Introduction
I. INTRODUCTION

Asteraceae is one of the largest families of flowering plants, comprising of 900 genera, with over 13,000 species. The family includes more than 10% of the total Angiosperm flora. Living in almost every conceivable situation, they present great variety in habits and habitats. The taxon, once considered to be of little economic importance has now gained universal recognition for its medicinally valuable plants. Chemical research in recent years has increased medicinal interest in the family and we have a better knowledge of many almost discarded folk remedies as well as hitherto uninvestigated plants.

The indigenous system of medicine like Ayurvedic, Siddha and Unani have been meeting the needs of 70% of our population residing in villages. There is a growing tendency all over the world to shift from synthetic to natural based products including medicinal plants. Now, more than 100 plant species have been used in modern medicine, among them the most vulnerable plant species are from India.

1.1 MEDICINAL PLANTS IN THE INTERNATIONAL SCENARIO

All over the world people have been using plants as sources of medicine. The use of traditional medicine and medicinal plants in most developing countries, as a normative basis for the maintenance of good health has been widely observed (UNESCO, 1996).

The practice of traditional medicine is widespread in China, India, Japan, Pakistan, Sri Lanka and Thailand. In China 40% of medicine is from
traditional herbal sources (Lemma, 1991). Similarly the flora of Africa is also a rich source of medicinal plants. Perhaps the best-known species in Africa is *Phytolacca dodecandra*. Extracts of the plant, commonly known as endod, are used as effective molluscicide to control schistosomiasis (Lemma, 1991). Other notable examples are *Catharanthus roseus*, which yields anti-tumour agents such as vinblastine and vincristine and *Ricinus communis*, which yields the laxative-castor oil.

In Botswana, Lesotho, Namibia and South Africa, *Harpagophytum procumbens* is produced as a crude drug for export. Similarly, *Hibiscus sabdariffa* is exported from Sudan and Egypt. Other exports are *Pausinystalia yohimbe* from Cameroon, Nigeria and Rwanda, which yield yohimbine; and *Rauwolfia vomitoria*, from Madagascar, Mozambique and Zaire, which is exploited to yield reserpine and ajmaline (Hoareau and De Silva, 1999).

### 1.2 MEDICINAL PLANTS IN INDIA

The rich biodiversity of Indian subcontinent contributes to the wealth of medicinal plants, which are very much used in traditional medical treatments (Chopra *et al.*, 1956). There are about 7500 plants used in local health traditions in mostly rural and tribal villages of India. Out of these, the medicinal efficacy of 4000 plants is either little known or hitherto unknown to the mainstream population (Pushpangadan, 1996). The indigenous medicinal systems such as Ayurveda, Siddha, Unani and Tibetan use about 1200 plants (Aszalos, 1962). However traditional communities use only 800 plants for curing different ailments (Kamboj, 2000). Although the local populations learn
the methods of preparing natural medicine from the traditional healers they are not sure of the scientific basis of natural medicines (Pushpangadan and Atal, 1984; Waller, 1993; Perumalsamy and Ignacimuthu, 1997). Therefore it is the responsibility of the scientific community to do scientific validation of the medicinal property of the traditional claims.

1.3. CONSERVATION OF MEDICINAL PLANTS

Despite the increasing use of medicinal plants, their future, seemingly is being threatened by complacency concerning their conservation. Reserves of herbs and stocks of medicinal plants in developing countries are diminishing and in danger of extinction as a result of growing trade demands for cheaper healthcare products and new plant-based therapeutic markets in preference to more expensive target-specific drugs and biopharmaceuticals. Hence there is a dire need to apply tissue culture techniques for the micropropagation of medicinal plants as well as scientifically proves the pharmacological importance of the active principles present in medicinal plants, as claimed by the traditional systems of medicine.

In this present research, *Blumea mollis* (D.Don) Merr. (Asteraceae), an aromatic medicinal plant known for its fungicidal property is chosen for tissue culture studies and investigations of some pharmacological parameters.
1.4. **BLUMEA MOLLIS** (D.Don) Merr.

**Systematic position of Blumea mollis**

- Kingdom – Plant
- Family - Compositae
- Sub Family -Asteorideae
- Tribe - Inuleae
- Order - Asterales
- *Blumea* - Blumea
- *Species* Mollis
- Scientific Name: *Blumea mollis* (D.Don) Merrill

**Synonyms:**

- *Blumea wightiana DC Hook*

*Erigeron molle D.Don*

*Blumea neilgherrensis Hook f.*

- Kannada - Gobbusoppu
- Mundri - Ote Jetang
The genus *Blumea* includes 50 species which are distributed mostly in tropical countries. The taxon is characterised by the following general morphological features.

- Aromatic herbs or small shrubs.
- Branchlets pubescent.
- Simple, sessile or subsessile, alternate leaves;
- Heterogamous, yellow or purple capitula which may be axillary or terminal;
- Central florets bisexual (or female), peripheral ones female;
- Involucre multisepiate; pappus white, filiform;
- Base of the anther tailed;
- Achenes glandular pubescent.

