RESEARCH ARTICLE

Histochemical analysis of some aromatic plants

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ABSTRACT

In aromatic plants in addition to terpenoids other secondary metabolites like alkaloids, tannin, steroids, flavonoids and gums are also present. These secondary metabolites have a great demand in drug industry. In view of this, the authors collected some medicinal aromatic plants (especially aromatic leaves having lysigenous and schizogenous cavities which contain terpenoids) for histochemical study, which gives basic information for further research in Pharmaceutical science.

Key words: Aromatic plants, diterpenoids, drugs, monoterpenoids, secondary metabolites

INTRODUCTION

Aromatic plant species are used for food, cosmetics and pharmaceutical industries and these plants have almost limitless ability to synthesize oxygen substituted derivatives (Geissman, 1963). The major constituents of these aromatics are generally monoterpenoids and diterpenoids. These components are present in the specialized cells of the leaves. Terpenoids are responsible for the flavour and fragrance of the plant parts of the aromatic plants. These terpenoids are major part of the plant resins and essential oils extracted from plant parts. On the other hand, to carry out chemical analysis studies for plant parts to see whether they have adequate active ingredients which can be used for drug preparation. In view of this, preliminary histochemical tests were conducted for some collected plant parts and identified different secretary ducts, canals, cavities, glandular hairs, specialized cells etc. in leaves. In view of this, the authors collected nine medicinal aromatic plants for histochemical study, which give basic information for further investigation in Drug industry.

MATERIAL AND METHOD

Microscopic study of secretary cell:

Leaf surface of various leaves of different aromatic plants were observed under compound microscope. Various type of secretary cells/ glands of aromatic leaves were identified and simple biochemical tests were conducted for alkaloids, terpenoids, steroids and flavanoids.

RESULTS AND DISCUSSIONS

In these aromatic plants the leaves as well as stem exhibits aroma due to presence of terpenoid, which were present in specialized secretary cells (vital organs) on the surface of the leaf. In view of this, microscopic study was conducted on leaves of some aromatic plants and identified different type of essential oil containing glands/cells. Those are lysigenic cavities, schizogenous cavities, glandular hair, oil globules, stalked globular cells etc. These secretory cells store essential oil along with some resins, tannins and other secondary metabolites. Generally the aroma of these aromatic plants is due to presence of terpanoids (mono and diterpenes) and the yield of secondary metabolite (essential oils) is directly related to the distribution and density of glands. In view of this, terpanoid test was also performed along with other chemical tests in the present investigation. In the entire samples terpenoid test was positive.

These aromatics have almost limitless to synthesize aromatic substances most of which are terpens or their oxygen substituted derivatives (Geissman 1963). The fragrance in their parts is due to the presence of terpanoid, which are stored in special vital organs like secretary glands and fragrance directly depends on their distribution (Udaya prakash *et al*. 2014). On the other hand, in the present study, mostly terpanoids were present in all the aromatic plants these indicates that the terpanoids are the major constituents for the fragrance of the leaves in aromatic plants. Similar results were reported in four aromatic plants by Ulhe and Narkhede (2009), Udaya Prakash *et al*., (2014) in *Sphearanthus* and Venkata Kanthum Reddy (2010) in *Ocimum.*

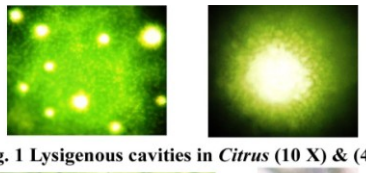

Fig. 1 Lysigenous cavities in *Citrus* (10 X) & (40 X)

Fig. 2 Glandular trichomes in *Spaeranthus* (10X) and (40 X)

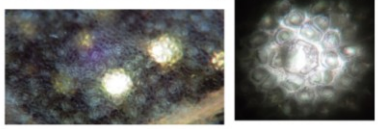

Fig. 3 Schizogenous cavities in *Eucalyptus* (10 X) and (40 X)

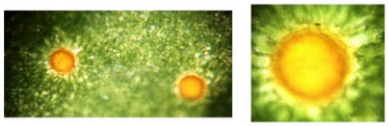

Fig.4 Lysigenous Cavities in *Tagetus* (4X) and (10X)

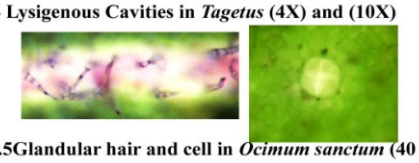

Fig.5Glandular hair and cell in *Ocimum sanctum* (40 X)

Fig. 6 *Mentha* (40 X)

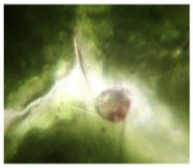

Fig. 7 *Lantana* (40 X)

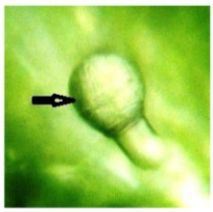

Fig. 8 *Lycospersicon* (10 X)

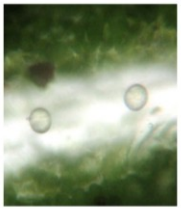

Fig. 9 *Hyptis* (40 X)

Fig.1-9: Different type of Secretary Cell in Aromatic Plant Species

Table: 1. Preliminary phytochemical test on leaves of some aromatic plant.

	Name of the Plant	Type of glands	Terpenoids	Alkaloids	Steroids	Flavonoids
1.	*Citrus aurantifolia* Swingle	Lysigenous	+	-	-	-
2.	*Eucalyptus globules* Labill	Schizogenous	+	+	+	+
3.	*Hyptis sauveolens* L.	Glandular trichomes	+	+	-	+
4.	*Lantana camara* L.	Glabular cells	+	-	-	+
5.	*Lycopersicon esculentum* (L) Karten	Stalked glandular cells	+	+	+	+
6.	*Mentha spicota* L.	Glandular flat cells	+ +	+ +	- +	+ +
7.	*Osimum sanctum* L.	Glandular cells & trichomes	+	-	-	-
8.	*Spharenthus indicus* L.	Glandular trichomes	+	+	+	+
9.	*Tagetes erecta* L.	Lysigenous cavities	+	-	+	-

CONCLUSION

The yield of secondary metabolite (essential oils) is directly related to the distribution and density of glands. In the present investigation, study of morpho-chemical character was aimed to determine the distribution of the gland in the plant. The present study linking the chemical content and morphology of the gland of aromatic plants has contributed to the knowledge and understanding of secretary structure of different aromatic plants.

This information has therefore contributed to the knowledge of the morphology of secretary glands and will lend support to further studies of the chemical constituent and useful in deciding the protocol required for isolation of secondary metabolites of these aromatic plants.

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