

Documentation of Invasive Alien Weeds of Family Asteraceae From Kishtwar (Jammu and Kashmir), India

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Abstract

Kishtwar district's invasive alien plant species were analyzed with regard to their floristic status, origin, introduction and invasion status. Most of the species identified were annuals, followed by perennial herbs. The invasives comprised of 16 families, the largest being Asteraceae, Fabaceae and Brassicaceae. Asteraceae or Compositae is an exceedingly large and widespread family of Angiospermae. The group has more than 23,000 currently accepted species, spread across 1,620 genera and 12 subfamilies. The main feature of the family is the composite flower type in the form of capitula surrounded by involucre bracts. This family has a remarkable ecological and economical importance, and is present from the polar regions to the tropics, colonizing all available habitats. Most of the species originated from Europe followed by North America. About one-third of the species were serious invaders of natural habitats.

Key words: Invasive alien species, Asteraceae, biodiversity, Kishtwar.

Introduction

Biological diversity faces many threats throughout the world. One of the major threats to the native biological diversity is now acknowledged by scientists and Governments to be Biological Invasions caused by the invasive alien species. The movement of species by man beyond natural dispersal barriers is a still accelerating process, resulting from global commerce and disturbance of natural ecosystems. Species introductions lead to biological invasions, which can have profound impacts on the regional economy and the ecological integrity of natural communities (Mooney and Hobbs, 2000; Pimentel, 2002). The number of alien plant species varies considerably among regions (Vitousek et al. 1997), and both socio-economic factors such as human density and degree of urbanization as well as biogeographic factors such as latitude and climate have been identified to correlate with alien species richness (Lonsdale, 1999; Rejmanek, 2000). Those alien species that become established in a new environment, then proliferate and spread in ways that are destructive to human interests are considered "Invasive Alien Species" (IAS). The spread of invasive species is now recognised as one of the greatest threats to our planet's environmental and economic well-being. The integrity of natural ecological systems worldwide is increasingly being jeopardised due to large - scale introductions of alien plants, animals and micro-organisms. This process is rapidly breaching biogeographic barriers that are responsible for global biodiversity maintenance leading to the 'McDonaldisation' (Lovei, 1997), or increasing homogenisation (Lodge, 1993; Werren et al., 2002). Such biotic homogenisation is a result of increasing global trade and transport because of which the number of plant and animal species translocated by humans, either deliberately or by accident, has drastically increased (Drake et al., 1989; Williamson, 1996; Mack et al., 2000; Kowarik, 2003; Perrings et al., 2005) and such invasions have the potential of altering the composition of the Earth's biodiversity (Vitousek et al., 1996, 1997; Mack et al., 2000). Asteraceae have a cosmopolitan distribution, and

are found everywhere except Antarctica and the extreme Arctic. These are mostly herbaceous plants, but some shrubs, trees and climbers do exist. Asteraceae are generally easy to distinguish from other plants, mainly because of their characteristic inflorescence and other shared characteristics. The most evident characteristic of Asteraceae is their inflorescence: a specialised capitulum, technically called a calathid or calathidium, but generally referred to as flower head or simply capitulum. The capitulum is a contracted raceme composed of numerous individual sessile flowers, called the florets, all sharing the same receptacle.

Taking note of the importance of studies on the alien invasive species, present study was aimed at compiling the first ever inventorisation of the alien fauna and flora of Kishtwar district, along with supplementation of each species with information on origin, spread, habit, mode of introduction and the invasion status.

Kishtwar district (33°32'N and 75°77'E), is the third largest in terms of area after Leh and Kargil lying in the outer Himalayan range in J &K state. It is an upland valley in the north-east corner of Jammu region positioned at an altitude of 5374 feet above sea level. It is situated on a central plateau set amidst sylvan surroundings of wooded hills. This fragile Himalayan ecosystem has witnessed intentional or unintentional introduction of varying faunal and floral elements from different regions over the time. Taking note of the importance of studies on the alien invasive species, present study was aimed at compiling the first ever inventorisation of the alien fauna and flora of Kishtwar district, along with supplementation of each species with information on origin, introduction and the invasion status.

