

Study of few exotic/alien plant species of dicot families and their economic importance

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ABSTRACT

A non-native plant or animal species is referred to as an exotic species in biology. It is brought into an environment where it does not naturally occur. The species' arrival could be intentional or unintentional. It is not always regarded as unpleasant or obtrusive.

Bihar's flora has been significantly altered as a result of the purposeful and unintentional import of alien species from all over the world. In view of this, we make an effort to study the alien/exotic species of Dicot families of Gopalganj, Bihar. In current research we surveyed twenty invading plant species based on data collected from traditional practitioners, forest areas, old men, farmers, and householders. Scientific name, popular name, family, behavior, nativity, components used, local usage, and chemical composition were used to classify the twenty species. Following the survey, we determined that exotic species represent a serious impediment to the world's economy's smooth operation. It has extended its tendrils all over the world, affecting practically every country. When an exotic species decides to invade a habitat, it influences the plants that grow around it and alters the environmental conditions. Exotic plants, on the other hand, have some medical potential. Finally, we infer that exotic species are more damaging to native species while yet possessing some characteristics values.

Key Words - Vermicompost, organic farming, tomato, t-test, Environment.

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INTRODUCTION

The International Union for Conservation of Nature and Natural Resources (IUCN) describes "alien invasive species" as a remote species that becomes classical in the natural surroundings, semi-natural ecosystems or habitat as a change agent and jeopardizes native genetic diversity. Invasive species of alien plants are one of the most significant threats to the lengthy viability and richness of ecosystems, as well as a huge threat to domestic genetic variety (Wagh and Jain, 2015).

According to The Convention for Biological Diversity, wild species are the world's second leading threat to biodiversity, imposing substantial costs on farming, woodland, and marine environments. Biological invasion is a type of

biological contamination and a key contributor to artificial alterations that lead to the demise of local plants. The ecosystem perspective to plant invasion has generally focused on (a) environmental and physical variables that favor particular breed penetration effectiveness and (b) the composition and adaptability of invading communities. (Srivastava *et.al*, 2014). Alien plants have a range of impacts mostly on the ecosystem and economics of quasi locations; several exotic plants can be useful to the economy, while others might have major negative implications. Some alien civilizations, which are routinely fostered, may give food, medicine, fuel, or animal feed to the neighboring humans, whereas others are

responsible for the destruction of native plants, as well as having a devastating effect on agricultural production, woodland regeneration, cattle ranching, and public health (Das and Duarah, 2013). Based on their actual consequences, it is predicted that up to 50% of invading species in general can be categorized as environmentally detrimental (Richardson *et al.*, 2000).

An approximated 10% of the world's largest vascular plants have the ability to infiltrate other environments and have a harmful influence on local biodiversity, either explicitly or implicitly. Aliens make up about 18 percent of the Indian flora, with Americans accounting for 55 percent, Asian and Malaysian species accounting for 30 percent, and European and Central Asian species accounting for 15 percent. Regional and national genuine information on invading aliens is clearly needed for tracking their expansion and effect in various places and developing effective strategies. Chhattisgarh's catalog of alien species is a start in the right direction (Shukla and Sinha, 2012).

Naturalization has been identified as the initial stage of biological invasions. A naturalized species (foreign, alien, or non-native) which can propagate and establish communities over many centuries without (or in spite of) explicit human involvement. (Richardson *et al.*, 2000; Pysek *et al.*, 2002).

Exotic species possess few advantageous properties over native species are faster growth rate and more production of Biomass. When compared to native species, biomass has a higher competitive potential, a higher reproductive efficiency, and qualities such as a large quantity of spores, fruitful dispersal, vegetative propagation, rapid installation, and other traits that aid in adaptation to new ecosystems. (Simberloff *et al.*, 2005 and Sharma *et al.*, 2005). Exotic species have potential to survive in extreme conditions and are allelopathic in nature (Sharma *et al.*, 2005 and Haung *et al.*, 2009). Invasive success is a combined result of auto ecological attributes of invading species as well as biotic and abiotic properties of the target habitat (Higgins and Richardson., 1996).

