



Invasive Alien Angiospermic plants from Chamorshi Tahsil of Gadchiroli District of Maharashtra, India

Deshmukh U.B.^{1*}, Shende M.B.¹ and Rathor O.S.²

¹Higher Learning and Research Centre, Janata Mahavidyalaya, Chandrapur, 442 401, MS, INDIA

²N.E.S. Science College, Nanded, MS, INDIA

Available online at: www.isca.in, www.isca.me

Received 1st November 2015, revised 20th November 2015, accepted 5th December 2015

Abstract

Present study from Chamorshi Tahsil of Gadchiroli District Maharashtra, (India) represents 47 invasive alien angiospermic plant species belonging to 25 families and 40 genera with its additional information on nativity, life form, habitat, habit and introduction mode. About 63% of the invasive alien species contributes from Tropical America and 8% from Tropical Africa. An analysis shows that mostly dicots about 95 % introduced and monocot only of 05%, family asteraceae contributed more species (08 species), followed by Amaranthaceae and Convolvulaceae (04 species each). Analysis of habitat shows that herbs dominates (40 species), followed by shrubs (06 species) and climber (01 species). An analysis of invasive alien species reveals that about 87% plants unintentionally introduced and only about 13% intentionally introduced.

Keywords: Chamorshi tahsil, Gadchiroli district, invasive alien species, angiospermic, plants.

Introduction

Chamorshi is a tahsil place and small town (19.55°N 79.52°E) situated near the left bank of the Wainganga River and bounded by Gadchiroli, Etapalli, Mulchera and Dhanora. Chaprala is surrounded by Saoli Taluka towards North, Mul Taluka towards west, Pombhurna Taluka towards west, Gadchiroli Taluka towards North towards this place. Chaprala is in the border of the Gadchiroli District and Chandrapur District and Chaprala Wildlife Sanctuary is about 85 km away from Chandrapur. Markandadeo is a small village in a Chamorshi Tahsil situated on the left bank of the Wainganga river about 50.37 km south of Gadchiroli. It is the historical and tourist place in the Gadchiroli district, famous for Markanda Temple. The Markanda Temples are constructed on the bank of Wainganga river in the east side in 196 x 168 sqft. area. The Wainganga River flowing from north makes a 'U' turn to flow north again at Markandadeo region and then it flows south on its way to meet the Pranhita river and then the mighty Godavari. The Wainganga river is situated at latitude 19° 59' 55" North and 79° 52' 21" East in Markanda (19° 59' 40" N and 79° 51' 59" E).

Thousands of plant species have been introduced to new locations by humans, especially during the last three centuries, to serve many purposes¹. Alien species are those species which get moved to new habitats apart from its natural habitats². Alien invasive species are those exotic species which destruct native species from its habitat and flourishes well in these new habitats³. All over the world these invasive alien species found in all forms of ecosystem and all forms of organisms. After the habitat loss invasion of invasive alien plant species became second most reason to destruct the plant diversity in its natural habitat⁴.

Invasive plant species in a forest landscape displaces the native species by out competing the seeds of native species to germinate and by suppressing the growth of native saplings. Higher resource uptake capacity of invasive plant seedling and dense growth of the invasive plants thus providing shade to native species sapling are some strategies for this. In agricultural landscapes, the invasive plant species out compete crops for soil and water resources thus reducing crop yield and forage quality. Aquatic invasive plant species clogs water bodies thus causing danger to the existence of native aquatic flora and fauna and adversely affecting the public water supply and irrigation system. Invasion by alien plant species affects the dynamics and composition of soil. In fact, native biodiversity greatly affected by invasion alien invasive species than any other reason like diseases, pollution etc⁵.

