Chromolaena Odorata (L) K and R (Asteraceae) – An Invasive Weed with Colossal Potential.

Rashmi Mishal, M. Pharm[1*], Harshavardhan Mishal, M. Pharm, PhD[2]

[1*]Sir Dr. M.S. Gosavi College of Pharmaceutical Education & Research, Nashik (M.S.) India

[2]MET's Institute of D. Pharmacy, Nashik (M.S.) India

Abstract: This paper identifies the occurrence of *Chromolaena odorata* (L) King and Robinson, an invasive species of Asteraceae family in the Anjaneri region of Nashik district, Maharashtra. Though native to United states and subsequently distributed to Asia, West Africa and Australia it is commonly known as Paraffin bush, Siam weed in English or as Ranmodi in local Marathi language. A plant with a peculiar aromatic odour and beautiful flower, is as such poisonous to cattle but has tremendous therapeutic potential and medicinal uses. This paper deals with its overall invasive and therapeutic aspects.

Key Words: *Chromolaena odorata,* Ranmodi, Siam weed, Jack of the jungle, paraffin bush.

Introduction: *Chromolaena odorata* [(1)] (L) King and Robinson is a small shrub, almost 250 cm in height. Stems are erect and densely branched. Leaves opposite, alternate, petiolate or sessile; blades usually 3-nerved from bases, ovate or elliptic, margins dentate or lobed, faces glabrous or puberulent to tomentose, sometimes gland-dotted. Corollas are white or purple to blue, lavender, or reddish, cylindric, bases not enlarged, glabrous, branches linear to linear-clavate. Though is native to United states, is found almost everywhere in tropical and subtropical countries like India, Bangladesh, Sri Lanka and distributed prominently in Asia, Australia and Africa. A notoriously

invasive species which grows in majority of the soil types and found in wastelands as well as along roadside. As such Chromolaena genus is one of the biggest genus of family Asteraceae, containing about 1200 species worldwide which are mostly small herbs, shrubs or sub-shrubs. It is a rapidly growing invasive species of a perennial herb, with multi stemmed body which grows up to 2 to 3 m in height. Plant entirely glandular, hairy, and gives a specific pungent odour when leaves are crushed.. Leaves opposite, alternate, petiolate or sessile; blades usually 3-nerved from bases, ovate or elliptic, margins dentate or lobed, faces glabrous or puberulent to tomentose, sometimes gland-dotted. Corollas are white or purple to blue, lavender, or reddish, cylindric, bases not enlarged, glabrous, branches linear to linear-clavate. Leaves are 4-10 cm long, petiolate with 0.5 to 1 cm width. Inflorescence is purple white or pinkish in colour. As such forest of Nashik district is very rich, still reports of occurrence of this dangerous invasive weed is missing in classic literature published earlier. Lakshminarasimhan [(2)] *et al* have mentioned total 164 roadside weeds, and weeds found in crop fields as well as wastelands with no allude to *Chromolaena odorata.*

Materials And Methods:

Study Area: Nashik District [(3) (4)(5)] is situated in north western part of Maharashtra. It lies between 19°35’ and 20°50’ north latitude and between 73°16’ and74°56’ east longitude and falls in parts of Survey of India degree sheets 46-H, 46-L and 47-E and 47-I. The district has a geographical area of 15530 sq. km. It is surrounded by Dhule district in the north, Dangs and Surat district of Gujarat State in the northwest, Jalgaon in the east and northeast, Ahmednagar in the south, Aurangabad in the southeast and Thane in the west and southwest. The district headquarters is located at Nashik Town. For administrative purpose four divisions have been formed namely Nashik, Niphad, Malegaon and Peth. The district is further subdivided in to 15 talukas viz., Nashik, Igatpuri, Dindori, Peint, Surgana, Deola, Satana, Kalwan, Chandwad, Niphad, Sinnar, Yeola, Malegaon,

Nandgaon and Trimbakeshwar. As per 2001 census, the population of the district is 61,09,052. The district has 18 towns and 1931 villages. Nashik is one of the largest districts in Maharashtra in terms of area and population. The district forms part of Godavari basin (southern part) and Tapi basin (northern part). Godavari and Girna are the main rivers flowing through the district. Total forest area in the district is 2.60 lakh hectares, which is 17.26 % of the total geographical area. Out of total forest area of the district, the highest forest area 16.59 % is in Surgana Taluka. The minimum area of 0.36 % is in Nashik taluka. Most of the production is received from timber and firewood and prominently from Bidi leaves, Gum, Hirda, Beetel nut, Bamboo, etc. Nashik Forest Circle having three territorial forest divisions, namely East Nashik, West Nashik and Ahmednagar and two forest sub divisions, namely Malegaon and Sangamner sub divisions. They are of East Nashik and West Nashik Forest divisions are adjoining to Gujarat State.

