COMPARATIVE PHARMACOGNOSY OF MEDICINALLY IMPORTANT INDIAN VITEX SPECIES

R.V KRISHNA RAO, T. SATYANARAYANA and RANJIT JENA
Department of Pharmaceutical sciences, Andhra University,
Visakhapatnam – 530 003

Received: 7 May, 1996
Accepted: 28 June, 1996

ABSTRACT: Vitex genera is reputed for their medicinal properties. Of the 12 species reported to be present in Indian only 8 species are medicinally useful. Of these six species were collected and their pharmacognostic characters were studied and described.

INTRODUCTION

The genera Vitex belongs to the natural order verbenaceae. The genus has about 250 species throughout the world.1,2 Out of these 12 species have been reported to be present in India, and of these 8 species are known to have therapeutic properties.3

The leaves are widely used in inflammation and pain, leucoderma, bronchitis fever, rheumatism, contusions, to improve memory, promote growth of hair, headache, and in many skin diseases and as insect and rodent repellent. By far the most important use of the leaves of V. agnuscastus and V. leucoxylon is in rheumatism.4 The leaves are boiled in oil and the oil is used as massage in rheumatism. It was accidentally observed that the leaf of V. leucoxylon are being used liver ailments. The bark is also used as astringent, antisypilitic and anti inflammatory5. The root is used in Unani as anti inflammatory and as aphrodisiac. The fruits are used in intermittent fever, in gonorrhoea and as tonic. The seeds have a bitter pungent taste, used as stomachic, abortifacient and diuretic. In Ayurveda the diseases of kapha and vata are treated with the seeds and leaves. Thus all parts of the plant are very useful medicinally.

In view of the variety of medicinal uses of Vitex genera and the usefulness of V. leucoxylon as a hepatostimulant an attempt was made to undertake a comparative pharmacognostic study of the Vitex species available in India. Out of the eight species only 6 species could be collected for the study. They are: 1. Vitex leucoxylon 2. Vitex negundo 3. Vitex trifolia 4. Vitex pubescence 5. vitex peduncularis 6. Vitex agnuscastus.

MATERIAL AND METHODS

1. For morphological studies foliage branches with inflorescences were collected. Morphologically they vary from shrubs growing to a height of about 6 meters (in the case of V. negundo, V. trifolia and V. agnuscastus) and trees growing to a height of more than 10 meters (in the case of V. leucoxylon, V. pubescence and V. peduncularis) Literature survey indicated the presence of winged petiole in juvenile leaf of V. Peduncularis. We have however identified the presence of winged petiole in juvenile leaf of V. pubescence. (Fig 2.9) This is the first report of such a novel feature in V. pubescence. The inflorescences were mainly terminal in V. negundo, V.
trifolia V. agnuscastus and V. pubescence while they were mainly axillary in V. peduncularis and V. leucoxylon. The inflorescence is racemose in all these plats.

The leaves are 3 to 7 foliate palmately compound, with reticulate venation. Usually they are trifoliate in V. trifolia, V. pubescence and V. peduncularis, while pentafoliate in V. negundo, V. leucoxylon and V. agnus castus. The leaves are petiolate, leaflets penninerved, entire or toothed, sessile or petiolate, lateral ones usually smaller, the comparative macroscopic features of eh vitex species are given in (Table I)

2. For microscopical study of the leaves free hand sections were taken with new razor blades and the sections were cleared with chloral hydrate, stained and mounted in glycerol.

RESULTS
Microscopical characters of leaf of different species of Vitex

In a free hand section of the leaf through the midrib the following tissues were seen under microscope. There is a single year of epidermal cells covered externally with thin cuticle. The epidermal cells of the lower epidermises show the presence of trichomes in the case of V trifolia, V. negundo, and V. agnus – castus and only lower side in the case of V. pubescence, and V leucoxylon (see figs 3.0, 3.1) the stomata are present in abundance on the upper epidermis and are few in number in lower epidermis the leaf is dorsiventral and there are one to two rows of palisade cells under each epidermis which are not continuous over midrib. There is no differentiation of the palisade cells with those of palisade cells with those of parenchymatous tissue in shape or size characteristic trichomes were found in vitex species. They range from unicellular to bicellular and sometimes multicellular (up to four cells). Bicellular trichomes appearing like a torch with striated cuticle had prominent collapsed foot cell (Fig 3.0) This type of trichomes were seen in V. trifolia Bicellular trichomes with bulging basal (foot) cell and a dagger shaped upper cell were prominent in V. negundo and V.agnus castus (fig 3.0) In tricellular trichomes the ultimate cell is daggershaped with striated cuticle were conspicuous in V. trifolia (Figs 3.0) only uniseriate multicellular trichomes are characteristic V. peduncularis and V. leucoxylon, while they are appressed in V.pubescence, (Figs 3.0) The trichomes are distributed throughout the upper surface of the midrib in all the vitex species, except V. leucoxylon, V. pubescence and V. peduncularis where the surface in nearly glabrous.

