

## Pharmacognostic investigation on aerial part of *Chromolaena odorata*

SUNDER SINGH K.<sup>1\*</sup>, MD. SAMIULLAH<sup>1</sup>, SETH DHEERAJ<sup>1</sup> and PRAVEEN SHARMA<sup>2</sup>

<sup>1</sup>Vinayaka College of Pharmacy, Kullu (India).

<sup>2</sup>IPS Academy Indore (India).

(Received: July 03, 2010; Accepted: July 31, 2010)

### ABSTRACT

*Chromolaena odorata* belongs to family Asteraceae is potentially distributed in Australia, Africa and Oceania, and it is also found in India. Pharmacognostical parameters for the aerial part of *Chromolaena odorata* were studied with the aim of drawing the pharmacopial standards for this plant. Macroscopic and microscopic studies, total ash, water soluble ash, acid insoluble ash, alcohol-soluble extractive, water-soluble extractive and moisture content on the aerial part of *chromolaena odorata* were conducted. Leaf Constant parameters of *Chromolaena odorata* were determined and reported as stomatal number, stomatal index, vein islet number, vein termination number and palisade ratio. The Macroscopic, Microscopic, and physicochemical parameters of the *Chromolaena odorata* were discussed in present paper.

**Key words:** *Chromolaena odorata*, pharmacognostical, phytochemical study.

### INTRODUCTION

*Chromolaena odorata* is also called as Siam weed<sup>1</sup> potentially distributed in Australia, Africa & Oceania, and it is also found in India (West Bengal, Nagaland). *Chromolaena odorata* is a fast growing perennial and invasive weed native to south and Central America. The medicinal values<sup>2</sup> of plant lie in their component phytochemicals such as tannins, flavonoids, phenolic compounds<sup>3</sup> and other nutrients<sup>4</sup> like as amino acid, proteins, which produce a definite physiological action on the human body. Fresh leaves and extract of *Chromolaena odorata* are a traditional herbal treatment<sup>5</sup> for burns, soft tissue repair, and other skin infection. Pharmacognostical parameter of aerial part of *Chromolaena odorata* helps in establishment of standardization parameter. The Macroscopic, Microscopic, and physicochemical parameters of the *Chromolaena odorata* were evaluated and reported.

### MATERIAL AND METHODS

Fresh Leaves and stems of *Chromolaena odorata* were collected and authenticated by Alva's education foundation Moodbidri. The leaves and stems were separated, dried, coarsely powdered. This powder was stored in an airtight container. Few dried leaves and stems were soaked in water for some time (till it get soften). The leaf was placed in between 2 potato slices and with the help of a sharp blade thin transverse sections were taken and placed in a watch glass; the sections were cleared by warming in chloral hydrate solution and stained with staining reagents containing a mixture of phloroglucinol and concentrated hydrochloric acid. Dilute hydrochloric acid and glycerol were used as mounting fluids for stained and unstained sections respectively. Leaf Constants values of leaf and powder characters of Leaf and stem of *Chromolaena odorata* were determined and reported. Physicochemical Parameter of Leaf and stem

powder were reported as total ash, water soluble ash, acid insoluble ash, alcohol-soluble extractive, water-soluble extractive and moisture content.

## RESULTS

### Macroscopy

The stems are circular, hairy or almost smooth and much branched. The leaves are arrowhead-shaped, 50-120 mm long and 30-70 mm

wide. The base of the plant becomes hard and woody while the branch tips are soft and green. As the species name '*odorata*' suggests, the green leaves emit a pungent odour with slightly bitter taste when crushed.

### Microscopy

Fig. 1 and Fig. 1.1 reported the T.S of the leaf through midrib region showed upper and lower epidermis with thin cuticle. Epidermis was made up