Collection And Identification: Plant material is collected from the backdrop of Anjaneri hills, Triambakeshwar of West Forest division of Nashik, in the month of December which is flowering season of the plant *Chromolaena odorata* (L). Voucher specimen of the collected plant is identified and deposited in herbarium of Department of Pharmacognosy, MET's Institute of D. Pharmacy, Nashik. (Fig 1 and Fig 2)

Discussion: Occurrence of this highly invasive species [6] was noted during our visit to the Anjaneri hills area, Trimbakeshwar of Nashik west forest division. Though this plant is distributed and found in entire Maharashtra state, its presence in this area is noted recently [7]. Plant specimen is collected in December month, which is also flowering season of *Chromolaena odorata* (L). Numerous reports are available about its potential therapeutic efficacy and presence of various chemically and medicinally important ingredients and secondary metabolites in it. *Chromolaena odorata* (L) King and Robinson is a dangerously invasive weed [8] which spreads rapidly to

throughout the wastelands and crop fields if not treated accordingly. Formerly known as *Eupatorium odoratum*, it is a weed of Asteraceae family. Two main invasive forms of Chromolaena found in Asia and Africa region are reported by Mondal [9] *et al*. There are chances of growing this plant rapidly and invading the rest of the fertile land as the climactic conditions of Nashik district are much favorable to it.

Chemistry: Presence of Pregeijerene, E - caryophyllene, β- pinene, α-pinene, as major chemical ingredients of the oil obtained from *Chromolaena odorata* is already reported by Pitakapawasutthi [10] *et al*. Same authors have also demonstrated the availability of Chlorogenic acid content in the leaves of this plant.

Pharmacology: Much work has already been done by the various research workers all-over the world regarding pharmacological and therapeutic activities of this plant. Vijayaraghavan [11] *et al* has metioned total fourteen pharmacolgical activities of the plant *Chromolaena odorata* (L) in her review article. Anti-bacterial activity of the methanolic extract of the leaves of *Chromolaena odorata against Staphylococcus aureus* has been mentioned earlier by Rasyid [12] *et al*. While Ikewuchi [13] *et al* has reported protective effect of aqueous extract of *Chromolaena odorata* against doxorubicin induced hepatotoxicity in Wistar rats. Potent antioxidant property of a newly isolated flavone 5,3 dihydroxy7,6 dimethoxy flavanone (odoratenin) from the leaves of *Chromolaena odorata* along with two known compounds isosakuranetin and subscandenin is reported by Devi [14] *et al*. While Onoja [15] *et al* have demonstrated protective effect of *Chromolaena odorata* extract against the benign prostatic hyperplasia in rats. Reports are also available about immunomodulating [16] activity of the leaves of this plant in the scientific literature. Remarkable antibacterial activity of the pre developed gauze dressing with *Chromolaena odorata* extract against *Staphylococcus aureus* is also reported by Sittikijyothin [17] *et al*. Surprisingly same

anti-bacterial and anti-fungal potential of biosynthesized silver nanoparticles of *Chromolaena odorata* leaves is demonstrated by Bishoyi [(18)] and coworkers. Apart from that reports are also available about the allelopathic and herbicidal [(19)] effect of crude extracts of *Chromolaena odorata* in the previously published literature. Elbiyo [(20)] *et al* have reported the prominent anti-malarial activity of ethanolic, ethyl acetate and aqueous fractions of *Chromolaena odorata* in his work. Latif [(21)] and coworkers have mentioned enhanced wound healing activity of *Chromolaena odorata* layered nitrile rubber polymer patches in rats. Same results are also reported with liquid plaster loaded with *Chromolaena odorata* leaf extract by Sangnim [(22)] *et al*. Prominent pharmacological activity of some flavonoids obtained from *Chromolaena odorata* against certain uropathogenic strains is also reported by Omokhua-Uyi [(23)] *et al*.

