Characteristics And Impacts of Invasive Plant Aliens in Khandesh Region (Maharashtra, India): Asteraceae

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Abstract: Convention for Biological Diversity (1992) considered 'Bioinvasion' of alien species as 'The Second Worst Threat To Native Biodiversity'. It is now also thought to be 'Biological Pollution'. Impacts of bioinvasion are now well known and at such circumstances, it is essential to take a stock of situation regarding invasive plant aliens. This communication projects as many as 29 alien species pertaining to 25 genera of the family Asteraceae (Compositae) in Khandesh (Maharashtra). Observations are extended on their morphological, ecological, biological and negative impacts on local environment and economy in the said region.

Key Words: Invasive Aliens, Asteraceae, Characteristics, Impacts, Khandesh.

INTRODUCTION

The Compositae are the largest family of vascular plants. They are distributed over most of the earth and in almost all habitats. They are generally herbaceous. The family is alternately also called Asteraceae and recognised by the inflorescence an involucral head, 5-lobed gamopetalous corolla, usually, achene with pappus (Lawrence, 1951). Economically, it is of considerable importance. Many members are noxious weeds (Lawrence, *loc.cit*.). The family has been investigated widely morphologically, taxonomically and phylogenetically (c*f*.Cronquist, 1988; Takhtajan, 1997).

Studies, in present time, on biodiversity are being extended in view of ecosystem functioning. The status and conspectus of biodiversity of a region or nation are also being examined. One such important area of research is invasion biology. Convention for Biological Diversity (CBD, 1992) considered biological invasion of alien species as the second worst threat after habitat destruction. Biologists also thought it a form of 'biological pollution' responsible for global environmental change and nay one of the major cause of species extinction. At this backdrop, it becomes imperative to take stock of present situation regarding the alien plant species in a region and also their impacts. In view of this, the present attempt is to evaluate the characteristic of such alien species which rendered them more invasive and successful. The family Compositae (Asteraceae) is, therefore, being investigated and endeavoured to shed more light on it especially alien plant species from Khandesh region of Maharashtra.

METHODOLOGY

Data on occurrence of alien plant species in Khandesh region (inclusive of Jalgaon, Dhule and Nandurbar districts) of Maharashtra State is borrowed from author's own works (Patil, 1990, 1995, 2017, 2024a,b). Field studies also involved characteristics of the alien plant species which are being limelighted in this communication. Their nativities are highlighted against each invasive alien floral element, besides their negative impacts.

Systematic Enumeration:

(A) Asteraceae (Compositae)

1. *Acanthospermum hispidum* DC.
   Roots penetrate deeply in soil, grows anywhere, fruits spinous and carried with passersby.
   Nativity: South America: Patil, 2003, 2024; Yadav and Sardesai, 2002.
2. *Adenostemma lavenia* (L.) Kuntze.

Branched erect herbs, deeply rooted, grows in waste places along rivers and rivulets, florets in panicles or corymbs, achenes provided with short pappus hairs.
Nativity: South America: Patil, 2003, 2024.