Alien invasive species replace native biodiversity directly or indirectly. They greatly affects the native flora and fauna by many ways like reducing reproductive ability, changing soil texture and chemical profile and compete for pollinating agents, for water for sunlight and reduces photosynthetic rate and productivity. They also increases fire chances in an invaded habitat and become noxious to native biodiversity. For eradication of these invasive species from invaded habitat or ecosystem requires herbicides which also greatly affects native biodiversity⁶. For effective management or eradication of these invasive species from invaded habitat or ecosystem it is essential to understand their life form, habitat, uses and diversity, in present study enumeration of an invasive alien species from Chamorshi tahsil of Gadchiroli District of Maharashtra along with its diversity given.

Material and Methods

During the Jan.2012 – Sept. 2013 intensive floristic surveys were undertaken in different villages and Chaparala Wildlife Sanctuary and Markhandadeo of Chamorshi tahsil of Gadchiroli District in such way that each locality, habitat could be studied in every season of the year. Periodic collection of invasive alien plants was made from each locality. Invasive alien plants collected, processed and identified from the available floras and deposited at the PG. Dept. of Botany, Janata Mahavidyalaya, Chandrapur for further⁷⁻¹¹.

The nativity and introduction mode of these alien invasive plants noted from the available literature¹²⁻²³. The invasive alien species enumerated alphabetically with name of the family, botanical name of plant, life form, habitat, habit, origin and introduction mode etc. (table-1)

Results and Discussion

Total 47 Invasive alien plant species reported from Chamorshi tahsil of Gadchiroli district from 25 families and 40 genera. (table-1). Among these dicotyledons contributes 23 families and 38 genera and 45 species; monocotyledons contributes 02 families 02 genera 02 species. In this present study on the nativity basis ten different geographic regions recorded namely

South America, Tropical America, North America, Central America, West Indies, Mexico, Brazil, Tropical Africa, Europe and Mediterranean. Maximum 27 invasive alien plant species introduced from Tropical America and 06 species from Tropical Africa South America contributes about 05 species, North America and Mediterranean contributes 02 species each, West Indies, Brazil, Mexico, Europe, Central America contributes 01 species each. An analysis shows that mostly dicots about 95 % introduced and monocot only of 05%, family Asteraceae contributed more species (08 species), followed by Amaranthaceae and Convolvulaceae (04 species each). Analysis of habitat shows that herbs dominates (40 species), followed by shrubs (06 species) and climber (01 species).

An analysis of invasive alien species reveals that about 87% plants unintentionally introduced and only about 13% intentionally introduced. For ornamental purpose 03 species introduced namely *Lantana camara* L., *Impatiens balsamina* L., *Ageratum conyzoides* L etc. and for Agroforestry *Prosopis juliflora* (Sw.) DC. and Food purpose 01 species *Portulaca oleracea* L. introduced. Dominating genera were *Cassia* with 03 species, family Asteraceae possess maximum 08 genera followed by 03 genera of families namely Amaranthaceae, Malvaceae and Lamiaceae.