In light of this, the current study strives to learn the impact of invasive alien species invading the vegetation to the natural habitat of the Gopalganj. Gopalganj is a rural community of Bihar where residents who live in distant locations have limited access to contemporary health care. Their primary sources of immediate medical treatment are the local flora found in the area. The diversification of plants in these areas also makes them a target for colonizing alien species, which are causing major agricultural and ecosystem loss.

We mounted the survey of 20 exotic plants of town. This listing of invasive exotic species would act as a base for future studies into the conservation of Gopalganj's indigenous and native woodland vegetation. The families of plant species in the current study, titled "Study of few exotic / alien plant species of dicot families and their economic importance" of Gopalganj, have been listed using the Benthum and Hooker (1862-1883) systems of plant categorization. While the current reorganization of families and specimen naming is based on Angiosperm Phylogenetic Group (APG 3) classification (2009).

The plant species were brought into the laboratory and identified on the basis of morphological and microscopic features of relevant available literatures (Mooney and Drake., 1987; Drake *et al.*, 1987; Randall *et al.*, Vitousek, 1992; Randall *et al.*, 1997; Jenkins., 1999; Lonsdale., 1999; Mooney., 1999; Elton., 2000; Mooney and Hobbs., 2000; Cowie., 2001; McNeely *et al.*, 2001). The nativity of the species is provided based on the work of (Sharma., 1984; Hajra and Das., 1982; Redd *yet al.*, 2000; Reddy and Raju., 2002; Reddy and Reddy., 2004; Murthy *et al.*, 2007).

Enumeration of plant Species:

Total 20 species under 4 dicot families were documented as exotic plant species. The 20 exotic species are mentioned below along with scientific name, common name, family name, habit, nativity, part used, local used, chemical composition. These are discussed as:

Table-1 Table showing the general characteristic features of all 20 exotic plants used in the survey including their medicinal/local uses and chemical composition.

Characteristics	Description
1. <i>Aerva vanica</i> (Burm.f.) Juss.E Schult	
Common Name	Desert Cotton/Safed bui
Scientific Name	<i>Aerva vanica</i> (Burm.f.) Juss.E Schult
Family	Amaranthaceae
Habit	Perennial Herb
Nativity	Tropical America
Parts Used	Seeds
Local uses	Boiled seeds are fed to animals suffering from Foot and mouth disease.
Chemical composition	Hentriacontane, nonacosane, heptacosane, pentaconsane, octacosane, triacontane, squalene <i>etc.</i>
2. <i>Alternanthera paronychioides</i> A. st. Hill	
Common Name	Smooth chaff flower
Scientific Name	<i>Alternanthera paronychioides</i> A. st. Hill
Family	Amaranthaceae
Habit	Perennial Herb
Nativity	Tropical America
Parts Used	Whole plant
Local uses	It is used as a local medicine often mixtures with other medicinal plants, to treat hepatitis, tight chest, Bronchitis, asthma and other lung troubles.
Chemical composition	Phaeophytin, oleanoic acid, beta-sitosterol, 3beta-hydroxystigmast-5-en-one, alpha-spinasterol, 24-methylenecycloartanol, cycloeucalenol, phytol.
3. <i>Alternanthera philoxeroides</i> (Mart). Griesb.	
Common Name	Alligator weed
Scientific Name	<i>Alternanthera philoxeroides</i> (Mart). Griesb.
Family	Amaranthaceae
Habit	Perennial Herb
Nativity	South America
Parts Used	Leaves
Local uses	The young tips can be eaten or cooked.
Chemical composition	Phaeophytin, oleanoic acid, beta-sitosterol, 3beta-hydroxystigmast-5en-7 one, alpha-spinasterol, 24-methlenecloartanol, cycloeucalenol, phytol