3. *Ageratinum conyzoides* L.
Erect herb, very variable, inhabits anywhere, produces numerous seeds, blooms nearly throughout a year.
Nativity: (i) Tropical America: Patil, 2003. (ii) South America: Kuroo *et al.*, 2007.
4. *Artemisia nilagirica* (C.B.Cl.) Pamp.
Branched shrubs, deeply rooted, flowering heads many in panicles, invades hilly places.
Nativity: (i) Mediterranean Region: Singh *et al.*, 2015. (ii) America: Singh & Inam, 2015.
5. *Bidens bitrenatea* (Lour.) Merr. & Sheriff.
Annuals growing on waste lands and cultivated fields and in any type of soil, luxuriant growth in black cotton soil, pappus hispid, bristly and carried by animals and wind.
Nativity: Tropical America: Reddy, 2008; Patil, 1995.
6. *Blainvellea acmella* (L.) Phillipson
Invades waste lands and open forests lands, fast growing, dominates other species, root system better developed, appear early after first showers, propagates by plenty seeds, an aggressive coloniser.
Nativity: (i) Tropical America: Patil, 1995, 2003; Reddy, 2008. (ii) South America: Shetty & Singh, 1987; Patil, 2024.
7. *Blumea eriantha* DC.
Grows on waste places especially in winter period, not broused by animals, seeds produced in large numbers and light in weight, carried by wind currents, pappus longer than achenes.
Nativity: Tropical America: Reddy, 2008; Chandra Sekar, 2012.
8. *Blumea lacera* (Burm.*f.*) DC.
Erect herbs, deeply rooted, invades banks of rivers, rivulets, streams and barren marshy places, gullies in forests, etc., very variable, grows gregariously, produces numerous seeds, achenes with bristly pappus, not broused by animals, blooms throughout a year.
Nativity: (i) Tropical America: Reddy, 2008; Chandra Sekar, 2012. (ii) Central America: Panda *et al.*, 2018.
9. *Blumea obliqua* (L.) Druce
Stout herbs, root system deep, occupies open forest areas, along roadsides and river banks, barren lands, near human habitations, not broused by animals, grows profusely in winter season, polymorphic, deeply rooted.
Nativity: Tropical America: Reddy, 2008; Patil, 2024; Wagh & Jain, 2018.
10. *Conyza japonica* (Thunb.) Less. ex DC.
Hispid herbs, deeply rooted, heads in panicles, achenes furnished with pappus, carried by winds.
Nativity: Indo-Malaysia: Mugendhiren *et al.*, 2020.
11. *Conyza stricta* Willd.
Erect herbs, deeply rooted, invading open forests, flowering heads many in dense panicles, achenes provided with plumose.
Nativity: Africa: Mugendhiren *et al.*, 2015.
12. *Echinops echinatus* Roxb.
Grows in waste places, root-stock penetrating and propagating, produces large seeds, vivipery and polymorphic observed, not consumed by live stocks.
Nativity: Afghanistan: Reddy, 2008; Chandra Sekar, 2012; Patil, 2024.
13. *Eclipta prostrata* (L.) Mant.
Erect or prostrate branched herbs, grows in aquatic and marshy places, fast growing, inhibits growth of other species, much branched, blooms throughout a year, not broused by animals, prostrate and erect forms observed, achenes tufted with dense poppus hairs.
Nativity: South & Tropical America: Reddy, 2008; Patil, 1990.
14. *Emilia sonchifolia* (L.) DC.

Invades waste and cultivated lands, erect or decumbent herbs, rooting basally, flowering heads plenty, seeds with copious pappus-hairs, dispersed by wind to long distances, colonising fast, appears after first showers, grows luxuriantly in black cotton soils.
Nativity: Tropical America: Reddy, 2008; Chandra Sekar, 2012.

15. *Flaveria trinervia* (Spreng.) C. Mohr.
Brnached herbs on wet waste lands, roots well developed, flowers and fruits during rainy and winter seasons, seeds produced plenty.
Nativity: Tropical America: Yadav and Sardesai, 2002; Naik, 1998.
16. *Galinsoga parviflora* Cav.
Much branched herbs, flowering heads and achenes produced plenty, achenes dimorphic.
Nativity: (i) Tropical America: Reddy, 2008; Patil, 2003, 2024. (ii) South America: Khuroo *et al.*, 2007. (iii) Central America: Wilson, 1994.
17. *Glossocardia bosvallea* (L.*f.*) DC.
Prostrate or suberect herbs, grows on wet rocky places along rivers and rivulets, fast growing, shed seeds early after season; achenes with stiff awns.
Nativity: East Indies: Reddy, 2008; Patil, 2003; Chandra Sekar, 2012.
18. *Gnaphalium luteo-album* L.
Erect or decumbent herbs, root system well developed, heads many in panicles, achenes furnished with bristly pappus.
Nativity: (i) America: Mugendhiren *et al.*, 2015. (ii) Africa & Europe: Stewart, 1972.
19. *Grangea maderspatana* (L.) Poir.
Prostate annuals, grow in drying ditches, wetlands, river banks, margin of water courses, spreads rapidly forming large dense patches, achenes produced plenty and provided with scaly pappus.
Nativity: (i) Tropical & South America: Reddy, 2008; Patil, 1990. (ii) South America: Singh *et al.*, 2013.
20. *Lagascea mollis* Cav.
Much branched tall herbs, deeply rooted, fast growing on waste lands and agricultural lands, neglected corners of gardens, etc. along railway tracks, flowering profuse, seeds furnished with fimbriate cup, achenes bearing tuft of pappus, dispersed by winds.
Nativity: (i) Tropical Central America: Reddy, 2008; Shetty & Singh, 1987. (ii) Tropical America: Matthew, 1991. (iii) Central America: Naik, 1998.
21. *Laggera alata* Nanth
Erect, suffruticose herbs, found in waste places, along roads and rivulets, rootstock woody, flowering heads many in panicles, achenes provided with pappus.
Nativity: Africa: Mugendhiren *et al.*, 2020.
22. *Parthenium hysterophorus* L.
Grow gregariously on waste places, barren lands, agricultural lands, etc. propagates vegetatively and by seeds, blooms throughout a year, not broused by animals, finds no native uses by mankind.
Nativity: (i) Tropical North America: Reddy, 2008; Chandra Sekar, 2012. (ii) Tropical America: Naik, 1998.
23. *Pentanema indicum* (L.) Ling
Suffruticose herbs, deeply rooted, found along edges of forests.
Nativity: Africa: Singh & Joshi, 2022.
24. *Sonchus brachyotus* DC.
Stout much branched herbs, root-stock creeping, invading grasslands, flowering heads many in panicles, achenes provided with pappus, dispersed by wind.
Nativity: (i) Europe: Sainkhedia, 2016; Patil, 2024. (ii) Eurasia: Patil, 2003.
25. *Sonchus oleraceous* L.
Commonly growing in cultivated fields, flowering heads numerous, fruits light in weight and carried by winds, seeds germinate early.
Nativity: (i) Mediterranean Region: Reddy, 2008; Chandra Sekar, 2012. (ii) Europe: Patil, 1995.

