



ORIGINAL ARTICLE

Taxonomical identification of different plant sources of *Nirgundi*

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Abstract

Taxonomy is a branch of biology focused on identifying, classifying, and describing organisms, including plants. Taxonomic identification involves recognizing the unique characteristics of a species, with morphological features serving as a primary and clear basis for this identification. In this study, conducted after one year of establishment of plants at the Herbal Garden, Department of Dravyaguna Vigyana, Tripunithura, a taxonomic evaluation was performed to assess the visible characteristics and overall appearance of four *Nirgundi* samples: V1 (*Vitex negundo* Linn var. *negundo*), V2 (*Vitex negundo* Linn var. *purpurascens* Sivar & Mold), V3 (*Vitex trifolia* Linn), and V4 (*Vitex negundo* Linn from North India). Both qualitative and quantitative data were collected during this morphological evaluation. The following features of the plants such as Habit, Stem, and Leaf were checked to identify differences among the various plant sources of *Nirgundi*. The characteristics like Inflorescence, Flower, Calyx, Corolla, Androecium, and Gynoecium were not observed due to the limited period of the study.

Introduction

Taxonomical classification helps in tracing the characteristics of species and also helps in the differentiation of the morphological features of plants. Four *Nirgundi* samples denoted as V1 (*Vitex negundo* Linn var. *negundo*) collected from Campus of Government Ayurveda College Tripunithura, V2 (*Vitex negundo* Linn var. *purpurascens* Sivar & Mold) collected from AVS Herbal Garden Kottakkal, V3 (*Vitex trifolia* Linn) collected from Foundation for Revitalisation of Local Health Traditions, Bangalore, and V4 (*Vitex negundo* Linn from North India) collected from Institute of Teaching and Research in Ayurveda, Jamnagar, Gujarat. All samples were vouchered and certified by the Pharmacognosy division of the Centre for Medicinal Plants Research at Arya Vaidya Sala, Kottakkal.

Vitex sample 1 was assigned the herbarium number CMPR/12888, Vitex 2 received the herbarium number CMPR/12889, Vitex sample 3 was given the herbarium number CMPR/12890, and Vitex 4 was assigned the herbarium number CMPR/12891.

Only observable traits related to habit, stem, and leaves were considered. Following are the features noted in each section.

A. Habit: Type of plant, lifespan (annual/biennial/perennial), and plant height

B. Stem: Nature, special modifications, branching pattern, texture, type, shape, colour, and external characteristics.

C. Leaf: Insertion, arrangement, presence of petiole, presence of stipule, leaf base, kind, form of lamina, the margin of lamina, leaf apex, surface texture, colour, venation, overall texture, and any special features or modifications.

Materials and methods

Four *Nirgundi* sources collected from the authentic sources are represented below:



Picture no.1. *Vitex negundo* Linn var *negundo*



Picture no.2. *Vitex negundo* Linn.var *purpurascens* Sivar & Mold)



Picture no.3. *Vitex trifolia* Linn



Picture no.4. *Vitex negundo* Linn from North India

Plants established in the Herbal garden

Four plant samples collected from their respective locations were planted in the Herbal Garden of the Department of Dravyaguna Vigyana, Government Ayurveda College, Tripunithura. Four pots were prepared and filled with a mixture of soil and organic manure.

With meticulous care, each sapling of the four *Vitex* plant species was transplanted into the designated pots. After one year of establishment, a follow-up was conducted to assess the growth, height, and overall health of the *Nirgundi* plants in the earthen pots. A digital vernier caliper, measuring tape, and measuring scale were utilized for accurate taxonomic measurements.



Picture no.5. Sample V1(*Vitex negundo*)



Picture no.6. Sample V2(*Vitex negundo* Linn.var *purpurascens* Sivar & Mold)



Picture no.7. Sample V3 (*Vitex trifolia* Linn)



Picture no.8. Sample V4 (*Vitex negundo* Linn from North India)



Picture No.9. Established samples of *Nirgundi* in the garden after 1 year

Observations

The observations noted are tabulated below.



