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EMEX AUSTRALIS STEINH. - A NEW RECORD FOR UTTAR PRADESH AND UPPER GANGETIC PLAINS OF INDIA

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ABSTRACT

Emex australis Steinh. (Polygonaceae), commonly called as ‘three corner jack or doublegee’, is native of South Africa. During floristic study of Chithara Village Panchayat, the species was recorded in the Botanic Garden of Shiv Nadar University where it was growing gregariously in small to large patches. It is a prostrate, annual, monoecious winter herb characterised by three angled nut enclosed in the spinescent perianth. *E. australis* is an aggressive serious weed in Australia and South Africa. In India, since the only reported occurrence of *E. australis* is Jammu this is the new record for Uttar Pradesh and Upper Gangetic Plains of India. The species is highly invasive. It has already spread in many parts of Jammu and Kashmir. As the plant has tendency to spread rapidly, it may become an aggressive weed of Agriculture in near future. The taxonomic description, habit, and habitat of the species along with photographs of morphological characteristics such as leaf, flowers and fruits is provided in the paper.

Keywords: *Emex australis*, New Record, Uttar Pradesh, Upper Gangetic Plains, Invasive

INTRODUCTION

The genus *Emex* belonging to the family Polygonaceae is represented by only two species in the world namely, *Emex australis* Steinh. and *Emex spinosa* (L.) Campd. (The Plant List, 2013). The type specimen for the plant, *E. australis* was collected from the Cape of Good Hope, South Africa (Steinheil, 1838). The genus name *Emex* is probably derived from *Rumex*, the genus to which it was originally placed and the Latin word 'ex', (out of) (Shivas and Sivasithamparam, 1994). The species name, *australis*, is Latin for 'southern' and refers to its southern African origins. *E. australis*, is commonly known as ‘three corner jack or doublegee’. It is also known by other common names like cat's head, bull head, devil's thorn, spiny emex and goat head; these names are possibly based upon the visual similarity of the achene.

In India, both the species are very scarcely distributed; *E. spinosa* has been recorded from Santhal Pargana, Bihar (Varma *et al.*, 1984) whereas *E. australis* from Jammu (Sharma and Jamwal, 1987). *E. australis* differs from *E. spinosa* by having longer fruiting perianth (e-Flora of North America, e-Flora of Pakistan). Initially, the species was found growing in recently laid Botanic Garden at the campus of Shiv Nadar University in the form of small patches which later grew in to continuous large patches. During extensive survey of Chithara Village Panchayat the species was found growing at few more places outside the SNU campus, where it was not located earlier.

The paper reports for the first time the occurrence of *E. australis* in the flora of Uttar Pradesh and Upper Gangetic Plains, discusses possible impact of this species on the ecosystem as invasive species along with its distribution.

MATERIALS AND METHODS

During biodiversity documentation of Chithara Village Panchayat, Dadri Block Panchayat, Tehsil Dadri, District Gautam Buddha Nagar, Uttar Pradesh, a species of Polygonaceae was found growing in winter in the Botanic Garden of Shiv Nadar University (Latitude 28°31'13.60" N, Longitude 77°34'32.81" E). Subsequently, the species was also recorded elsewhere in Chithara Village Panchayat. After wide consultation of the regional floras such as Flora of the Upper Gangetic Plain and of the adjacent Siwalik

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and Sub-Himalayan tracts (Duthie, 1903-29), Illustrations of the Flora of Delhi (Maheshwari, 1966), Flora of Agra District (Sharma and Dhakre, 1995), Flora of Ghaziabad District (Vardhana, 2007) and available literatures, it was found that no species of Polygonaceae has been recorded with such type of morphological characteristics. Under Polygonaceae family, only genus *Emex* is known to possess spiny fruits which distinguish it from other genera of the family like *Rumex*, *Fagopyrum* and *Polygonum*. After detailed morphological examination the *Emex* species was identified as *Emex australis* (e-flora of Pakistan; e-flora of North America; Bala and Kaul, 2011; CABI, 2018).

RESULTS AND DISCUSSION

Botanical Name: *Emex australis* Steinh. (Figure 1).