4. <i>Alternanthera tenella</i> Colla	
Common Name	Joseph's coat
Scientific Name	<i>Alternanthera tenella</i> Colla
Family	Amaranthaceae
Habit	Perennial Herb
Nativity	Tropical America
Parts Used	Stems and leaves
Local uses	It is used in folk medicine to treat fever, infections and genital inflammation.
Chemical composition	Flavonoids, acacetin 8-C-, [alpha-L-rhanopyranosyl-(1-2 beta-D-glucopyranoside)], Vitexin, quercetin and kaempferol.
5. <i>Celosia argentea</i> L.	
Common Name	Silver Cock's comb
Scientific Name	<i>Celosia argentea</i> L.
Family	Amaranthaceae
Habit	Annual Herb
Nativity	Caribbean and South America
Parts Used	Leaves and stems
Local uses	The leaves, young stems and inflorescence are used for stew, as they soften up readily in cooking. The leaves also have a soft texture and a mild spinach-like taste.
Chemical composition	Saponins, peptides, phenols, fatty acids, and amino acids, of which saponins have been considered as the characteristic and active constituents of <i>Celosia argentea</i> .
6. <i>Digera muricata</i> (L.) Mart.	
Common Name	False Amaranth
Scientific Name	<i>Digera muricata</i> (L.) Mart.
Family	Amaranthaceae
Habit	Annual Herb
Nativity	Africa
Parts Used	Flower and leaves
Local uses	It is used against digestive system disorders. Seeds and flowers are also used to treat urinary disorders. Leaf is applied locally to prevent pus formation.
Chemical composition	Flavanoids, alkaloids, terpenoids, saponins, coumarins, tannins, cardiac glycosides and anthraquinones.

7. <i>Gomphrena serrata</i> L.	
Common Name	Prostrate Gomphrena
Scientific Name	<i>Gomphrena serrata</i> L.
Family	Amaranthaceae
Habit	Perennial Herb
Nativity	Tropical America
Parts Used	Whole plants
Local uses	Used in nutrition and traditional folk medicine. More effective against diarrhea, hay fever, pains, carminative, bronchial asthma, diabetes and dermatitis.
Chemical composition	Flavonoids, volatile oil, alkaloids, tannins and phenols, saponins, steroids, carbohydrates, acid compounds, glycoside, amino acids and proteins.
8. <i>Corchorus aestans</i> L.	
Common Name	East Indian Mallow, Jute.
Scientific Name	<i>Corchorus aestans</i> L.
Family	Tiliaceae
Habit	Annual herb
Nativity	Tropical America
Parts Used	Leaves, seeds, young shoot
Local uses	Leaves are used for the treatment of headache, and the seeds in the form of decoction, as a tonic, carminative and febrifuge. The young shoots and leaves, either from cultivated or wild plants are locally solid.
Chemical composition	Flavonoids, glycosides, Carbohydrates, lupeol, betulin, 2- methyl anthraquinones, scopoletin etc.
9. <i>Corchorus fascicularis</i> Lam.	
Common Name	Chunchali soppu / Bahuphalli/ Kiram kuri
Scientific Name	<i>Corchorus fascicularis</i> Lam.
Family	Tiliaceae
Habit	Annual herb
Nativity	Tropical America
Parts Used	Whole plant, fruit
Local uses	The plant is used as a cooling medicine in fevers; its mucilage is prescribed in gonorrhoea, also for increasing the viscosity of seminal fluid. An extract of the plant is applied as a paste to wounds.
Chemical composition	B-sitosterol, betulinic acid, terpenoids, steroids, phenol and tannins, saponins etc.

10. <i>Corchorus tridens</i> L.	
Common Name	Horn-Fruited Jute
Scientific Name	<i>Corchorus tridens</i> L.
Family	Tiliaceae
Habit	Annual Herb
Nativity	Tropical America
Parts Used	Leaves
Local uses	The leaves are used as a vegetative in stews eaten with starchy staple foods, and in soups and sauces. In West Africa and Malawi, the plant has been used for its stem its stem fibres, e.g., for finishing lines and rough cordage.
Chemical composition	Flavanoids, alkaloids, carbohydrates, quinines, steroids, tannins, phenol <i>etc.</i>
11. <i>Corchorus trilocularis</i> L.	
Common Name	Wild jute, African jute
Scientific Name	<i>Corchorus trilocularis</i> L.
Family	Tiliaceae
Habit	Annual Herb
Nativity	Tropical America
Parts Used	Leaves and seeds
Local uses	The leaves are used as a plaster to reduce swellings. The seeds are used in the treatment of gripe and nausea.
Chemical composition	Tetracyclic triterpenoid trilocularol A and trilocularol A 3-glucoside and pentacyclic triterpenoids tirlocularoside A.
12. <i>Asclepias curassava</i> L.	
Common Name	Tropical milkweed/ Blood flower
Scientific Name	<i>Asclepias curassava</i> L.
Family	Asclepiadaceae
Habit	Perennial Herb
Nativity	Tropical America
Parts Used	Roots and leaves
Local uses	It is used as a contraceptive and snakebite remedy by Native Americans and is used in the tropics as an emetic, laxative, febrifuge, expectorant and to remove warts and is used to treat skin parasites, kidney stones and asthma.
Chemical composition	Acid-detergent fiber, cellulose, speciosa, acid detergent lignin, alpha and beta amyryn and acetates.