Picture No.11. Fresh leaf of V1



Picture No.13. Fresh leaf of plant V2



Picture No.12. Enlarged View of trunk Portion of V1



Picture No. 14. Enlarged view of trunk portion of V2

Table No. 1. Morphological characters of different sources of *Nirgundi*

Characters	Sources of <i>Nirgundi</i>			
	<i>Vitex negundo</i> Linn var <i>negundo</i>	<i>Vitex negundo</i> Linn var <i>purpurascens</i> Sivar & Mold	<i>Vitex trifolia</i> Linn	<i>Vitex negundo</i> from North India
A. Habit				
a. Type of plant	Shrubby	Shrubby	Shrubby	Shrubby
b. Annual/ biennial perennial	Perennial	Perennial	Perennial	Perennial
c. Height of Plant	155cm	153 cm	168 cm	140 cm
B. Stem				
a. Special modification	NIL	NIL	NIL	NIL
b. Branching	1 lateral ascending branches arose 3.5 cm above the soil.	3 lateral branches emerged in an ascending manner from the trunk positioned 3 cm above the soil.	4 lateral branches emerged in an ascending manner from the trunk, positioned 7.5cm above the soil and the trunk continues to grow producing new branches	2 lateral branches which is less herbaceous arising 4cm above the soil.
c) Branching angle	50°	55°	75°	70°
e. Texture	Rough	Rough	Rough	Smooth
f. Type	Solid	Solid	Solid	Solid
g. Shape	Cylindrical	Cylindrical	Cylindrical	Cylindrical
h. Colour	Greyish brown	Greyish brown	Light brown	Greenish brown
i. External characters	Smooth and thin bark which was easily scrapable found in mature stem. Lenticels present - raised elongated arranged longitudinally visible in mature stem.	Smooth and thin bark which was easily scrapable found in mature stem. Lenticels present - raised elongated arranged longitudinally visible in mature stem.	Smooth and thin bark which was easily scrapable found in mature stem. Lenticels present - which are prominent, elongated arranged longitudinally visible in the mature stem.	Scrapable lenticels present which is raised and elongated
C. Leaf				
a. Insertion	Ramal	Ramal	Ramal	Ramal
b. Arrangement	Opposite decussate	Opposite decussate	Opposite decussate	Opposite decussate
c. Presence of petiole	Petiolate, semiterate, and short	Long	Petiolate	Petiolate, long
i. Length of petiole	3-4cm	5-7 cm	3-4.5cm	2.5-7 cm
ii. Diameter of petiole	0.08-0.19cm	0.06-0.15 cm	0.09-0.14cm	0.09-0.14 cm
d. Presence of stipule	Stipulate	Stipulate	Stipulate	Stipulate
e. Leaf base	Attenuate	Attenuate	Sub cordate	Attenuate
f. Leaf kind	Compound with 3-5 leaflets	Compound with 3-5 leaflets	Compound with 3 leaflets	Compound with 3-5 leaflets
g. Surface of lamina	Glabrous	Glabrous	Glabrous	Glabrous
i. Lamina length (l)	1.75 - 6.5 cm	3.93 - 11.83 cm	2.3 - 6.25 cm	3.05 - 8.01 cm
ii. Lamina breadth (w)	1.24 -1.74cm	1.04 -3.39 cm	1.25 -2.66 cm	0.91-2.52 cm
iii. l/w ratio	2.76 cm	3.55 cm	2.18 cm	3.22 cm
h. Shape	Lanceolate	Lanceolate	Ovate to elliptical	Lanceolate
i. Margin of lamina	Entire	Entire	Entire	Entire up to 1 cm from the apex and 3.5cm from the base region, marked serrations 4cm long that appear from the midpoint of the lamina which is present only in terminal leaflets, both the lateral leaflets are entire.
j. Leaf apex	Acute	Acuminate	Acute	Acute
k. Surface	Upper surface -Smooth in young leaves and rough when matured, minutely pubescent beneath	Upper surface -young leaves are coriaceous (++) and smooth when matured, minutely pubescent beneath.	Upper surface -Glaucous when young and smooth when matured, Pubescent beneath.	Upper surface coriaceous (+) when young and smooth when matured, minutely pubescent beneath.
l. Colour	Green on the upper surface and lighter green to greyish-green underneath.	Green to purplish-green colour on the upper surface, with the purplish tint more pronounced underneath. Young leaves are more purplish tinted on both surfaces.	Leaves are light green when young and dark green when matured on the upper surface, lighter or greyish-green underneath	Green on the upper surface and lighter green or greyish green underneath.
m. Venation	Multicostate reticulate with 7 -10 pairs of primary vein at an angle of 50° running parallel to each other, secondary veins are obscure	Multicostate reticulate with 8 -10 pairs of primary vein at an angle of 50° of running parallel to each other, secondary veins are obscure	Multicostate reticulate with 6-7 pairs of primary veins at an angle of 40° running parallel to each other, secondary veins are obscure	Multicostate reticulate with 9 -10 pairs of prominent primary veins at an angle 42° of running parallel to each other, secondary veins are obscure.
n. Texture	Smooth	Smooth	Smooth	Smooth



