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Pharmacognostic studies on *Nicotiana glauca* graham from Maharashtra

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Abstract
The present investigation is conducted on *Nicotiana glauca* Graham. plant which was collected from Kavatemahakal taluka of Sangli district in Maharashtra and further pharmacognostic analysis was done on the plant. The leaves are slightly thick and elongated, oval without hairs as compared to that of the *Nicotiana tabacum* L. (Tobacco) plant. In the present study a comparative account of mainly leaf of *Nicotiana glauca* Graham and *Nicotiana tabacum* L. is given in the present investigation.

Keywords: *Nicotiana glauca*, pharmacognostic analysis

Introduction

Nicotiana glauca Graham is a naturally growing tobacco plant belonging to family Solanaceae commonly called as 'Tree tobacco' or 'Mahasatpurusha' or 'Satpurush'. It is large a large perennial shrub about 10 to 25 feet tall growing on bands along the fields, on the walls, on the terrace and reported from wild habitat at Jarandi and Kundalpur of Kavatemahankal taluka in Sangli district of Maharashtra. The plant contains large number of primary and secondary phytoconstituents and some of the important secondary phytoconstituents which are starch, sugars, proteins, mucilage, alkaloids, saponins, tannin and glycosides.

Alkaloids are the organic products of natural or synthetic origin, which are basic in nature and contain one or more nitrogen atoms of heterocyclic nature and possess specific physiological action on human or animal body, when used in small quantities. Alkaloids performs a number of pharmacological functions. They may act as central nervous system stimulants or depressant, analgesic and purgatives etc.

Glycosides are organic compounds from plant or animal sources which on enzymatic or acid hydrolysis give one or more sugar moieties with non-sugar moiety. The former is called as glycone and the later as aglycone. Chemically they are sugar ethers formed by interaction of hydroxyl group each of non-sugar and sugar moiety with a loss of water molecule. Depending upon the type of linkage between glycone and aglycone they are categorized as O – glycosides (anomeric carbon atom of glycone is linked with alcohol or phenolic hydroxyl group of aglycone through hemiacetyl linkage), S – glycosides (anomeric carbon of glycone is attached to aglycone through S), N – glycosides (glycone is attached to amino group of aglycone) and C – glycosides which involves C-C linkage between glycone and aglycone. Medicinally important glycosides belong to saponins, flavonides, cynogenetic and cardiac group. They are therapeutically active as antihelmentics, antiulcer, cardiotonics etc.

Saponins are economically important as they can convert to steroid hormones. Triterpenes saponins occur as free triterpene as wel as in glycoside form, the steroid saponins are never found as free sapogenins in plants Tannins are the secondary metabolites consisting of mixture of polyphenols. They form colloidal solution with water and are non-crystalline in nature. They are soluble in alcohol, glycerine but practically insoluble in organic solvent except acetone. Another group of tannins known as 'Pseudotannins' which do not tan leather but yield purple or violet colour with iron salts. Tannins are astringent and have capacity to combine with tissue proteins and precipitate them. Therefore they are used in medicines as mild antiseptics, in treatment of diarrhea and to check small hemorrhages.

Nicotiana glauca Graham is well known medicinal plant as bitter tonic for cough, asthma and joint pain. It is also used as mosquito repellent by local peoples. The present investigation was undertaken with objective to personal visit to the selected localities and collection of information by local peoples about the plant. To find out the Pharmacognostic properties of crude drug of *Nicotiana glauca* Graham. And phytochemical investigations of *Nicotiana glauca* Graham and its comparison with *Nicotiana tobacum* L. The study for detecting starch, alkaloids, reducing sugar, proteins, tannins, flavonoids and antraquinones were done in the laboratory. For detection of glycosides from the dry leaf powder analysis was conducted.