13. <i>Calotropis procera</i> (Ait.) R.B.	
Common Name	Apple of Sodom / Rubber tree
Scientific Name	<i>Calotropis procera</i> (Ait.) R.B.
Family	Apocyanaceae
Habit	Perennial Shrub
Nativity	Tropical Africa
Parts Used	Leaf
Local uses	It is used for digestive disorders including diarrhea, constipation and stomach ulcers, joint pain and for parasitic infections.
Chemical composition	Cardenolides, steroids, tannins, glycosides, phenols, terpenoids, sugars, flavonoids, alkaloid sand saponins.
14. <i>Calotropis gigantea</i> (L.) R.Br.	
Common Name	Crown flower
Scientific Name	<i>Calotropis gigantea</i> (L.) R.Br.
Family	Apocynaceae
Habit	Perennial Shrub
Nativity	Tropical Africa
Parts Used	Bark
Local uses	Bark is used against neuro dermititis and syphilis.
15. <i>Cryptostegio grandiflora</i> R.Br.	
Common Name	Rubber vine
Scientific Name	<i>Cryptostegio grandiflora</i> R.Br.
Family	Apocynaceae
Habit	Perennial shrub
Nativity	Madagascar
Parts Used	Leaves
Local uses	The leaves are widely used as, folk Caribbean Colombian medicine for their anti-inflammatory effects.
Chemical composition	Phytosterols and triterpenoids (lanosterol, beta-sterol, stigmaterol, campesterol, friedelin, lupeol, ursolic acid and beta-amyrin).
16. <i>Chamaesyce hirta</i> (L.) Millsp.	
Common Name	Asthma plant
Scientific Name	<i>Chamaesyce hirta</i> (L.) Millsp.
Family	Euphorbiaceae
Habit	Annual herb
Nativity	Tropical America
Parts Used	Whole plant
Local uses	It is used to heal wounds. Several pharmacological properties including antiseptic, antidiabetic, antibacterial etc. It is used for female disorders, respiratory ailments, worm infestations in children etc.
Chemical composition	Afzelin, quercitrin, myricitrin, gallic acid, protcatechuic acid etc.

17. <i>Chamaesyce hypericifolia</i> (L.) Millsp.	
Common Name	Graceful sandmat
Scientific Name	<i>Chamaesyce hypericifolia</i> (L.) Millsp.
Family	Euphorbiaceae
Habit	Annual Herb
Nativity	Tropical South America
Parts Used	Leaves, latex
Local uses	It is used for treatment of gonorrhoea, menorrhagia, leucorrhoea, pneumonia and bronchitis.
Chemical composition	Flavonoids, sterols, lignans, coumarins, tannins, quinines etc.
18. <i>Croton bonplandianum</i> Boil.	
Common Name	Ban Tulsi
Scientific Name	<i>Croton bonplandianum</i> Boil.
Family	Euphorbiaceae
Habit	Perennial/Herb
Nativity	South America
Parts Used	Leaves
Local uses	It's used for the treatment of blood pressure and cuts and wounds.
Chemical composition	Caryophyllene, germacrene, caryophyllene, germacrene, borneol, isobornyl etc.
19. <i>Euphorbia cyathophora</i> Murry	
Common Name	Dwarf poinsettia/ Fire on the mountain
Scientific Name	<i>Euphorbia cyathophora</i> Murry
Family	Euphorbiaceae
Habit	Annual Herb
Nativity	Tropical America
Parts Used	Roots and barks.
Local uses	Decoctions of barks are used to treat ague.
Chemical composition	Flavonoids, lignins, alkaloids, tannins etc.
20. <i>Euphorbia grantii</i> Hork.f.	
Common Name	African milk bush
Scientific Name	<i>Euphorbia grantii</i> Hork.f.
Family	Euphorbiaceae
Habit	Annual shrub
Nativity	Tropical America
Parts Used	Latex
Local uses	Several drops of latex from warmed leaves are taken to expel intestinal parasites and sometimes tapeworms. The leaves sap is also used to treat cardiac problems and excessive menstruation.
Chemical composition	Flavonoids, lignins, tannins, alkaloids.

