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# SCREENING AND ADVERTISING THE MEDICINAL PROPERTY OF INVASIVE ALIEN PLANTS: A FEASIBLE WAY FOR CONTROL THE INVASION PROBLEMS IN INDIA

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**ABSTRACT**

*Well acclaimed studies have clearly stated that, exotic species are responsible for the decline or extinction of several endemic species throughout the world. Globally the research community and resource managers are waging war against IAS and seeking a better management plan to overcome the invasion and its associated problems. Apparently increasing market demands for a plant can lead to rapid decline of the species in the wild. In most of the cases the medicinal property of the native plants leads to the overexploitation of species which emerged as threat for the survival of the species in due course of time. Interestingly, invasive plants possess the untapped source of novel drugs and essential aromatic oils, number of investigations from different parts of India revealed the medicinal property of several invasive plants (> 100 species). The researchers especially in pharmaceutical side should pay more attention to screen IAS plants for finding new drugs. The scientific proof will encourage the collection of IAS species from the wild and due course of time the invasion intensity may decline/control or some time even eradicated.*

***Keywords****:* CBD; IAS; India: medicinal property; pharmaceutical

Convention for Biological Diversity (CBD), Global Invasive Species Program (GISP), International Union For Conservation of Nature and Natural resources (IUCN) and other international and regional top conservation bodies have rightly pointed out that, Invasion of Alien Species (IAS)is the second worst threat to global biodiversity after habitat destruction (Surendra *et al*. 2013). Invasive alien species pose a serious threat to native species as a direct predators, competitors and transmit infectious diseases. Further, the invasion modifies the habitat and altering native species composition, zonation and dynamics (MA 2006). Most of the time due to the combine consequence of aforesaid issues, number of endemic plants and animals are dwindling precariously in India. In fact,most of the ecologically sensitive regions of India, including the 'biodiversity hotspots' and coastal regions are highly prone to multiple invasion and have the prime chance to evolve as an invasion hotspot (Adhikari et al 2015). It is worth to mention here that more than 50% of sensitive and vital eco-regions of India are climatically susceptible for introduction establishment and persistence of multiple invasive alien species (Adhikari *et al.* 2015).

Well acclaimed studieshave clearly stated that, exotic species are responsible for the decline or extinction of several endemic species throughout the world. For instance, the introduction of Zebra mussels (*Dreissena polymorpha*) in North America has resulted in the extinction of considerable number of native aquatic species (Ricciardi, 2004; Clout and Williams, 2010). Likewise, Birdlife International reported that, more than 65 bird species already extinct within the last two centuries due to IAS (Birdlife International 2006). Pertaining to India, several native aquatic species especially Indian major carps in many major rivers (e.g.Yamuna, Ganges) systems have become critically declined due to the introduction of commercially important alien species (Singh et al. 2014;Sandilyan 2022,2023). Globally the research community and resource managers are waging war against IAS and seeking a better management plan to overcome the invasion and its associated problems.

On the other hand researchers admitted that eradication/ management of IAS is possible only if the affected area is comparatively smaller (few kilometers) and easily approachable,or the eradication process could be started during the initial period of the invasion, unless IAS eradication efforts are end in vain (Mack and Lonsdale 2002; Moore *et al*. 2011). It is a bitter truth that there is no concrete solution arrived yet.

Pertaining to India, various control methods including application of pesticides, manual, mechanical and introduction of biological control agents have failed in several habitats is a grim reality. For instance, combination of methods attempted so far to curb the weeds such as *Lantana camara*, *Prosopis juliflora* and *Eichhornia crassipes* in India soil has ended in vain (Priyanka *et al*. 2013; Sandilyan and Vant Klooster 2016; Sandilyan *et al.* 2018). Therefore it is the time for ending our perpetual war against IAS and it is also essential to find some effective alternative ways for the better management/eradication of IAS in order to protect India'sunique ecosystems and immense diversity.

