

# Phneological Studies on *Trewia Nudiflora*

Kapil Ghai, Navadha Bhatt, Brij Bhushan, Arunima Nayak

**Abstract:** *Trewia nudiflora* Linn belongs to plant genus of the spurge family Euphorbiaceae, sub-family Acalyphoideae and is one of the important medicinal plants in Indian systems of medicine like Ayurveda, Siddha, etc. It has numerous phytochemical and pharmacological significance. The whole plant is alternative, stomachic and efficacious in swellings. The root decoction is beneficial in flatulence, stomachic, applied locally in form of poultice for the cure of gout rheumatism.

*Trewia nudiflora* is distributed from Kumaon (Himalaya) region of Garwhal up to eastward to Assam and fruits were collected from Dehradun. *Trewia nudiflora* plants are unisexual. The phenological observations made showed that in the male and female plants from the month March to July.

**Keywords:** *Trewia nudiflora*, Phenology, Phytochemical applications, Pharmacological significance

## I. INTRODUCTION

*Trewia* is a plant genus of the Euphorbiaceae (spurge family), consisting two species, viz. *Trewia nudiflora* & *Trewia Polycarpa*. *Trewia nudiflora* L. (Euphorbiaceae) is generally found tree in riverine forests and distributed in tropical districts of India, Malaysia, and the south of China<sup>4</sup>. The fruits of *Trewia nudiflora* Linn. are large, hard green, and dull, become coloured upon ripening. Although ripe fruits on the tree are ignored by arboreal and volant like bats, birds, and monkeys. During the monsoon season (June—October), the hard green fruit of *Trewia nudiflora* fall to the ground in large amount, are more likely food of the Indian rhinoceros. The seeds of *Trewia nudiflora* after passage through rhino gut show increased germination rate<sup>4</sup>. Leaf-miner insects (Lepidoptera species) feeds *Trewia nudiflora* as food plant. It is found wild in Forest areas. The flowering takes place from March to April and just after flowering the fruiting takes place between May to June.

## II. GENERAL INFORMATION

*Trewia nudiflora* is a deciduous tree with spreading branches. Leaves opposite, broadly ovate, long pointed, cordate or rounded base, young leaves are hairy beneath, acuminate, glabrous later and 2-7 cm long stalks. Male and female flowers on separate trees, males flowers yellow in long lax drooping inflorescences, female flowers on long peduncles, green solitary or 3-4 together in the leaf axis. Fruits are fleshy and globose berry, 3 cm by 3.5 cm<sup>7</sup>. Fruits are a capsule 2-3 cm across, greenish brown, woody, broadly cuneate to rounded, 3-4 loculed, pericarp of fruit is very thick; the seeds are globose and ovoid.

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Kingdom	:	Plantae
Order	:	Malpighiales
Family	:	Euphorbiaceae
Subfamily	:	Acalyphoideae
Division	:	Angiosperma
Class	:	Eudicots
Unranked	:	Rosids
Tribe	:	Acalypheae
Subtribe	:	Rottlerinae
Genus	:	<i>Trewia</i>
Species	:	<i>nudiflora</i>
Common name	:	Gutel, khamara