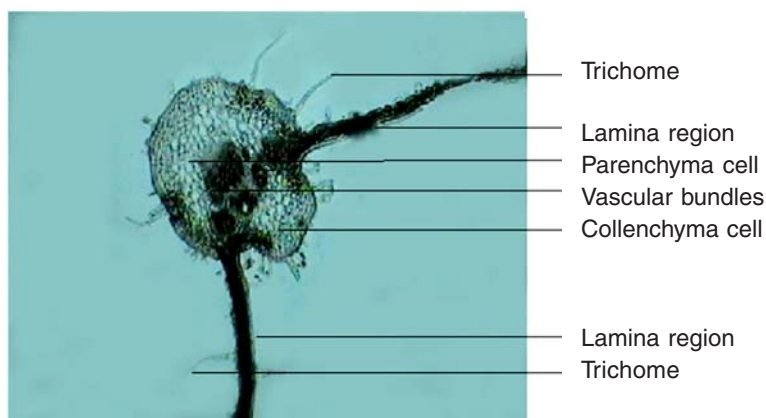


Fig. 1: T. S. of leaf



Fig. 1.1: Lamina region of T S

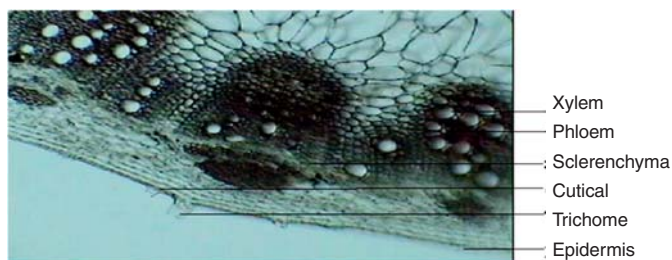
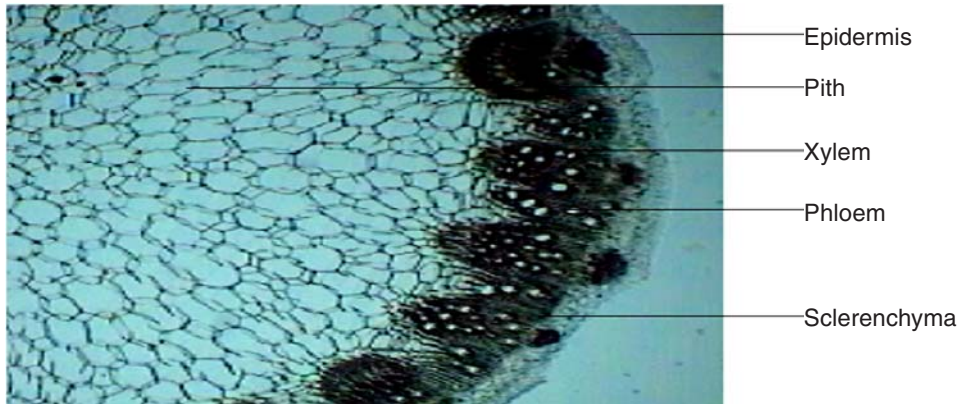


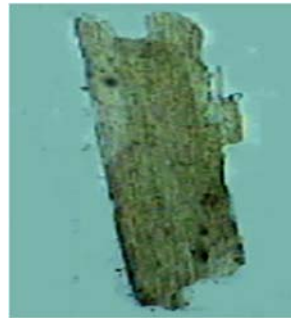
Fig. 1.2: T.S of the stem



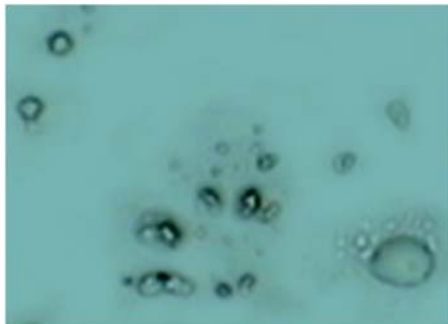
**Fig. 2.1:** T S of stem, half portion enlarged



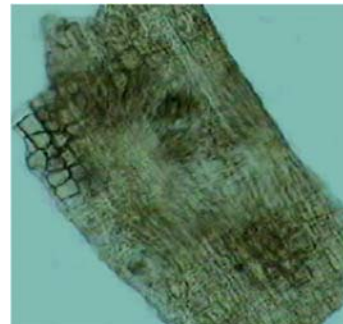
**Fig. 3:** *Covering trichome*



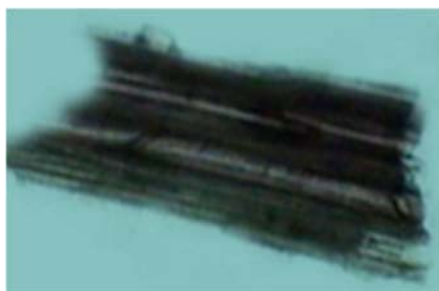
**Fig. 4:** *Parenchyma cells*



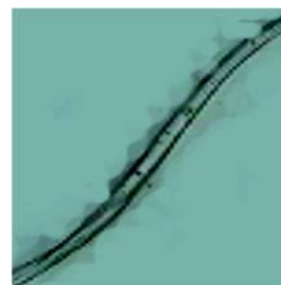
**Fig. 3.1:** *Starch grains*



**Fig. 4.1:** *Xylem vessels*



**Fig. 3.2:** *Fiber bundle*



**Fig. 4.2:** *Fiber*

of thin walled, rectangular cells. Epidermis is followed by 2-3 layers of collenchymatous tissues which were arranged compactly. the parenchymatous cell was found to be thin walled. *Chromolaena* leaf showed presence of vascular bundles with xylem and phloem. The Epidermis constituted with presence of multicellular trichomes and lamina region showed well developed upper and lower epidermis covered by thin cuticle. T.S. through lamina region reported the presence of palisade cell which arranged compactly.