FUTURE PERSPECTIVE: Many secondary metabolites available in *Chromolaena odorata* have been reported to possess pharmacological properties. Especially presence of certain flavonoids exerts prominent anti-oxidant as well as profound immunomodulatory and wound healing activity, making it a combined source of a good medicinal value. This article also reveals that the screened phytochemicals and isolated compounds can become the potential sources for pharmaceutical industries in the future to treat multiple ailments if further analysed.

Limitations: There are certain limitations to this article. This review did not pay close attention to the individual mechanism of actions of the reported chemical ingredients due to the lack of enough evidences and literature, but this can become a guideline for further research in this regard.

Conclusion: *Chromolaena odorata* a plant with ill repute of being an invasive weed of crop fields all over the world exerts diverse pharmacological effects that align with its various therapeutic applications. Among *Chromolaena* species, certain species have abroad spectrum of pharmacologically effective phyto constituents. In depth research and analysis of their

pharmacokinetic profile may lead to the exciting possibilities for newer drug molecules. Given the global revival of interest in herbal remedies, *Chromolaena odorata* can offer a compelling option for treatment of various ailments. More research is needed to determine its applicability in modern medicine.

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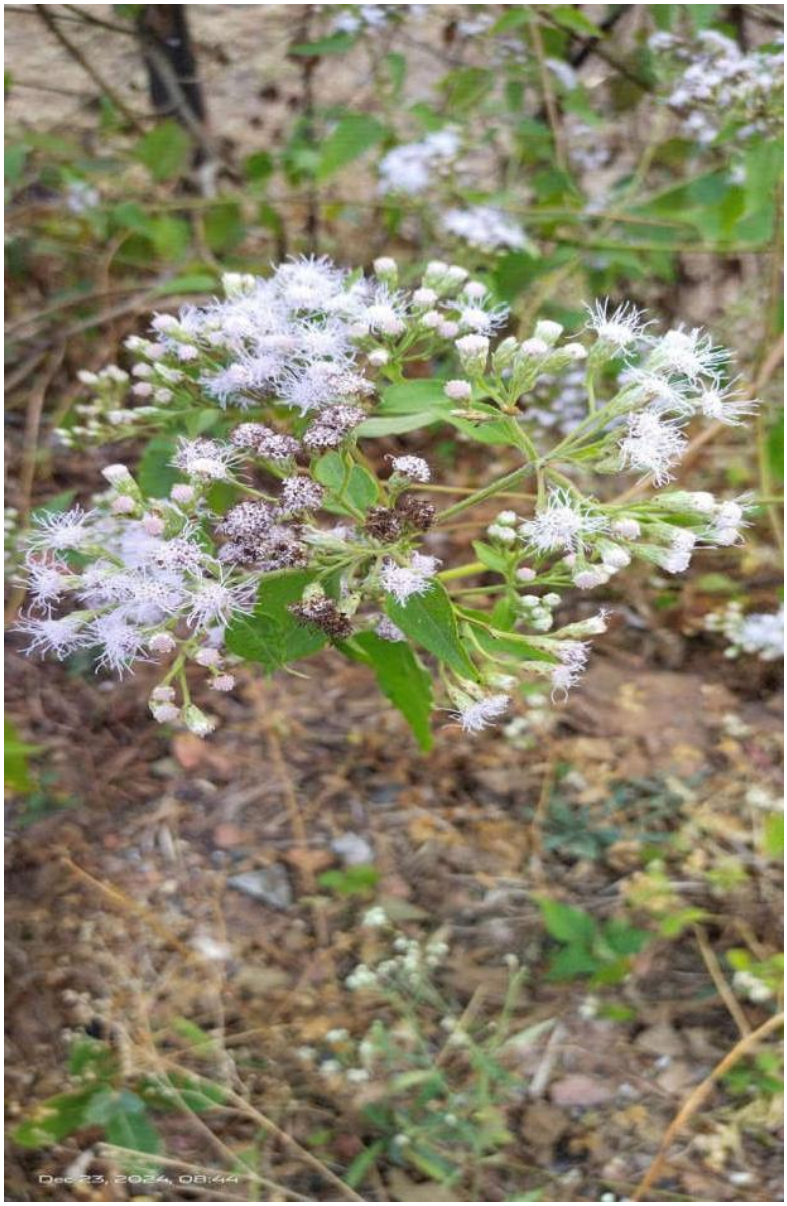
Conflict of Interest:

The authors declare no conflict of interest.

Figure 1: *Chromolaena Odorata* (L) K and R in Natural Habitat



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