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Murraya tetramera C. C. Huang (Rutaceae): New record to Indian flora from Arunachal Pradesh

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Abstract
Murraya tetramera is reported for the first time in India from Arunachal Pradesh. This species is differs from other Indian *Murraya* species by having 4-merous flowers; stamens-8 and ripened berries pale yellowish-purple. Detailed descriptions, photographs, habitat and ecology are provided for easy identification. Furthermore, a comparison of the diagnostic characters between this species and other Indian species are made.

Keywords: *Murraya tetramera*, new record, India, Arunachal Pradesh.

Introduction
Murraya Koen. Ex L., Rutaceae is distributed in Asia, Australia, and the Pacific Islands. There are 14 species globally but, only two are reported in India, namely, *Murraya koenigii* and *Murraya paniculata* (Noolu *et al*. 2013) [1]. During recent inventory of medicinal plants survey was conducted at nearby forest area of Pasighat, Arunachal Pradesh, North East India for strengthening the medicinal plants repository of North Eastern Institute of Folk Medicine (NEIFM), located at Pasighat. All the collected voucher specimens were identified by referring to various Floras such as the Flora of British India (Hooker 1875) [2] and Flora of India (Narayanan & Nayar 1997) [3]; the North Eastern State Floras *viz*. Flora of Namdapha, Arunachal Pradesh (Chauhan *et al*.1996) [4], Materials for the flora of Arunachal Pradesh (Chowdhery *et al*. 1996) [5], Flora of Tripura (Deb 1981) [6], Tree Flora of Meghalaya (Haridasan & Rao 1985) [7], Flora of Assam (Kanjilal *et al*.1936) [8], Floristic Diversity of Assam: Study of Pabitora Wildlife Sanctuary (Bora and Kumar 2003) [9], Flora of Mizoram (Singh *et al.* 2002) [10] and Floral diversity of Arunachal Pradesh-Upper Subansiri District (Ambrish 2013) [11]. Among the collected specimens, one species which could not be identified were further examined with the descriptions and illustrations in the Flora of China (Wu *et al*., 2000) [12], this was identified as *Murraya tetramera* C. C. Huang, Rutaceae. Interestingly this species have so far not been recorded from India. No specimens could be located in CAL, ASSAM, ARUN and BSHC. Therefore the present collections form new distributional record for India. The voucher specimens will be deposited at CAL and at North Eastern Institute of Folk Medicine, Pasighat, Arunachal Pradesh, for future reference.

Taxonomic treatment
Murraya tetramera C. C. Huang, (Rutaceae); Acta Phytotax. Sin. 8: 102. 1959.

Large shrubs or small trees, up to 7 m high; branchlets cylindric, glabrous; Leaves 5-11-foliolate; petioles and rachises densely white-puberulent, petiolules 2-4 mm; leaflets alternate, conspicuously asymmetric; leaflet blades lanceolate, 2-7 × 0.8-2 cm, dark green above, pale green beneath, somewhat foetid-scented, midrib puberulent, less prominent above, raised beneath, glandular-crenulate along margins, apex acuminate. Inflorescences axillary, paniculate up to 14 cm long. Flowers many, up to 40, in loose cymes, obovate in buds, scented; pedicels slender, 9 mm long, puberulent. Sepals 4, ovate, less than 1 mm, connate at base. Petals 4, 7 x 3 mm, valvate, white, oblong. Stamens 8, filaments subulate, 4 mm long, glabrous; anthers yellowish, dorsifixed, ellipsoid, short, less than 1 mm long. Ovary globose, ca. 1 mm. greenish, glandular; style slender, pale green, 2 mm long; stigma capitate, Fruit globose, green, juicy, pale yellowish-purple after rippen, 1-1.2 cm in diam., with many oil glands, 1-3-seeded. Seed ovoid, coat membranous, smooth.

Flowering and Fruiting: March-May

Distributions: India (Arunachal Pradesh) and China (W Guangxi and SE Yunnan).

Specimens Examined: India, Arunachal Pradesh, Pasighat, Sibo Korong river; 28° 4'26.11" N & 95° 19'02.16" E; *K. Jeyaprakash NEIFM-00512* dated 03-05-2016 and NEIFM garden; 185.95 m MSL, 28° 4'2.4096" N longitude & 95° 19'14.2896" E latitude, *K. Jeyaprakash NEIFM-00513* dated 03-05-2016.

Habitat and Ecology: This species is occasionally found on the slopes along stream sides and NEIFM campus as well with stone mixed soil, at 183-185.95 m elevations. Its local distribution is continuous and the population is represented by few scattered individuals. Only 12 individuals have been located in the slopes and streamlets of Sibo Korong River and 32 individuals has been located in the NEIFM-campus, Pasighat. The commonly associated species in the habitat include *Mikania micrantha* Kunth, *Amorphophallus napalensis* (Wall.) Bogner & Mayo, *Dioscorea bulbifera* L., *Dioscorea pentaphylla* L., *Solanum nigram* L., *Murraya koienii* (L.) Spreng., *Physalis minima* L., *Oxalis deblis* H.B.K., *Ageratum conizoides* L., *Galinsogo quadriradiata*

Ruiz & Pavon, *Crassocephalum crepidioides* (Benth.) Moore and *Eupatorium odoratum* L.

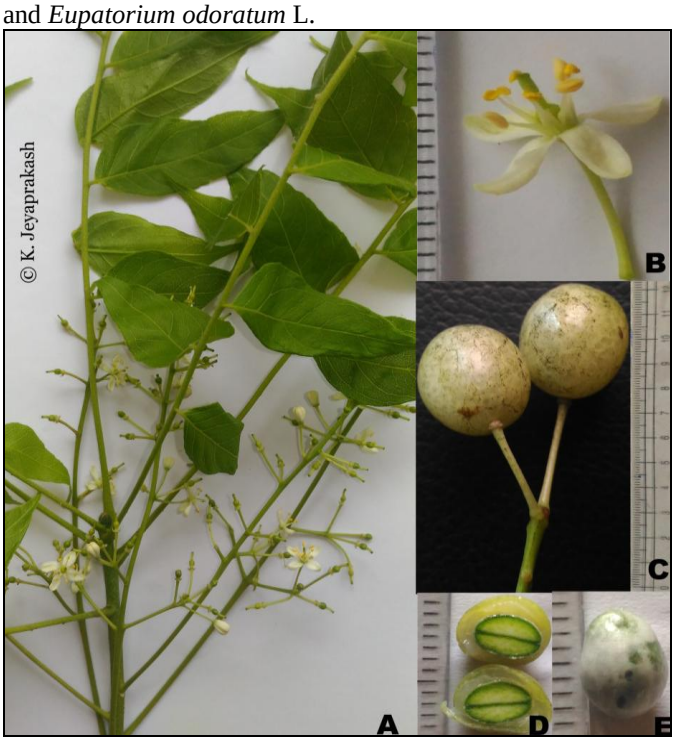

Fig 1: *Murraya tetramera*: A. Twig with Inflorescence; B. Flower; C. Fruits; D. Fruit, (inner view); E. Seed.

Key to *Murraya* species in India

1a. Leaves symmetrical. Leaf-rachis glabrous ----------*M. paniculata*

1b. Leaves asymmetrical. Leaf-rachis pubescent:

2a. Flowers 5-merous. Stamens-10. Berries purplish-black----------*M. Koenigii*

2b. Flowers 4-merous. Stamens-8. Berries pale yellowish-purple----------*M. Tetramera*

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