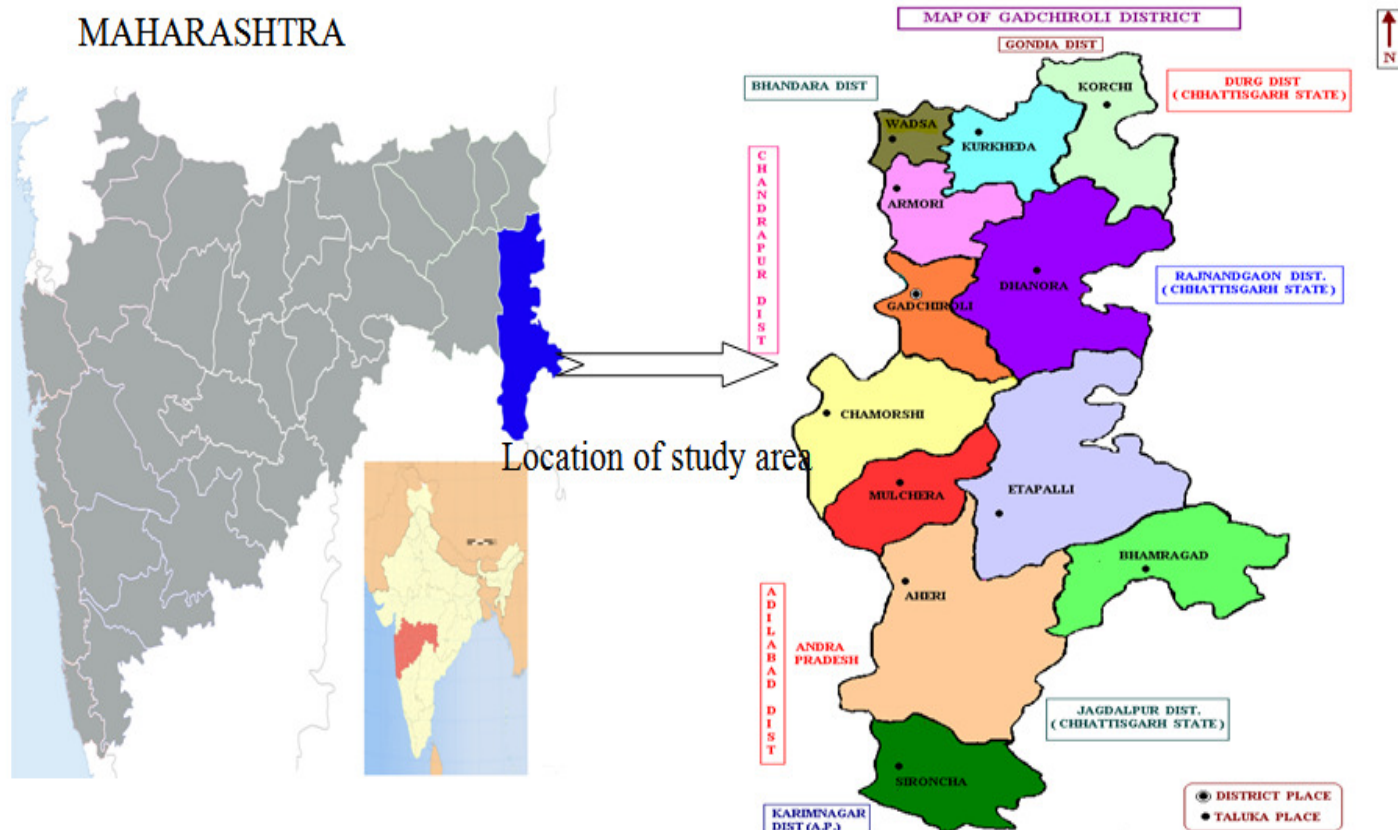


Figure-1
 Location of study area showing the Chamorshi tahsil in Gadchiroli district map

Table-1
Invasive alien angiosperms from Chamorshi tahsil of Gadchiroli district

Family	Botanical name of plant	Life form	Habitat	Habit	Origin	Introduction Mode
Amaranthaceae	<i>Alternanthera philoxeroides</i> (Mart.) Griseb	Herb	River bed	Perennial	Tropical America	Unintentional
Amaranthaceae	<i>Alternanthera sessilis</i> (L.) DC.	Herb	River bed	Perennial	Tropical America	Unintentional
Amaranthaceae	<i>Amaranthus spinosus</i> L.	Herb	Cultivated field	Annual	Tropical America	Unintentional
Amaranthaceae	<i>Celosia argentea</i> L.	Herb	Cultivated field	Annual	Tropical Africa	Unintentional
Asclepiadaceae	<i>Calotropis procera</i> (Ait.) R. Br	Shrub	Wasteland	Perennial	Tropical Africa	Unintentional
Asclepiadaceae	<i>Calotropis gigantea</i> (L.) R. Br.	Shrub	Wasteland	Perennial	Tropical Africa	Unintentional
Asteraceae	<i>Acanthospermum hispidum</i> DC.	Herb	Wasteland	Annual	Brazil	Unintentional
Asteraceae	<i>Ageratum conyzoides</i> L.	Herb	Wasteland	Annual	Tropical America	Ornamental
Asteraceae	<i>Blumea eriantha</i> DC.	Herb	Wasteland	Perennial	Tropical America	Unintentional
Asteraceae	<i>Eclipta prostrata</i> (L.) Mant.	Herb	Along roadside	Annual	Tropical America	Unintentional
Asteraceae	<i>Parthenium hysterophorus</i> L.	Herb	Wasteland	Annual	North America	Unintentional
Asteraceae	<i>Synedrella nodiflora</i> (L.) Gaertn.	Herb	Wasteland	Annual	West Indies	Unintentional
Asteraceae	<i>Tridax procumbens</i> L.	Herb	Cultivated field	Perennial	Central America	Unintentional
Asteraceae	<i>Xanthium strumarium</i> Mill	Herb	Along roadside	Annual	Tropical America	Unintentional
Balsaminaceae	<i>Impatiens balsamina</i> L.	Herb	Along roadside	Annual	Tropical America	Ornamental
Cactaceae	<i>Opuntia elatior</i> Miller	Shrub	Wasteland	Perennial	South America	Unintentional
Caesalpinaceae	<i>Cassia occidentalis</i> L.	Herb	Wasteland	Perennial	South America	Unintentional