26. *Sphaeranthus senegalensis* DC.
Procumbent much branched annuals, invading ditches, wet places, etc. deeply rooted, heads globose and packed densely with florets.
Nativity: Africa: Kshirsagar, 2005; Sainkhedia, 2016; Patil, 2024.
27. *Synedrella nodiflora* (L.) Gaertn.
Appears in pure stands, fast growing, invades mostly waste lands along river banks, neglected corners of cultivated fields and gardens, old building, etc. achenes with bristly awns, dispersal by wind.
Nativity: (i) West Indies: Reddy, 2008; Wagh & Jain, 2018. (ii) Tropical America: Patil, 1995; 2003; Shetty & Singh, 1987.
28. *Tridax procumbens* L.
Appears immediately after first flowers, blooms throughout a year and completes 2-4 life-cycles in a year, invades waste lands cultivated fields, gardens and parks, etc., seed dispersal by wind.
Nativity: (i) Tropical Central America: Reddy, 2008; Naik, 1998. (ii) South America: Patil, 1990.
29. *Xanthium strumarium* L.
Four different forms *viz*., winter, summer and monsoon and winter-summer observed, plasticity and adaptability to any extremes of environmental conditions noted, avoid shady habitats of thick forests, fruits spiny and hooked, carried by animals and passersby, not broused by animals, blooms in any season, suppress growth of other species, thus observed in pure stands.
Nativity: (i) Tropical South America: Reddy, 2008; Naik, 1998. (ii) Tropical America: Patil, 2003.

RESULTS & DISCUSSION

The research workers in plant taxonomy, ecology, forestry and agriculture are presently well acknowledged regarding problems caused by invasive plant aliens. Such species acquire capacity to replace indigenous plant species from their home. They disrupt nutrient cycles. Rapid increase in invasive species is leading to homogenise the world's flora. Bioinvasion is thus a primary cause of global biodiversity loss. Even the invasive species are threating considerably the valued environmental, agricultural or private resources by the damage.

The present author (Patil, 2024a,b) inventorised exotic or alien invasive plant species in the state of Maharashtra. It is felt that the characteristics of invasive aliens should be limelighted revealing their success in certain regions of localities. The present attempt is directed towards the study of their characteristics in Khandesh region of state of Maharashtra with particular emphasis on members of the family Asteraceae (Compositae) being a largest family in vascular plants. Moreover, they are mostly herbaceous and even noxious weeds of different habitats. As many as 29 invasive alien plant species pertaining to 25 genera of the said family are projected in this account.

The present in-depth observations on the asteraceous invasive aliens revealed some characteristics which rendered them aggressive and successful in the region of Khandesh. These characteristics are: well developed deep root system, more branching, short or longer life-cycle span, frequent and long flowering and fruiting periods, fruiting in different periods, production of numerous flowers, fruits and seeds, longer period of seed viability, early seed germination, light weight seeds, seeds or achenes furnished with pappus or such structures helping wind dispersal, fruits spiny helping dispersal by animals, not broused by animals, tolerance of wide range of soil and weather conditions, broad native range, also grow by vegetative means, aggressive growth and colonisers, phenotypic plasticity, achenes dimorphic, increased adaptability, emergence after first showers, etc.

All such invasive alien taxa have negative impacts on agricultural economy, soil fertility, water availability, alteration of soil characteristic, pollination in native flora, depletion or extinction of indigenous biodiversity, changes in soil microbial and faunal assemblage, etc. In present time, climate change is putting long strides which is favourable to such invasive aliens. We are again ignorant about their allelopathy which reduces germination of seeds of native plant taxa. In such circumstances, it is imperative to know first the number of invasive plant aliens, their distribution and period of appearance, allelopathic effects in a region of interest. The present

attempt is, therefore, justifiable for further investigations in Khandesh region of Maharashtra.

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