**Medicinal property and IAS management**

Obviously increasing market demands for a plant can lead to rapid decline of the species in the wild. For instance, some of the plant species which were reported to occur abundantly in India half a century ago are became rare nowadays mainly due to their commercial importance (Mishra 2000; Giri *et al*. 2015; Sandilyan and Vant Klooster 2016). In most of the cases the medicinal

property of the plants leads to the overexploitation of species which emerged as threat for the survival of the species. Obviously, number of herbal plants in India stand dangerously close to the precipice of extinction. For instance, the Ayurveda and healthcare industry of India using Ashtvarga plants (combination of eight herbal plants) for preparing 'Chyavanprash' a traditional health care herbal tonic (Giri *et al*. 2015). The irrational collection of herbal plants for preparing 'Chyavanprash' drive some of the species at bay (e.g. *Habenaria intermedia* and *Habenaria edgeworthii)* (Giri *et al*. 2015). The industries are now in a difficult situation to obtain aforesaid species in required quantities with a sustainable way (Giri *et al*. 2015).

In general, the collection of herbal plants/parts in irrational manner by untrained workers resulted in poor natural regeneration of the species which resulted in local extinction (Marker *et al*. 1943; Uncial *et al*. 2002; Mishra 2000). Repeatedly the reproductive parts such as flower,fruit, seeds, root and rhizome are collected enormously for medication will prevent the survival rate or possibility of existence and ultimately leads to extinction of several plant species (e.g. *Chlorophytum borivilianum, Curcuma caesia, Rauvolfia serpentine, Picrorhiza kurrooa, Podophyllum hexandrum, Nardostachys grandiflora, Dactylorhiza hatagirea, Aconitum heterophyllum, and Saussurea costu, Asparagus, Curcuma, Gloriosa, Hemidesmus, Smilax*) (Marker *et al*. 1943; Mishra 2000; Uniyal *et al*. 2002).

Even though the high taxonomic diversity, rapid spread and huge distribution of IAS in India has not attracted an appropriate level of attention of the scientific and policy making communities till date (Adhikari *et al.* 2015). Interestingly, IAS plants possess the untapped source of novel drugs, number of investigations from different parts of India revealed the medicinal property of several IAS plants (> 100 species) (Sekar 2012; Kumar and Bihari 2015; Devamma and Gopal 2013; Aravindhan and Rajendran 2014: Renganathan *et al*. 2015; Sandilyan and Vant Klooster 2016). Obviously, screening and popularizing the medicinal property of IAS plants might attract the herbal/ medicinal industries and herbal collectors who can help to curb the invasion menace to some extent. In order to support the potential medicinal property of anIAS plants, here we have selected the exotic plant *Casia alata* (L). to sustain the hypothesis.

*Casia alata* (L), an exotic to India, which grows abundantly in marshy areas, open and abandoned land, road sides, pastures and other denatured and disturbed habitats. It is an aggressive competitor and drives several native plants from the habitat where it invades (Sankaran *et al.* 2013). This weed have the ability to survive in harsh climatic conditions, however the survival rate is higher in the marshy areas (Sankaran *et al*. 2013), (Figure 1).

*C. alata*is also known as ringworm cassia since the leaves are commonly used to treat ringworm infection. *C.alata* having very high medicinal values in particular it is known for its high antimicrobial property especially against the fungal dermatophytes. The leaf extract is used in several countries as a common medicine for constipation, inguinal hernia, intestinal parasitosis, syphilis and diabetes (Chatterjee *et al.* 2012). Folklores and other authenticated research from various countries disclosed about the medicinal property of this plant (Table 1). Moreover, researchers identified some unique group of bio-compounds including saponin, kaempferol and anthraquinones which contain more medicinal propriety (Chatterjee *et al.* 2012). Besides, the ingredient of the plants are also used to prepare soaps, shampoos and lotions due to its high antifungal property (Chatterjee *et al.* 2012).

Numerous plants and their parts are traditionally being used to cure diseases, even though scientific evidencein terms of modern medicine is lacking in several cases or still in its infancy. The development of scientific knowledge in pharmacology to provide scientific authentication about the IAS plants for curing a particular disease is highly needed (Balunas and Kinghorn, 2005; Sandilyan and Vant Klooster 2016). The researchers especially in pharmaceutical side should pay more attention to screen Indian IAS plants for finding new drugs. The scientific proof will encourage the collection of IAS species from the wild and due course of time the invasion intensity may decline/control or some time even eradicated (Sandilyan and Vant Klooster 2016).