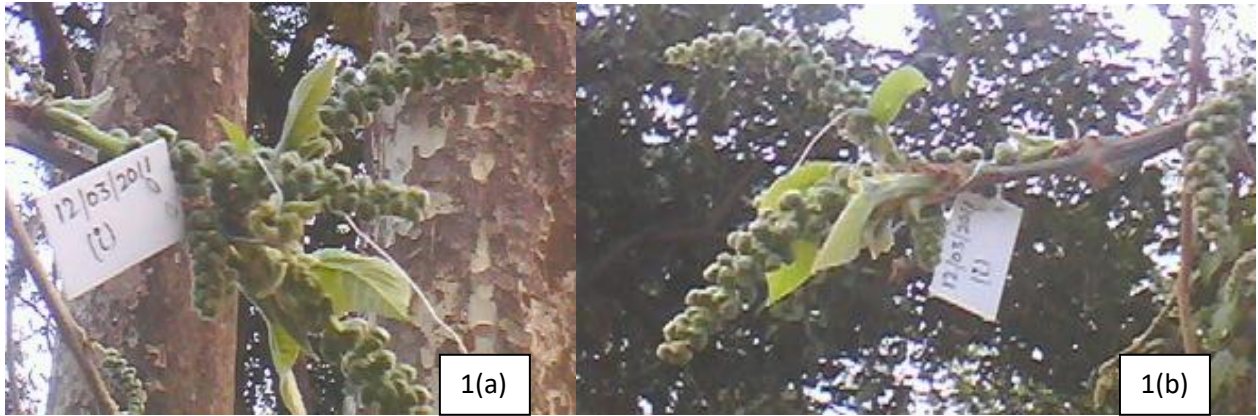
## III. DISTRIBUTION

It is distributed from the Himalaya (Kumaon Region of Uttarakhand, India) to Hainan Island (China). *Trewia nudiflora* have habitat all the way through moist and hot parts of India. These species have hard large fruits. In India, it is known by the local names 'Gutel' or 'Khamara'. It is a small sized tree and generally has height up to 5-8 meters.

## IV. PHENOLOGICAL STUDIES

The phenological studies on fruits of *Trewia nudiflora* was performed at Forest Research Institute, Dehradun (India). The male and female trees of *Trewia nudiflora* are different i.e. unisexual. The phenological observations made showed that in the male plants flowering initiated in the month of March [Slide no. 1(a) & 1(b)] and within a week plants were with fully bloomed male flowers [Slide no. 2(a) & 2(b)]. The female plant also showed the appearance of flowering at the same time (Slide no. 3). The growth and ripening of the fruits were observed from April to July [Slides no. 4(a), 4(b), 5 & 6].

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Slide 1(a) and 1(b): Male plant of *Trewia nudiflora* showing inflorescence of male flowers on March 12, 2011 in the campus of Forest Research Institute, Dehradun



Slide 2(a) and 2(b): Male plant of *Trewia nudiflora* showing inflorescence of male flowers on March 19, 2011 in the campus of Forest Research Institute, Dehradun



Slide 3: Female plant of *Trewia nudiflora* showing inflorescence of female flowers on March 28, 2011 in the campus of Forest Research Institute, Dehradun





Slide 4(a) and 4(b): Female plant of *Trewia nudiflora* showing immature green fruits as on April 20, 2011 in the campus of Forest Research Institute, Dehradun



Slide 5: Female plant of *Trewia nudiflora* showing mature green fruits as on April 28, 2011 in the campus of Forest Research Institute, Dehradun



Slide 6: Female plant of *Trewia nudiflora* showing mature fruits with colour initiation as on May 05, 2011 in the campus of Forest Research Institute, Dehradun

## V. ETHNOMEDICAL INFORMATION

The root of *Trewia nudiflora* enclosed with resinous matter and carbohydrate. Various plants parts of *T. nudiflora* such as whole plant, fruit, leaves, and seeds have been reported for pharmacological activities.

Nadkarni & Nadkarni, Rastogi et al. reported that decoction of *Trewia nudiflora* shoots and leaves of is utilized as a conventional medicine to reduce swelling and to treat flatulence, extreme bile and sputum<sup>12, 18</sup>. The leaves have the significant effectiveness to heal the wounds.

Rathore et al. reported that the decoction of the root is used as stomachic and alternative in rheumatism and malignancy especially leukemia and hepatobiliary affections<sup>19</sup>.

### VI. CHEMICAL CONSTITUENTS

Shilpi et al. reported that the plant of *Trewia nudiflora* consists a pyridine alkaloid, N-methyl-5-carboxamide-2-pyridone, and the leaves consist an alkaloid, nudiflorine. Bark yields taraxerone and betasitosterol. The seeds also have a maytansinoid compound, trewiasine<sup>20</sup> Powell et. al. reported that it revealed crucial cytotoxic activity against a variety of human cell lines in vitro<sup>15</sup>.