Family	Botanical name of plant	Life form	Habitat	Habit	Origin	Introduction Mode
Caesalpinaceae	<i>Cassia pumila</i> Lam.	Herb	Wasteland	Annual	Tropical America	Unintentional
Caesalpinaceae	<i>Cassia tora</i> L.	Herb	Wasteland	Annual	South America	Unintentional
Cleomaceae	<i>Cleome viscosa</i> L.	Herb	Wasteland	Annual	Tropical America	Unintentional
Convolvulaceae	<i>Evolvulus nummularius</i> (L.) L.	Herb	Wasteland	Perennial	Tropical America	Unintentional
Convolvulaceae	<i>Ipomoea carnea</i> Jacq	Shrub	Wasteland	Perennial	Tropical America	Unintentional
Convolvulaceae	<i>Ipomoea hederifolia</i> L.	Herb	Forests	Annual	Tropical America	Unintentional
Convolvulaceae	<i>Ipomoea nil</i> (L.) Roth.	Herb	Wasteland	Annual	North America	Unintentional
Cusutaceae	<i>Cuscuta chinensis</i> Lam	Herb	Wasteland	Perennial	Mediterranean	Unintentional
Cusutaceae	<i>Cuscuta reflexa</i> Roxb	Herb	Wasteland	Annual	Mediterranean	Unintentional
Euphorbiaceae	<i>Euphorbia hirta</i> L.	Herb	Cultivated field	Annual	Tropical America	Unintentional
Fabaceae	<i>Indigofera linnaei</i> Ali	Herb	Forests	Annual	Tropical Africa	Unintentional
Lamiaceae	<i>Hyptis suaveolens</i> (L.) Poit.	Herb	Along roadside	Annual	Tropical America	Unintentional
Lamiaceae	<i>Leonotis nepetifolia</i> (L.) R. Br.	Herb	Wasteland	Annual	Tropical Africa	Unintentional
Lamiaceae	<i>Ocimum americanum</i> L.	Herb	Wasteland	Annual	Tropical America	Unintentional
Malvaceae	<i>Malachra capitata</i> (L.) L.	Herb	Wasteland	Perennial	Tropical America	Unintentional
Malvaceae	<i>Urena lobata</i> L.	Shrub	Wasteland	Perennial	Tropical Africa	Unintentional
Malvaceae	<i>Sida acuta</i> Burm.f.	Herb	Wasteland	Annual	Tropical America	Unintentional
Mimosaceae	<i>Prosopis julifera</i> (Sw.) DC.	Shrub	Wasteland	Perennial	Mexico	Agro forestry
Oxalidaceae	<i>Oxalis corniculata</i> L.	Herb	Cultivated field	Perennial	Europe	Unintentional
Papaveraceae	<i>Argemone mexicana</i> L.	Herb	Wasteland	Annual	South America	Unintentional