#### T S of Stem

Figure: 2 and Figure: 2.1 showed The T.S. of stem. Epidermis was found to be with 2-3 layer of tangentially elongated cell surrounded by cuticle.

Xylem consisting xylem vessels, phloem cell, sclerenchyma tissue and well developed pith observed in the T S of stem. *Chromolaena* stem reported presence of vascular bundle with xylem and phloem. Epidermis also showed presence of covering trichomes.

#### Powder microscopy

Powder microscopy of the leaf exhibited covering trichomes, starch grains and fiber bundle.

#### Powder microscopy of the stem

The parenchyma cells were abundant and occurred in group. Xylem vessels were found to be in large group. Fiber was found to be in lack amount.

**Table 1: Physicochemical parameters**

| Sample Identity  | Moisture Content % | Total Ash% | Acid Insoluble ash% | Water soluble ash % | Water soluble Extractive value% | Alcohol soluble Extractive value% |
|------------------|--------------------|------------|---------------------|---------------------|---------------------------------|-----------------------------------|
| Leaves and Stems | 11                 | 7          | 1.15                | 5.5                 | 22.4                            | 8                                 |

**Table 2: Leaf Constants**

| Sample Identity | Stomatal No. | Stomatal Index | Vein islet no. | Vein termination no. | Palisade ratio |
|-----------------|--------------|----------------|----------------|----------------------|----------------|
| Leaves          | 200          | 15-17          | 6              | 2                    | 15             |

#### CONCLUSION

The present study attempts pharmacognostic studies of leaves and stem parts of *Chromolaena odorata*. Macroscopic as well as microscopic studies of this crude drug are the primary steps to establish its botanical quality control before going to other studies. Hence Pharmacognostic studies of this drug play a very important role in identifying the purity and quality of crude drugs.

In the present study the arrangement of tissues in transverse section and type of cells were

studied with the aid of microscope. T S of the leaf of *chromolaena odorata* showed the presence of collenchymatous tissues, parenchymatous cell and covering multicellular trichomes. Lamina region of leaf reported the presence of palisade cell which arranged compactly. *Chromolaena* stem reported presence of vascular bundle with xylem and phloem. Epidermis also showed presence of covering trichomes.

Powder microscopy of the stem exhibited parenchyma cells, Xylem vessels and Fibers. Powder microscopy of the leaf exhibited covering trichomes, starch grains and fiber bundle.

Physicochemical parameters and leaf constant studies will be useful tool along with macroscopical and microscopical characters of *Chromolaena odorata*.

#### ACKNOWLEDGEMENTS

Authors are sincerely thankful to Mr. N. S. Thakur, Chairman, Vinayaka College of Pharmacy, Kullu for his encouragement, moral support and facility extended to us.

