 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, refferent and direct observation (Cotton, 1996; Hoffman & Gallaher, 2007).

Fig. 1 : Map of Bromo Tengger and Semeru Biosphere Reserves

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.) Gaertner

Nicandra Adans. *nom cons*.

Flora of Java Vol. 2: 465-466;Fam. Pl. 2: 219 (1763) (nom. Cons.); Fruct. Sem. Pl. 2: 237. 1791.(lectotype: LINN 246.3). Lectotypified by Schönbeck-Temesy, inRechinger, Fl. Iran. 100: 2. 1972.

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 yellow-white color with, 7 - 9 mm, notched edge 5; deep neck color with yellow-brown stains; on each stain there are clusters of short hairs arranged tightly. Stalk 5 x 1 mm round, pale yellow; anthers mm shape 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-obovate 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.

Distribusi: Terrestrial, Malang Regency, Perhutani forest and BTS-NP, 544-2100 m ASL., 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

Fig. 3: *Nicandra physalodes* (L.) Gaertn. in Ngadisari village, Sukapura District, among *Allium fistulosum*.

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 physaloldes* (L.) Gaertnfruits were rich in proteins, carotenoids, vitamin–A and vitamin–C, and s creening 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*is 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.

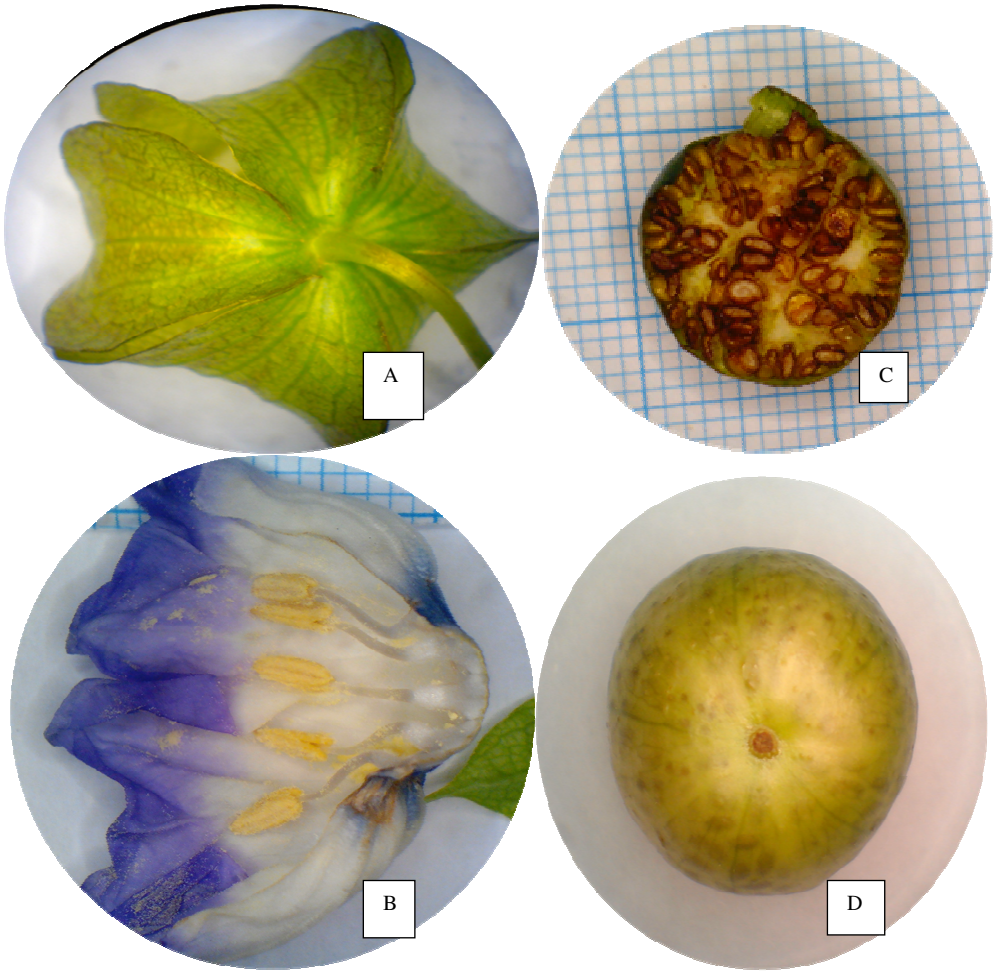

Fig. 4 : Habitus *Nicandra physaloides* (L.) Gaertn. A,B. Flower. C,D. Fruit and seeds.

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, roadsides, 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.

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