Material and methods

Extensive survey of invasive alien species was carried out in Kishtwar district of Jammu region during 2011-2012. Investigations yielded 10 species of which 7 plant invasives from Asteraceae family have been listed in the present paper. The survey areas were selected at different tehsils of Kishtwar district. Each study site was sampled for invasive alien species, their numbers and other characters. The study followed a random sampling method so that no bias is introduced. All the available plant species were collected and recorded. The plant material collected during each visit was pressed and properly preserved by mounting on the herbarium sheets using conventional methods of processing and drying.

Results and Discussions

1. *Parthenium hysterophorus* L. (Fig: 1)

Brief Description: It is an annual herb with erect, light green branching stems, which becomes woody with age. Leaves are finely lobed. *Parthenium* weed flower is creamy white in colour. It has small (1-2 mm long) black seeds with white scales. They are not visible to the naked eye. *Parthenium* has been recorded for the first time from this area as new distributional records by the author.

Native Range : Tropical America.

Introduced Range: Australia, Asia, Africa, North America, South America.

Impacts: Contact with this plant causes dermatitis and respiratory malfunction in humans, dermatitis in cattle and domestic animals, due to the presence of toxin parthenin. It can trigger allergies and is a common cause of pollen allergy. Not only human beings, the weed also causes dermatitis in animals like cows and goats. When they eat the weed, their milk becomes bitter and drinking it for some length of time may cause death. The rapid growth of *Parthenium* weed had become a great threat to the environment and biodiversity. It adversely affects the germination and growth of several crop plants.

Threat level: High

2. *Anthemis cotula* L. (Fig: 2)

Brief Description: *Anthemis cotula*, is a flowering annual bushy plant with a noticeable and strong odour. The plant has branching upright stems reaching a height of 12 inches to 24 inches. The leaves of the plant sometimes have very fine and soft hairs on the upper surface, although the plant is mostly hairless. There is no leaf stalk; leaves grow immediately from the stems. The leaves are pinnate in shape, with many extremely thin lobes, and can be around 1 or 2 inches long. Each stem is topped by a single flower head which is usually around 1 inch in diameter. The flower head is encompassed by about 10 and 18 white ray florets, each with a three-toothed shape.

Native range: Europe and North Africa.

Introduced range: Cuba, Mexico, Panama, Saint Lucia, United States, Jamaica, Costa Rica, Bahamas, Southern Africa, Canada, Argentina, Australia, New Zealand, India, Pakistan.

Impacts: This invasive species is unpalatable to grazing animals. Contact with mayweed chamomile can cause skin rashes, blistering of livestock muzzles, and irritation to mucous membranes of grazing livestock (Whitson et al.1996, 2000). It may also impart a strong flavour to the milk of dairy animals (Whitson et al. 1996). Mayweed chamomile invades disturbed and overgrazed areas. The whole plant is penetrated by an acrid juice; touching or ingesting the plant can cause allergies in some people.

Threat level: High

3. *Centaurea calcitrapa* L. (Fig: 3)

Brief Description: This is an annual plant growing erect to a maximum height of one to 1.3 metres. The stems are hairless and grooved. It sometimes takes the shape of a mound, and it is finely to densely hairy to spiny. The leaves are dotted with resin glands. The lowermost may reach a length of 20 cms and are deeply cut into lobes. The inflorescence contains a few flower heads. Each is 1.5 to 2 cms long and oval in general shape. The phyllaries are green or straw- coloured and tipped in tough, sharp yellow spines. The head contains many bright purple flowers. The fruit is an achene a few millimeters long which lacks a pappus. It flowers from July until September, and the seeds ripen from August to October.

Native range: Europe

Introduced range: Africa, Australia, Asia and North America.

Impacts: It is known across the globe as an introduced species and often a noxious weed.

Threat level:High

4. *Xanthium spinosum* L. (Fig: 4)

Brief Description: This is an annual herb producing a slender stem up to a meter tall or slightly taller. It is lined at intervals with very long, sharp, yellowish spines which may exceed three cms in length and may divide into two or three separate spines. The leaves are divided into linear or lance-shaped lobes, the middle much longer than the others, and are arranged alternately all along the stem. Each is up to 10 or 12 cms long and dark green or greyish on top with a white underside. The plant produces male and female flower heads. The spiny burs are easily dispersed to new areas when they become attached to animals, people, and objects, or float on water.

Native range: South America, possibly from Chile.