*Blumea mollis* is characterised by the following exomorphic features (Fig. 3)

The plant is a herb growing upto 80 cm in height. Younger parts and leaves are glandular pubescent and aromatic. Leaves are obovate, 3-7 cm long, 1.4 cm broad, pubescent on both sides; the lower leaves partly clasp the stem, upper leaves shortly petiolate (Fig. 3.1 and 3.2). Leaf margins are irregularly serrate. Inflorescence: dense corymbose, axillary or terminal panicle; capitulum companulate; phyllaries (involucral bracts) linear lanceolate. Central tubular florets are bisexual with rose to pink corolla, 5-lobed, stamens five. Outer florets are female, corolla tubular, stigma subulate. Florets purple to
lilac. Achenes oblong, 0.5mm long, sparsely to densely hairy, pappus white, 2-4mm long.

**Occurrence**

The plant grows in plains, fallow fields, waste lands and bunds of paddy fields. Flowering is at its peak during January - April.

**Distribution**

Tropical Asia and Africa.

Blumea is a small genus comprising of about 50 tropical species. *Blumea mollis* (D.Don) is an annual herb, 0.3-1 m high, strongly aromatic and somewhat viscid, stems erect, simple or branched from the base, glandular and hairy.

Leaves ovate – oblong, 1-9.5 long, 0.6-5cm wide, sharply toothed, densely silky, hairy on both surfaces, upper leaves smaller, acute to apiculate, base acute, sessile, lower leaves rounded or obtuse, base tapering, petiolate.

Panicles dense, spike like, heads hemispherical to campanulate, 3-4mm diameter, peduncles silky, involucral bracts 2-3 seriate, linear, acute to acuminate, purplish tinged, densely hairy, the outer shorter florets purple to lilac.

Achenes oblong, 0.5mm long, sparsely to densely hairy, pappus white, 2-4mm long.
It is a well known medicinal herb used for its antibacterial and antifungal properties against several human pathogenic bacteria and phytopathogenic fungi (Indian drugs, 1977-78, 15, 253). Boiled herb as used by Mundas to treat diarrhea. (Wealth of India, II B, 168). The plant contains stigmasterol. (Ind. J. Chem, 1975). Being a good medicinal plant, indiscriminate harvesting may threaten its status in biodiversity. Hence it becomes imperative to establish suitable tissue culture protocols for biotechnological applications

1.5 THE OBJECTIVES OF TISSUE CULTURE STUDIES

- To establish a reproducible standard protocol for large scale regeneration of Blumea mollis (D.Don) Merr.

- To succeed in standardizing the tissue culture methods of direct regeneration for organogenesis.

- To standardize a workable protocol for the callus mediated regeneration of Blumea mollis (D.Don) Merr.

- To establish DNA fingerprints for cultivar identification and plant variety rights.

- For phylogenetic genetic diversity analysis & hybrid confirmation.

- To establish genome mapping and gene tagging for marker assisted selection and map based cloning.
1.6. THE OBJECTIVES OF DNA FINGERPRINTING

The main applications of SSR (Simple Sequence Repeats) are in genome mapping and in population analysis, but microsatellites are also useful for taxonomy percentage analysis, identification of individuals in forensic studies and human cancer diagnostics. Due to their exceptional variability, microsatellites are now generally considered the most powerful genetic marker. The use of primers with homology to a given SSR can amplify sequence between simple sequence repeat (ISSR).

The applications of this tool include

- DNA fingerprinting for cultivar identification and plant variety rights
- Phylogenetic and genetic diversity analysis
- Hybrid confirmation, genome mapping and gene tagging for marker assisted selection and map based cloning.

As no prior knowledge is required, the SSR are more reliable and robust than RAPD markers, due to the fact that primers are longer, and hence PCR conditions are more stringent. In most plant species tested, ISSR markers can be suitably applied to most situations, and have been shown to be particularly useful in genetic fingerprinting, diversity and stability analysis.
1.7 THE OBJECTIVES OF PHARMACOGNOSY

Pharmacognosy study reveals

- The correct identification of plants
- Detection of adulteration
- Evaluation of purity and genuineness
- Identification of the phytodrugs
- External features of the foliar and floral morphology, habit and habitat data
- Microscopic studies of the drug

1.8 THE OBJECTIVES OF PHARMACOLOGICAL STUDIES

- To study the antimicrobial property of Blumea mollis (D.Don) Merr.
- To evaluate the anti-inflammatory activity of Blumea mollis (D.Don) Merr.
- To evaluate the anti-pyretic activity of Blumea mollis (D.Don) Merr.
- To assess the hepatoprotective activity of Blumea mollis (D.Don) Merr.
- To determine the histopathology of the pharmacologically important principles of Blumea mollis (D.Don) Merr.