Through detailed analysis of all 20 alien species, we observed that most of the exotic species are from Tropical America region. These species are invaded at gopalganj and in present time, these plants are dominant over native vegetation. Other exotic plants belong from different places such as South East Australia, Tropical Africa, Madagascar, Mexico and Caribbean but they are quite less in

numbers than the species of tropical America. Unlike our analysis (Sourabh *et al.*, 2008) observed that 36.12% of exotic species are from America followed by China (11.03%), West Indies (5.19%), Europe (5.19%). The overall percentage wise distributions of exotic plants are mentioned in Pie chart (Figure 1).

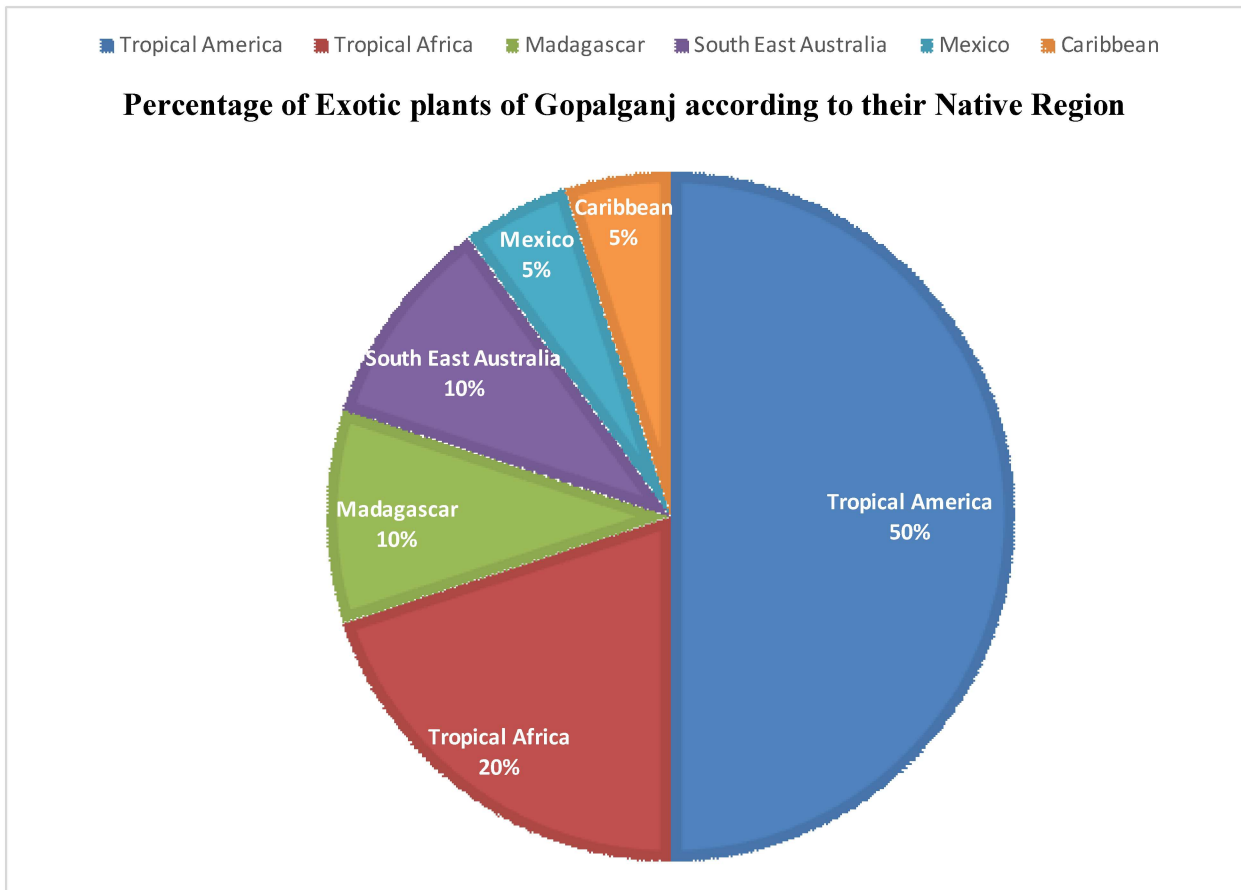


Figure: 1 Pie Chart showing the percentages of exotic plants of different regions, which are alien species at Gopalganj, Bihar. 50% of total exotic species are from Tropical America followed by Tropical Africa (20%), South East Australia (10%), Madagascar (10%), Caribbean (5%) and Mexico (5%). Native land is flooded with exotic species and they are dominant over local vegetation.