Materials and Methods

In the present study the plant material is collected from Kundalpur village where it is growing in natural habitat. The photograph of different plant parts were taken in field like flower, leaves and entire plant. The leaves and stem were used for pharmacognostic analysis and hand cut sections of leaf were taken, stained with safranin and mounted on a slide and cell content were observed. The plant is separated organ wise, sun dried leaves, stem, root, flower and then oven dried at 55ºc until they attained constant weight and then powered with the help of grinder and mixer. The powder was stored in dry bottles and used for analysis. The fruits and seeds were also collected separately and dried and stored in dry bottles and were used for pharmacognostic investigation. The auto ecological observations were made on the plant including morphological parameters like height and diameter of main

stem, total number of branches, number of leaves per branch, total number of flowers and fruit per plant, seed per fruit and dry biomass was analyzed. The plant specimen was pressed in flowering stage and standard herbarium sheet was prepared. The identification of the plant was confirmed from Blatter Herbarium, St. Xavier's College, Mumbai.

The macroscopical observations such as colour, size and shape of the plant were studied and for microscopic studies plant material is collected and then transverse sections of different plant parts were taken and observed. The phytochemical screening on plant is done and reducing sugar, detection of proteins, tannins, saponin, alkaloids, anthraquinone, flavonoids and Glycosides is conducted.

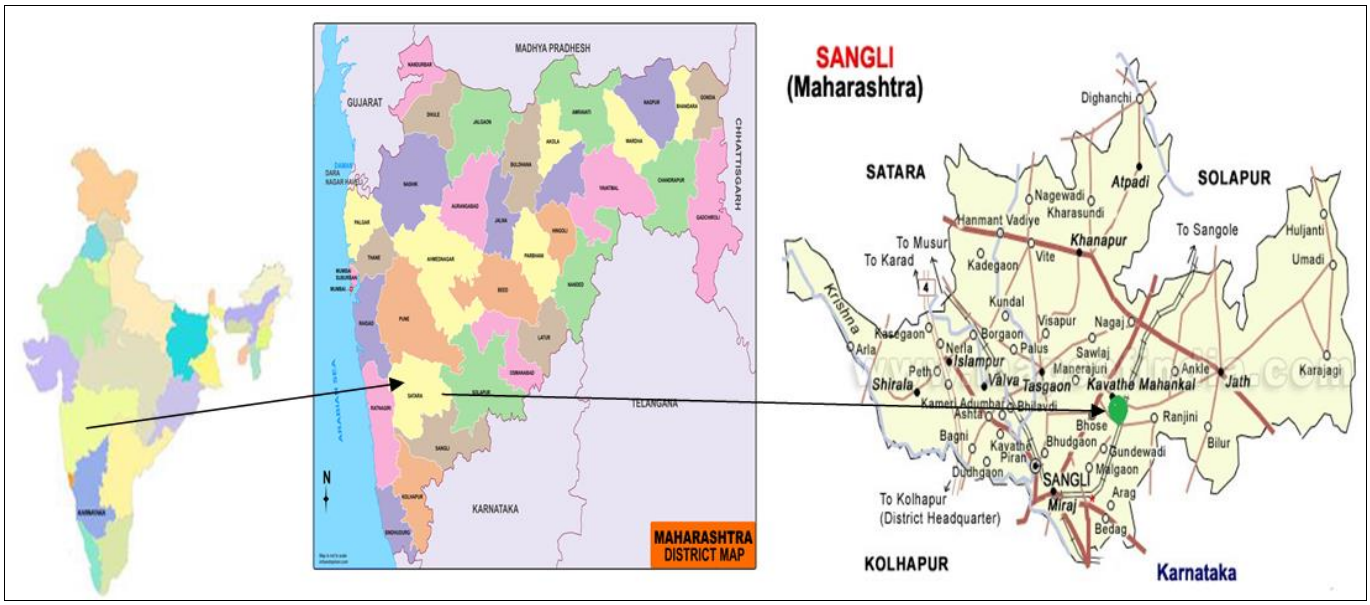
Observations

Morphological characters of *Nicotiana glauca* Graham plant

Botanical name: Nicotiana glauca
Family: Solanaceae
Common name: Tree tobacco, Mahasatpurusha, Satpurusha
Native: South America