The meristele region is oval in shape in V. leucoxylon and V. pubescence while it is horse shore shaped in V. negundo, V agnuscastus and V. peduncularis. Gutter shaped stellar region with radiating xylem followed by phloem followed by an oval ring of pericyclic fibres extending upto the two arms of the midrib is conspicuous in V. trifolia and V. negundo.

The stomatal index in different species was found to be 3.2, 4.9 and 6.7 for the species V. trifolia V. negundo and V. agnus castus respectively and very high in V pubescence, V. peduncularis and V. leucoxylon 25.8: 25.3 and 33.3 respectively. This difference could be due to habitat, the former being shrubs and the later are trees.

The palisade ratio also falls in a similar range of difference namely 2.7 to 4.0 in V. trifolia, V. negundo and V. agnus – castus while the figures for palisade ratio of V. pubescence, V. peduncularis and V.
leucoxylon were from 6.9 to 9.0 However, there was no distinct difference in vein islet number of the different species which was in the range of 5.0 to 9.0 Fluorescence analysis (Table II) of the powdered drug. The ash values were also recorded which could help in the identification of the different species.

Thus the different species of vitex could be identified within themselves and from other adulterants by making use of different quantitative standards like stomatal index, palisade ratio, fluorescence analysis and ash values.

ACKNOWLEDGEMENT

The authors are grateful to the University for providing facilities for this work.

REFERENCES:

1. Hey Wood, V.H., The flowering plants of India (1987).
2. Mebberly. D.J The Plant Book (1987). Cambridge University press, UK.
3. Kirtikar, K.R. and Basu, B.D Indian Medicinal plants (1981), Vol III, 1935.
4. Idem – Ibid.
FIGURE 3.0

DIFFERENT TYPES OF TRICHOMES SEEN IN VITEX SPECIES

1. Torch-like bicellular
2. Uniseriate multicellular
3. Club-shaped unicellular
4. Appressed tricellular
5. Dagger-shaped bicellular
### Table I
MACROSCOPICAL FEATURES OF DIFFERENT SPECIES OF *VITEX*

| Name of the species | Leaves                                      | Inflourescence                                      |
|---------------------|---------------------------------------------|----------------------------------------------------|
| *V. negundo*        | 3-5 foliate, lanceolate entire or pinatified | Mainly terminal                                    |
|                     |                                             | Panicles or their main branches linear, oblong, cymose, all short subequal and few ftfd. |
| *V. trifolia*       | Trifoliate oblong, ovate, usually           | -do-                                               |
| V. agnus-castus | obtuse, the terminal leaflet sessile. 5% foliate, long leaflets slightly tomentose above and green below | -do- |
| V. pubescence | 3 foliate, elliptic, 10-20 cm long observed for the first time winged petiole at juvenile stage. | Mainly terminal panicles rather dense, lower cymose branchets elongate so that panicle is pyramidal. |
| V. Peduncularis | 3 foliate lanceolate Membranous, distinct win petiole at juvenile stage. | Exclusively axillary 4, cymes, racemose, 20 cm long, corolla cream with yellow throat. |
| V. leucoxylon | 3-7 foliate petiolate, lanceolate, almost coriaceous, only midrib hairy underside. | Exclusively axillary wholly cymose and dichasial 10 cm long. Corolla cream with purple throat. |

Table 2

FLUORESCENCE ANALYSIS OF THE LEAF POWDER OF DIFFERENT VITEX SPECIES

|         | V. leucoxylon | V. negundo | V. trifolis | V. peduncularis | V. pubescens | V. agnus castus |
|---------|---------------|------------|-------------|-----------------|--------------|-----------------|
| a) Powder as such | Light greenish | Greenish | Greenish | Greenish | Greenish | Light Greenish |
| b) Powder treated with in NaOH in methanol | Dark brownish | Brownish | Brownish | Brownish | Brownish | Brownish |
| c) Powder treated with IN HCl | Dark brownish | Brownish | Brownish | Brownish | Brownish | Brownish |
| d) Powder treated with H$_2$SO$_4$ (1:1) | Dark green | Dark green | Greenish | Dark green | Greenish |
| e) Powder treated with HNO$_3$ (1:1) | Greenish brown | Brown | Brown | Dark brown | Dark brown |