#### REFERENCES

1. Rachel Cruttwell Mcfadyen and Bryce Skarratt. "Potential distribution of *Chromolaena odorata* (Siam weed) in Australia, Africa & Oceania. *Agriculture, Ecosystem & Environment*", **59**(1-2): 89-96 (1996).
2. Afolabi C. Akinmoladun, E. O. Ibukun and I. A. Dan Ologe. "Phytochemical Constituents and antioxidant properties of extracts from the leaves of *Chromolaena Odorata*", *Scientific research*. **2**(6): 191-194 (2007).
3. Phan TT, Wang L, See P, Grayer RJ, Chan SY, Lee ST. "Phenolic compounds of *Chromolaena odorata* protect cultured skin cells from oxidative damage: Implication for cutaneous wound healing. *Biol Pharm Bull*", **24**(12): 1373 (2001).
4. Ayodeji O., Fasuyi, Kola S. O. Fajemilehin and Samuel O. Aro. "Nutritional Potential of *Siam Weed* (*Chromolaena odorata*) leaf meal (SWLM) on laying hens: Biochemical and Haematological Implications", *Pakistan Journal of Nutrition.*, **4**(5): 336-341 (2005).
5. Phan TT, Hughes MA, Cherry GW, Le TT, Pham HM. "An aqueous extract of the leaves of *Chromolaena odorata* (formerly *Eupatorium odoratum*) (Eupolin) inhibits hydrated collagen lattice contraction by normal human dermal fibroblasts", *J Altern Complement Med*. Fall, **2**(3): 335-43 (1996).
6. Phan TT, Allen J, Hughes MA, Cherry G, Wojnarowska F. "Upregulation of adhesion complex proteins and fibronectin by human keratinocytes treated with an aqueous extract from the leaves of *Chromolaena odorata* (Eupolin)", *Eur J Dermatol*. **10**(7): 522 (2000).
7. Boppré, M., "A non-nutritional relationship of *Zonocerus* (Orthoptera) to *Chromolaena* (Asteraceae) and general implications for weed management. *Ecology of Chromolaena odorata*", *BIOTROP Special Publication* **44**: 153-161 (1991).
8. Pisutthanan N, Liawruangrath B, Liawruangrath S, Baramée A, Apisariyakul A, Korth J, Bremner JB. "Constituents of the essential oil from aerial parts of *Chromolaena odorata* from Thailand", *Nat Prod Res*. **20**(6): 636-40 (2006).
9. Pisutthanan N, Liawruangrath B, Liawruangrath S, Bremner JB. "A new flavonoid from *Chromolaena odorata*", *Nat Prod Res.*, **20**(13): 1192-8 (2006).
10. Nisit Pisutthanan, Saisunee Liawruangrath, John B. Bremner & Boonson Liawruangrath. "Chemical constituent and biological activities of *Chromolaena odorata*", *Chiang Mai J. Sci.*, **32**(2): 139-148 (2005).
11. Apori, Long, Castro & Orskov. "Chemical composition and nutritive value of leaves and stem of tropical weed *Chromolaena odorata*", *Grass and Forage science*. **55**(1): 77 (2000).
12. Suksamrarn A, Chotipong A, Suavansri T et al. "Antimycobacterial activity & cytotoxicity of flavonoids from the flowers of *Chromolaena odorata*", *Arch Pharm Res.*, **27**(5): 507-11 (2004).
13. Baruah RN, Leclercq PA. "Constituents of the Essential Oil from the Flowers of *Chromolaena odorata*", *Planta Med*. **59**(3): 283 (1993).
14. Suntornsuk L, Anurukvorakun O. "Precision improvement for the analysis of flavonoids in selected Thai plants by capillary zone electrophoresis. *Electrophoresis*", **26**(3): 648-60 (2005).
15. Ram P. Rastogi, B. N. Mehrotra. "Compendium of Indian Medicinal Plants", 1960-1969: 182.
16. Velasco Alinsug MP, Rivero GC, Quibuyen AO. "Isolation of mercury-binding peptides in

- vegetative parts of *Chromolaena odorata*", *Z Naturforsch [C]*. **60**(3-4): 252-9 (2005).
17. Ling SK, Md Pizar M, Man AS. "Platelet-Activating Factor (PAF) Receptor Binding Antagonist Activity of the Methanol Extracts and Isolated Flavonoids from *Chromolaena odorata*", *Biol Pharm Bull.* **30**(6): 1150-2 (2007).
  18. Thang PT, Patrick S, Teik LS, Yung CS. "Antioxidant effects of the extracts from the leaves of *Chromolaena odorata* on human dermal fibroblasts and epidermal keratinocytes", *Burns.* **27**(4): 319-27 (2001).
  19. Phan TT, Hughes MA, Cherry GW. "Effects of an aqueous extract from the leaves of *Chromolaena odorata* (Eupolin) on the proliferation of human keratinocytes and on their migration in an in vitro model of reepithelialization", *Wound Repair Regen.* **9**(4): 305-13 (2001).
  20. Ngono Ngane A, Ebelle Etame R, Ndifor F, Biyiti L, Amvam Zollo PH, Bouchet P. "Antifungal activity of *Chromolaena odorata*", *Chemotherapy*, **52**(2): 103-6 (2006).
  21. Owoyele VB, Adediji JO, Soladoye AO. "Anti-inflammatory activity of aqueous leaf extract of *Chromolaena odorata*. *Inflammopharmacology*", **13**(5-6): 479-84 (2005).
  22. Ram P. Rastogi, B. N. Mehrotra. " *Compendium of Indian Medicinal Plants.* **4**, 1985-1989: 182.
  23. Irobi ON. "Activities of *Chromolaena odorata* (Compositae) leaf extracts against *Pseudomonas aeruginosa*", *J Ethnopharmacol.* **37**(1): 81-3 (1992).