Nicotiana glauca Graham is a naturally growing perennial shrub and commonly called as Tree tobacco or Mahasatpurusha by the local people of Sangli district in Maharashtra. The plant grows up to 10 to 25 feet tall, growing on the bands along the fields and on the road side. The plant is evergreen with various branches with simple and alternate leaves. Large plants have numerous multi branches stems arising from their bases. The large leaves are oblong and green. The long leaves petiole is grey green in colour and half the length of leaf. When the leaf is crushed it gives an unpleasant odour. They become smaller as they near the end of branches. The small tubular yellow coloured flowers present at the branches end. Flowers are hermaphrodite, with long hairy pedicel. Fruits is capsule and ellipsoid or rarely subcircular, pedicel curved in fruit. The seeds capsule contains many small brown seeds and in each capsule more than 25-30 seeds were present. The entire plant is stick and covered with whitish layer. The plant requires very less water and is naturally growing in wild habitat and found in Kundalpur, Jarandi, Ghatnandre and Panchegaon villages of Kavathe-Mahakal taluka of Sangli district of Maharashtra.

Study Area



Comparative phytochemical analysis of *Nicotiana glauca* Graham and *Nicotiana tabacum* L.

Table 1: Powder characteristics of *Nicotiana glauca* Graham and *Nicotiana tabacum* L.

Plant	Colour	Odour	Taste
Nicotiana glauca Graham	Dark Green	Faint	Bitter
Nicotiana tabacum L.	Brown	Strong	Bitter

Table 2: Pharmacognostic analysis of leaf Nicotiana *glauca* Graham and *Nicotiana tabacum* L.

Contents	Nicotiana *glauca* Graham		*Nicotiana tabacum* L.	
	Upper epidermis	Lower epidermis	Upper epidermis	Lower epidermis
Stomata number (per sq. mm.)	70-105	180-210	80-100	182-225
Stomatal Index	15-20	22-28	21-24	29-34
Palisade ratio	3-8		3-7	
Vein islet number	10-18		12-20	

Table 3: Phytochemical analysis between Nicotiana *glauca* Graham and *Nicotiana tabacum* L.

Sr. No.	Contents	Nicotiana *glauca* Graham	*Nicotiana tabacum* L.
1	Total ash	4.5%	3.8%
2	Acid Insoluble ash	0.4%	1.2%

3	Acid soluble ash	4.1%	2.6%
4	Aqueous extractives	21.5%	20%
5	Petroleum ether extractive	2.0%	3.10%
6	Alcoholic extractive	15%	13%
7	Starch	+++	+++
8	Reducing sugar	+++	++
9	Proteins	++	+
10	Mucilage	+++	+++
11	Alkaloids	+++	++
12	Saponins	+	+
13	Tannins	+	-
14	Glycosides	-	-
15	Antraquinones	-	-

Leaf powder analysis reveals total ash 4.5%, acid insoluble ash 4.1% and strong positive test for starch, reducing sugar, alkaloid and saponin, medium test for mucilage, weak test for tannin and glycosides and negative test for anthraquinones and flavonoids. Total ash percentage, aqueous extractives and extractives were slightly higher than that of *Nicotiana tabacum* L. From above observation it is clear that the luxuriant growing of *Nicotiana glauca* Graham in these areas can be used as an alternative source for extraction of alkaloids.

Leaves are bitter in taste and when chewed with Piper betel L. leaves produce a sort of hallucination and useful against cough, asthma and joint pains. Strong doses of leaves is lethal which is observed in grazing animals and when consumed by them causes death.

Conclusion

The leaves of *Nicotiana glauca* Graham is used by the local inhabitants as it gives hallucination and taken in small amount to cure asthma with betel leaf. The fresh leaves are used as mosquito repellent. The leaf juice is used as alcoholic drink by the locals as it contain Nicotine as a major alkaloid. The leaves of *Nicotiana glauca* Graham are used as antirheumatic and poultice of the leaves is applied to cuts, swelling, wounds and removing pus from scrofulous sores and boils.

Tea prepared from the leaves of the plant is consumed orally as an astringent diuretic for urinary tract infections, to induce vomiting probably due to the poisonous effect, as both an effective purgative and also used for treatment for Diarrhea and Convulsions. An infusion of the leaves is been used as a steam bath in the treatment of rheumatism. Many a times the grazing animals had died due to excess consumption of leaves in different localities where this plant is growing.

Nicotiana glauca Graham plant is highly poisonous, due to presence of Anabasine, which is a pyridine alkaloid and it is nicotinic receptor against toxins and minor tobacco alkaloid. Due to Anabasine alkaloid if strong dose is taken it can cause death by systolic and toxicity.

Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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