Family	Botanical name of plant	Life form	Habitat	Habit	Origin	Introduction Mode
Pedaliaceae	<i>Martynia annua</i> L.	Herb	Wasteland	Perennial	Tropical America	Unintentional
Polygonaceae	<i>Antigonon leptopus</i> Hook. and Arn.	Climber	Along roadside	Perennial	Tropical America	Unintentional
Pontederiaceae	<i>Monochoria vaginalis</i> (Burm.f.) C. Presl.	Herb	River bed	Perennial	Tropical America	Unintentional
Portulacaceae	<i>Portulaca oleracea</i> L.	Herb	Wasteland	Annual	South America	Food
Scrophulariaceae	<i>Scoparia dulcis</i> L.	Herb	Wasteland	Perennial	Tropical America	Unintentional
Solanaceae	<i>Datura metel</i> L.	Shrub	Perennial Wasteland	Perennial	Tropical America	Unintentional
Solanaceae	<i>Physalis minima</i> L.	Herb	Wasteland	Annual	Tropical America	Unintentional
Tiliaceae	<i>Triumfetta rhomboidea</i> Jacq.	Herb	Wasteland	Annual	Tropical America	Unintentional
Typhaceae	<i>Typha angustifolia</i> L.	Herb	River bed	Perennial	Tropical America	Unintentional
Verbenaceae	<i>Lantana camara</i> L.	Herb	Forests	Perennial	Tropical America	Ornamental

Many invasive alien plant species like *Malachra capitata* (L.) L. *Celosia argentea* L., *Lantana camara* L., *Parthenium hysterophorus* L. *Xanthium strumarium* L. and *Prosopis juliflora* (Sw.) DC. *Ageratum conyzoides* L. *Hyptis suaveolens* (L.) Poit, becomes highly invasive and found in Agriculture land, Forest area and along roadside and in protected areas like in Chaparala Wild Life Sanctuary.

As compared to native plant diversity invasive alien plants species more rapidly adapt and establish to invaded habitat because they grow rapidly by producing more biomass, more reproduction ability by producing more viable seed and by vegetative propagation and having more seed dispersal mechanisms and having more competitive ability than native plant species²⁴. Invasive alien species change ecosystem structure and function by changing vegetation and by replacing native biodiversity and produce more biomass and density as compared to native species which is more threat for decline of endangered and threatened species in invaded habitat²⁵. Invasive alien weeds become noxious and badly affect ecosystem, native flora and fauna, environment, habitat of native biodiversity and also affect the human health and economics¹³.

Because of this, it is important to raise awareness at all levels, both at governmental and non-governmental level to face the serious problem of invasive alien species in any ecosystem or non-protected and protected areas like in Chaparala Wild Sanctuary and in Chamorshi Tahsil of Gadchiroli district. Public awareness is important among rural, tribal and schools, college student levels in presence of Agriculturist or Botanist or Environmentalist or Officer from forest department or all of them to stop the invasion or eradication of invaded invasive plant species.

Acknowledgment

The authors thank to Janata Education Mahavidyalaya and Secretary of Chanda Shikshan Prasark Mandal Chandrapur, for providing facilities.

References

- Richardson D.M., Forestry and agroforestry, In: Simberloff D, Rejmánek M (eds) Encyclopedia of