### VII. PHYTOCHEMICAL ACTIVITY

Total phenol and antioxidant phytochemical analysis of numerous extracts of leaves and roots of *Trewia nudiflora* by DPPH radical scavenging method exhibited the occurrence of various phytochemical including alkaloids, steroids, glycosides, flavonoids, phenolic compounds and tannins<sup>16</sup>. The aqueous and ethanolic extracts of *Trewia nudiflora* roots and leaves presented the considerable antioxidant activity<sup>1</sup>.

Kang et. al. reported antioxidant properties of three compounds extracted from the stem bark of *Trewia nudiflora* with the DPPH radical-scavenging assay<sup>8</sup>.

### VIII. PHARMACOLOGICAL/BIOLOGICAL ACTIVITY

Du et. al. reported ethanolic extract of the pericarp of *T. nudiflora* showed significant antifungal bioactivity against *Penicillium avellaneum* UC-4376<sup>5</sup>.

The ethanolic extract of the leaves of *Trewia nudiflora* showed significant anti-ulcerogenic effect against ulcers induced by Indomethacin in a dose-dependent manner had been reported<sup>17</sup>.

Kumar & Sastry, reported cerebroprotective effect from ethanolic extract of *Trewia nudiflora* leaves against the worldwide model of ischemia in rats. In this study, the animals were pre-treated with ethanol extract of it over a period of 7 days (200 and 400 mg/kg) p.o and showed significant (P<0.01) improvement in the behavior pattern, and spatial learning, which was established in conduct experiment sessions in water maze test when compared with the negative control clust<sup>er</sup>.

The significant antimicrobial bioassay activity against *Mycobacterium tuberculosis* had been reported by Li et. al.<sup>10</sup>.

It was reported that two new cardenolides namely trewianin and trewioside along with scopoletin and indole-3-carboxylic acid were extracted from the stem bark of *Trewia nudiflora*<sup>20</sup>.

The *Trewia nudiflora* seeds are also containing a rich amount of maytansinoids<sup>13,14,15</sup> and some of them have significant tumor inhibitors properties<sup>13,14</sup>.

The seed of *Trewia nudiflora* is a rich source of unusual glyceride oil<sup>3</sup>, several novel pyridinone alkaloids such as ricinidine<sup>11</sup> and an inhibitor of protein synthesis<sup>2</sup>.

### IX. ECONOMIC IMPORTANCE:

- Though the wood is uniformly textured. It belongs to the category of very weak and soft timber.
- It has been used for the preparation of drums, appropriate wood for match splints and planking, tea chests and packing cases.

- It is also being useful for agricultural implements, dugouts, picture frames and slate, carved images, and toys.
- Its root's poultice applied in gout and rheumatism.
- Though the wood is uniformly textured. It belongs to the category of very weak and soft timber.

### X. PHYSIOCHEMICAL ANALYSIS

The fruit index of *Trewia nudiflora* fruits grows up from immature unripe green to fully ripe stages of ripening. The ripening involves the textural softening and loss of fruit firmness. The cell wall polysaccharides as acetone insoluble solids had been regularly decreased with the ripening of fruits. The strength of galacturonic acid in acetone insoluble solids decreased from immature unripe green to fully ripe stage<sup>6</sup>.

### XI. CONCLUSION

Many studies have attempted to prove scientifically on plants. *Trewia nudiflora* is one of the important medicinal plants among these. Hence, further studies required to find much more utilization of this plant.

*Trewia nudiflora* is a widely distributed plant; a large number of fruits are dispersed in the forest and not being utilized presently. So, research has been undertaken for isolation and complete structural determination of compounds in order to make it commercially viable vis-à-vis other plant fruits.

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