Picture No.14. Fresh leaf of plant V3



Picture No.16. Fresh leaf of plant V4

Results and Discussion

Taxonomic identification at the infraspecific level involves recognizing distinctions such as subspecies, varieties, and forms outlined by the International Code of Nomenclature for algae, fungi, and plants (ICN). The officially accepted botanical source of *Nirgundi* is *Vitex negundo* Linn which is mentioned in The Ayurveda Pharmacopoeia of India^[1]. Studies show a wide range of morphotypes for the drug *Vitex negundo* Linn. Research has shown that *Vitex negundo* exhibits considerable genetic diversity within its populations, leading to variations in leaf morphology. These variations include differences in leaf shape, size, and vein patterns across different populations. In the textbook *Ayurvedic Drugs & their Plant Sources* mentions *Vitex negundo* Linn var *negundo* and *Vitex negundo* Linn var *purpurascens* differ in minor characteristics due to their purple pubescence^[2]. In the present study, four different sources of *Nirgundi* were selected and evaluated, after 1 year of establishment of plants. A comparative study of these plants displayed subtle morphological distinctions. Sample V1 and Sample V2 may be considered as varieties as they show minor characteristic differences. Sample V3 *Vitex trifolia* Linn different species within the *Vitex* genus. While Sample V4 shows only minor differences such as colour variation which indicates it is a form.

Conclusion

Based on the taxonomical observations, summarizing the distinctions and similarities among the sample. Sample V1 (*Vitex negundo* var. *negundo*) and Sample V2 (*Vitex negundo* var. *purpurascens*) show only minor characteristic differences, they likely represent two varieties within the same species.



Picture No.15. Enlarged view of trunk Portion of V3



Picture No.17. Enlarged view of trunk portion of V4

Varieties are distinguished by slight morphological traits that don't affect the plant's essential genetic makeup, indicating that V1 and V2 belong to the same species, *Vitex negundo*, but with varietal distinctions. Sample V3 (*Vitex trifolia* Linn) exhibits more significant differences, supporting its identification as a separate species within the *Vitex* genus. The presence of distinct morphological and genetic traits suggests that V3 is taxonomically distinct from *Vitex negundo* and its varieties (V1 and V2). Sample V4 (*Vitex negundo* from North India) only minor differences are observed, such as colour variation, suggest that it may represent a form rather than a distinct variety or species. Forms generally indicate slight, often environmentally influenced differences within a species. These distinctions emphasize both the diversity within the *Vitex* genus and the effectiveness of taxonomic classification in distinguishing between varieties, species, and forms. Based on morphological and minor genetic markers, these samples represent distinct taxonomical categories within the *Vitex* genus.

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