Introduced range: Widely distributed throughout the temperate regions in the world. It is found in Asia, Europe, North and South America, Africa, Australia and New Zealand. It has been introduced to at least 39 countries across the globe.

Impacts: *Xanthium spinosum* is classified as a noxious weed in the majority of areas where it has been introduced. It is a prolific seed producer with high germination and survival rates. *Xanthium spinosum* competes with pasture crops as well as

contaminates seeds and wool. As a result, it easily establishes in pastures, meadows, river banks and potentially threatens native or endemic wildlife. Additionally, bur gets attached to the wool of sheep and reduces its value economically. The plants, especially new seedlings, are toxic to livestock. Management has proven to be difficult, although possible biological controls are currently being investigated.

Threat level: High

5. *Conyza canadensis* (L.) Cronquist (Fig: 5)

Brief Description: It is an annual plant growing up to 1.5 m tall, with sparsely hairy stems. The leaves are slender, 2- 10 cm long and up to 1 cm broad, with a coarsely toothed margin. The flowers are produced in dense inflorescences 1 cm in diameter, with a ring of white or pale purple ray florets and a centre of yellow disc florets.

Native range: North America and Central America.

Introduced range: East Africa, Europe, Asia, New Zealand.

Impacts: This weedy species can be found throughout the world. It spreads rapidly and is considered as one of the most common noxious weed of the fields. Many people are allergic to its pollen and can get a reaction just by handling the plant. It is one of the leading causes of fall allergies. Livestock animals seem to ignore this plant because of its bitter taste.

Threat level: High

6. *Jacobaea vulgaris* Gaertn. (Fig: 6)

Brief Description: The plant is biennial or perennial. The stems are erect, straight, have no or few hairs, and reach a height of 0.3- 2.0 metres. The leaves are pinnately lobed and the end lobe is blunt. The hermaphrodite flower heads are 1.5- 2.5 cm diameter, and are borne in dense, flat-topped clusters; the florets are bright yellow. It has a long flowering period lasting from June to November.

Native range: Europe.

Introduced range: Britain, Ireland, North West and North East California, Idaho, Illinois, Maine, Massachusetts, Michigan, Montana, New Jersey, New York, Oregon, Pennsylvania, Washington, Argentina, Africa, India, Siberia, New Zealand and Australia.

Impacts: Ragwort contains many different alkaloids, making it poisonous to animals. Ragwort is of concern to people who keep horses and cattle. Horses do not normally eat fresh ragwort due to its bitter taste. It loses this taste when dried and can become a danger in hay. If sufficient quantity is consumed, the results can be irreversible cirrhosis of the liver. Animals may also resort to the consumption of ragwort when there is shortage of food. Sheep, in marked contrast, eat small quantities of the plant with relish. Sheep and goats suffer the same process of liver destruction but at a reduced rate to horses and pigs. Ragwort poses little risk to the livers of humans since, although it is theoretically poisonous to humans, it is distasteful and is not used as a food. Some sensitive individuals can suffer from an allergic reaction because ragwort like many members of the compositae family contains sesquiterpine lactones which can cause compositae dermatitis. In the Republic of Ireland, the Noxious Weeds (Thistle, Ragwort, and Dock) Order 1937, issued under the Noxious Weeds Act 1936, declares ragwort as a noxious weed, requiring landowners to control its growth.

Threat level: Moderate

7. *Cirsium arvense* (L.) Scop. (Fig: 7)

Brief Description: Canada thistle is a tall, erect, spiny, perennial, herbaceous plant that grows to 4 ft. tall. It has an extensive creeping rootstock. The leaves are lance-shaped, irregularly lobed, 2- 6 in. long with prickly margins. The stems

are ridged and hairy. The flowers are purple to white and can be up to 0.5 inch in diameter. The small fruit, called achenes, are 1 to 1.5 in long and have a feathery pappus which allows them to be dispersed further by wind.

Native range: Europe and eastern Asia.

Introduced range: Europe, North America, South America, Australia, New Zealand, Africa.

Impacts: Canada thistle can invade a variety of open habitats including prairies, savannas, fields, pastures, wet meadows and open forests and is considered as a noxious weed of agricultural fields. It forms dense stands which can shade out and displace native vegetation. Once established it spreads rapidly and is difficult to remove.

Threat level: High

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