- biological invasions, University of California Press, Berkeley, 241–248 (2011)
2. Saxena K.G., Biological invasions in the Indian subcontinent: Review of invasion by plants. In: Ramakrishnan, P.S. (ed.). Ecology of biological invasion in the tropics. International Scientific Publication New Delhi. 21-34, (1991)
 3. Keane R.M. and Crawley M.J., Exotic plant invasions and the enemy release hypothesis, *Trends Ecol. Evol.*, **17**, 164 -170 (2002)
 4. Hobbs R.J. and Humphries S.E., An integrated approach to the ecology management of plant invasions, *Biology*, **9**, 761-770 (1995)
 5. Drake J.A., Mooney H.A., Dicastri F., Grooves R., Kruger F., Rejmanek M., Williamson M., Biological Invasions: A Global Perspective, John Willey, Chichester, UK, (1989)
 6. Levine J.M., Vila M., D'Antonio C.M., Dukes J.S., Grigulis K. and Lavorel S., Mechanisms underlying the impacts of exotic plant invasions, *Proc. Roy. Soc. Lond. B. Biol.*, **270**, 775–781 (2003)
 7. Cook T., The flora of presidency of Bombay (reprint edition) BSI, Calcutta, **1,2,3** (1967)
 8. Ugemuge N.R., Flora of Nagpur District, Shree Prakashan, Nagpur, 440010 (1986)
 9. Yadao S.R. and Sardesai M.M., Flora of Kolhapur District, Shivaji University, Kolhapur, 416004 (2002)
 10. Naik V.N., Flora of Osmanabad, Venus Prakashan, Aurangabad, 431001 (1979)
 11. Naik V.N., Flora of Marathwada, Amrut Prakashan, Aurangabad, **1 and 2** (1998)
 12. Reddy C.S., Catalogue of Invasive Alien Flora of India, *Life Science Journal*, **5(2)**, 84-89 (2008)
 13. Khanna K.K., Invasive Alien Angiosperm of Uttar Pradesh, *Biological Forum, An International Journal*, **1(2)**, 41-46 (2009)
 14. Sood S.K., Kumar S, Dogra K.S. and Sharma R., Alien Plants Distribution and Ecology in the Temple-Courtyards of Himachal Pradesh (N.W. Himalaya), *Himachal Pradesh University Journal*, 1-11 (2011)
 15. Shukla B.K and Sinha G.P., An inventory of invasive alien species of Chhattisgarh, India, *Bioherald, International Journal of Biodiversity and Environment*, **2(2)**, 126-133 (2012)
 16. Chandrasekar K., Invasive Alien plants of Indian Himalayan Region-Diversity and implication, *American journal of plant science*, **3**, 177-184 (2012)
 17. Deshmukh U.B., Shende M.B. and Rathor O.S., Invasive Alien Angiosperms of Chandrapur District of Maharashtra (India), *Bionano Frontier*, **5(2-II)**, 100-103 (2012)
 18. Udayakumar M., Bharathidasan E. and Sekar T., Invasive Alien Flora of Thiruvallur District, Tamil Nadu, India, *Sch. Acad. J. Biosci.*, **2(4)**, 295-306 (2014)
 19. Srivastava S, Dvivedi A and Shukla R.P., Invasive Alien Species of Terrestrial Vegetation of North-Eastern Uttar Pradesh, *Int J Forest Res*, 1-9 (2014)
 20. Aravindhan V. and Rajendran A., Diversity of Invasive Plant Species in Boluvampatti Forest Range, The Southern Western Ghats, India, *American-Eurasian J. Agric. and Environ. Sci.*, **14(8)** 724-731 (2014)
 21. Wagh V.V. and Jain A.K., Invasive alien flora of Jhabua district, Madhya Pradesh, India, *Int. J. Biodivers. Conserv*, **7(4)**, 227-237 (2015)
 22. Mishra A.K., Mir S.A., Sharma M.P. and Singh H, Alien plant species in Delhi flora, *International Journal of Geology, Earth and Environmental Sciences*, **5(2)** 128-140 (2015)
 23. Singh S, Khurajam JS and Roy R.K., Checklist of invasive alien species in CSIR-NBRI Botanic Garden, Lucknow, India, *Communications in Plant Sciences*, **5(3-4)**, 59-65 (2015)
 24. Simberloff D., Parker I.M. and Windle P.M., Introduced species policy, management and future research needs, *Frontiers of Ecological Environment*, **(3)**, 12–20 (2005)
 25. Denslow J.S., Managing dominance of invasive plants in wild lands, *Current Science*, **93(11)**, 1579–1586 (2007)