To support this a recent study by Verma *et a.* (2016) highlighted the aromatic nature of certain IAS plants namely *Ageratum conyzoides, Cannabis sativa, Cyperus rotundus, Eupatorium adenophorum, Lantana camara, Parthenium hysterophorus* and *Sphagneticola trilobata*due to presence of essential oils which possess a complex mixture of terpenes, Phenyl alkanoids and other important compounds. In general the oils extracted by hydro- or steam distillation of plant biomass and extensively utilized in flavour, fragrance, cosmetic and pharmaceutical industries. Hence, IAS plants can be explored and processed for utilization in flavour, fragrance, cosmetic and pharmaceutical industries. Detailed phytochemical and pharmacological studies on invasive aromatic weeds may contribute to the development of important pharmaceutical, perfumery, flavour and cosmetic products for future industrial use. Further the authors also suggested that, sustainable industrial utilization will help to curb the IAS menace (Verma *et al.* 2016).

Besides, for the past 50 years the global community has witnessed an outbreak of several new diseases such as Ebola, meningitis, SARS, bird flu and swine flu. We are 'defenceless' and highly prone to new pathogens (Regunathan and Kitto 2009). Moreover diseases like cancer, AIDS and Alzheimer have made the drug seekers and doctors desperately seeking out for new drugs/chemical and bioactive compounds (Regunathan and Kitto 2009). Identification and advertising of new bio-compounds and drugs from IAS plants may help to control/cure new and emerging diseases as well as getting an avenue for the better management of IAS plants and restore the affected habitats of India. However the scientific proof only promote the collection from the wild and over the course of time the invasion may decline /control or some time even eradicated (Sandilyan and Vant

Klooster 2016). In this way, we can not only conserve our biodiversity from the invasive weeds, but can also generate raw materials at low inputs for extraction of valuable phytomolecules for industrial utilization (Verma *et al.* 2016).

**Disclaimer**

The views and the opinions expressed in the article are the authors own view and not of the National Biodiversity Authority.

**Figure 1**. Invasion of *Casia alata*on in the bunds of a traditional pond near Mayiladuthurrai, Tamilnadu, Southern India.

Table 1. List of countries used the *Cassia alata* for medication.

| S. No | Country | Remedies |
|---|---|---|
| 1 | Africa | Abortifacient, laxative, scurvy. |
| 2 | Brazil | Anaemia, constipation, dermatitis, dyspepsia, fevers, hydropsy, liver problems, menstrual disorders, skin problems, venereal disease. |
| 3 | Cuba | Diuretic, diaphoretic, laxative, against herpes, skin infections. |
| 4 | Ghana | Abortifacient, insecticide, purgative, vermifuge, dhobeyitch, eczema, gonorrhea, herpes, leprosy, mycosis, parturition, ringworm, shingles, skin problems, sores, wounds. |
| 5 | Haiti | Depurative, diaphoretic, insecticide, vulnerary for amygdalitis, herpes, itch, measles, psoriasis. |
| 6 | Java | Itch, ringworm, scabies, syphilis and larvaecide. |
| 7 | India | Antidote, bactericide, diuretic, fungicide,insecticide, purgative, vermifuge for asthma, bronchitis, constipation, dysentery, eczema, herpes, intestinal parasites, rheumatism, skin disorders, snakebite, stomach ache, venereal diseases. |
| 8 | Mexico | Diaphoretic, diuretic, insecticide, purgative; for fever, rheumatism, ringworms, skin infections, snakebite, syphilis |
| 9 | Nigeria | Infectious diseases |
| 10 | Peru | Diuretic, insecticide, laxative, vermifuge, for hepatitis, herpes, intestinal parasites, ringworm, skin problems, snakebite, urinary infections. |
| 11 | Samoa | Purgative for ringworms, skin problems, snakebite |
| 12 | South America | Stomach problems, fever, asthma, snake bite and venereal diseases |
| 13 | Venezuela | Diuretic for itch and skin problems |

Source: Chatterjee *et al.* 2012; Timothy *et al*. 2012.

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