Our research also sheds light on the daily ritual assessment, which reveals that herb with 16 species are the most common, trailed by 4 shrubs. Trees and Climbers are recessive with no growth. Likewise, observation of (Sourabh *et al.*, 2008) also proved that herb is a voracious former colony of

marginal lands with little ground cover and bare soil, such as barren wasteland, wayside land, or overfished property. They spread very rapidly and suppress the growth of native species. Moreover few weeds are extremely harmful for human and animals.

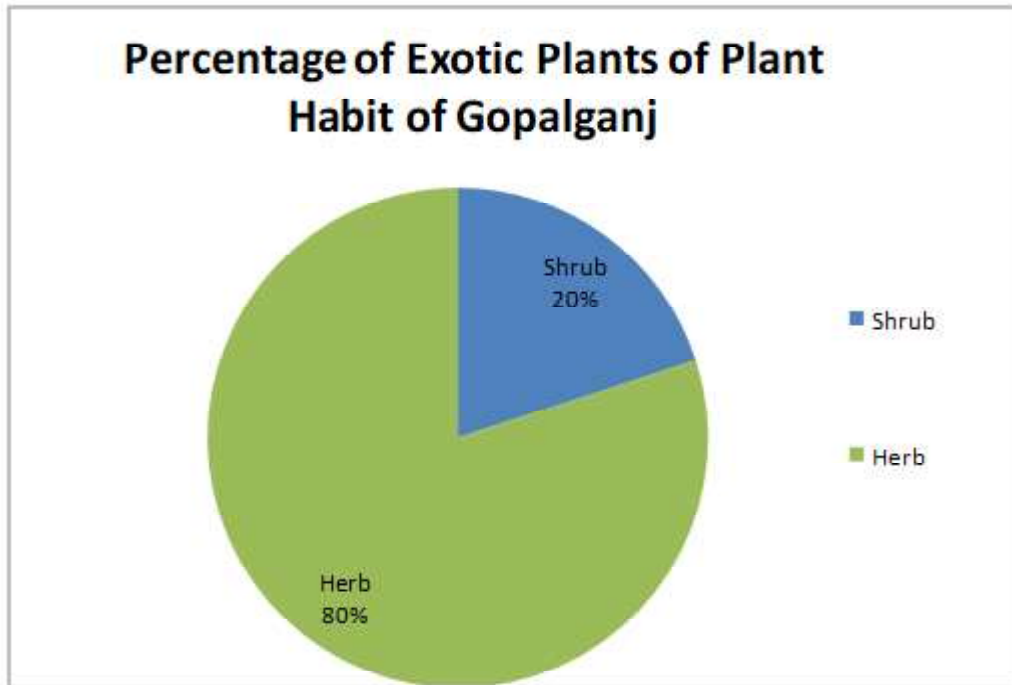


Figure: 2 Pie chart showing percentage of habit of different plants. Herbs are dominant habit with 80% followed by Shrubs. Trees and Climbers are recessive in exotic species at Gopalganj, Bihar

We observed various families of invading organisms. Having seven species, Amaranthaceae is now the most dominant family, trailed by Asclepiadaceae/Apocyanaceae with six, Tiliaceae with four, and Euphorbiaceae with four.

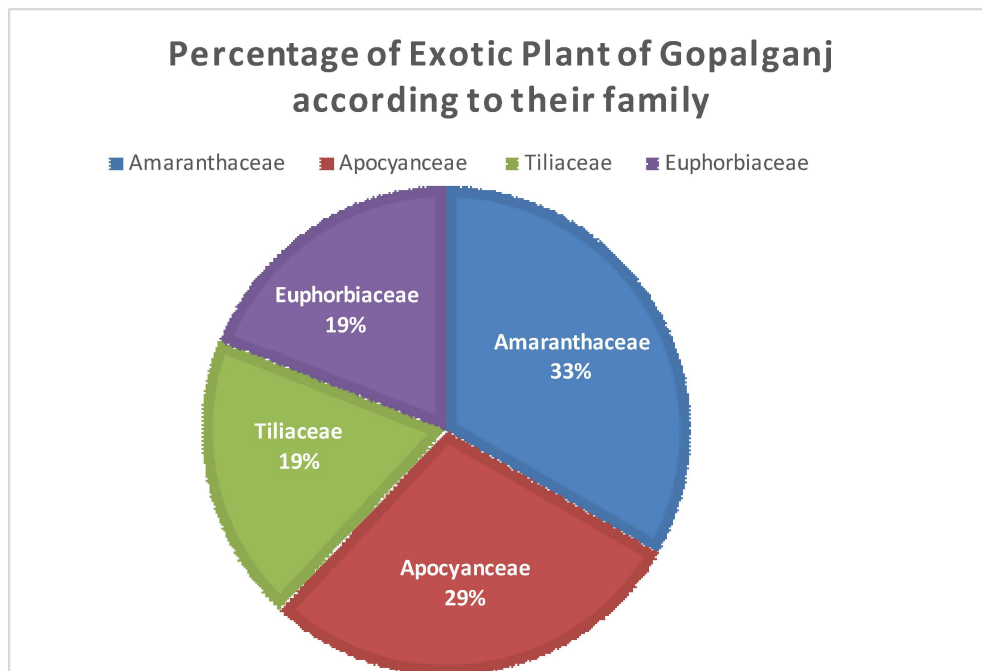


Figure: 3 Pie Chart describes that Amaranthaceae is the dominant family of invasive species followed by other families

The dominance of Amaranthaceae species in the alien classification demonstrates the significant influence of neotropical vegetation on the Gopalganj region. In addition to negative impact on indigenous flora and economy, some exotic plants were much useful to local people.

The prostrate Gomphrena is economically important species. Seed and flower was used to treat urinary disorders. Leaf paste applied locally to prevent pus formation. Joseph's coat used to treat fever, infections and genital inflammation. East India Mallow is used for the treatment of stomach and Pneumonia. Bark of Rubber vine used for treat neurodermatitis and syphilis. Safed bui, smooth chaff flower, Alligator weed, Silver cock's comb, false amaranth, white jute, blood flower, Apple of sodom, crown flower, Asthma plant, Bana tulsii and African milk bush were used in native medicine.

SUMMARY AND CONCLUSION

Survey based 20 plant species were studied based on information collected from traditional practitioners, forest dwellers, Vaidis, old men, farmers and housewives. The 20 species was categorized under heads i.e. scientific name, common name, family, habit, nativity, parts used, local uses and chemical composition. After Survey we analysis exotic species are a major obstacle in way of smooth running economy of world. It has spread its tentacles around the globe and has affected almost every part of world. Exotic species affects the plants growing around it and it also changes the conditions of the environment when it invades a habitat. But exotic have also some medicinal value. Finally we conclude that exotic species is more harmful to native species but also have some properties/medicinal values.

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