Synonym: *Emex centropodium* Meisn.

Habit, Habitat and Ecology: A prostrate herb. The three corner jack, *E. australis* grows in wide range of climatic conditions from high to low rain fall areas (Gilbey and Weiss, 1980). It is found in waste places, fallow fields and pastures. Besides, the plant is also found along roadsides, picnic sites, and firebreaks, edges of creeks, old homesteads, watering points, riverine flats and granite rocks (Gilbey and Weiss, 1980; Bala et al., 2012). The plant has ability to grow in different types of soil ranging from loamy sands to clay loams, usually neutral to slightly alkaline; also has strength to tolerate subtropical to temperate climates (Gilbey and Weiss, 1980). *E. australis* a serious invasive weed in Australia and South Africa (Holm et al., 1979).

During floristic study of Chithara Village Panchayat, the species was recorded in the Botanic Garden of Shiv Nadar University where it was growing gregariously in small to large patches (Figure 1 G) as well as associated with species such as *Anagallis arvensis* L.; *Chenopodium album* L.; *Cynodon dactylon* (L.) Pers.; *Cyperus rotundus* L.; *Erigeron bonariensis* L.; *Melilotus indicus* (L.) All.; *Parthenium hysterophorus* L.; *Rumex dentatus* L.; *Spergula arvensis* L., etc.

Distribution: *E. australis* is recorded from Asia, Africa, North America, Central America and Caribbean, and Oceania. It occurs indigenously in South Africa and is an introduced weed in many countries. It is a serious weed of cereal crops in Australia. In Asia, it is found distributed in India, Pakistan and Taiwan (CABI, 2018).

Flowering and Fruiting Time: January-April.

Taxonomic Description: A prostrate, monoecious, tap rooted, annual herb. Stem ribbed, much-branched from the reddish base. Leaves somewhat leathery, triangular or ovate-lanceolate, 5-9 x 2-5 cm, entire, cordate or truncate at the base, acute or obtuse at apex, petiole up to 6 cm long; basal leaves usually long-petioled; ochrea membranous, lacerate, brown. Flowers unisexual. Male flowers sessile, axillary and in terminal clusters; tepals greenish-yellow, ovate-lanceolate. Female flowers in axillary clusters, sessile and in short leafless spikes; tepals ovate-oblong; style reduced; stigma feathery, 3-lobed. Fruiting perianth 8-12 mm long with 3 sharp, spreading spines at the apex. Achenes 4-6 mm long, indehiscent.

A mounted herbarium specimen of *E. australis* has been deposited in BSI Herbarium, Northern Region, Dehradun, Uttarakhand, India.

Uses: Leaves of *E. australis* have previously been used as spinach but is no longer regarded as a vegetable and has only limited beneficial characteristics (Gilbey and Weiss, 1980).

In South Africa, an aqueous decoction of the root of doublegee is useful in constipation and restlessness in infants and adults. Apart from this, roots are also used for stomach cramps. A decoction of roots of *Galenia secundica* and *E. australis* is applied for the treatment of kidney pain. Unspecified parts are used to treat stomach and intestinal problems (Dold and Cocks, 2000; Dubey, 2015).

Possible impact of *E. australis* on the ecosystem as invasive species: *E. australis* is monoecious and self-compatible and reproduces only by seed (Gardner, 1930). During favourable conditions, plants are capable of producing over 1100 seeds (Weiss, 1978). As long as the season is favourable, the plant shows indeterminate stem growth, with continue production of seeds throughout the plant's lifetime. The prickly

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achenes of the plant are responsible for its invasive nature, which can travel skewered on elastic tires or attached to livestock or machinery and allow the seeds to be transported long distances (Gilbey, 1975). *Emex* achenes can float in water, water is also an important mode of dispersal (Gilbey, 1975). In Australia, its spiny fruits were spread by stock and rubber tyres and the plant quickly became an unwanted weed. The plant has already spread in many parts of Jammu and Kashmir (Sharma and Jamwal, 1987; Bala and Kaul, 2011; Gupta and Kaul, 2014).

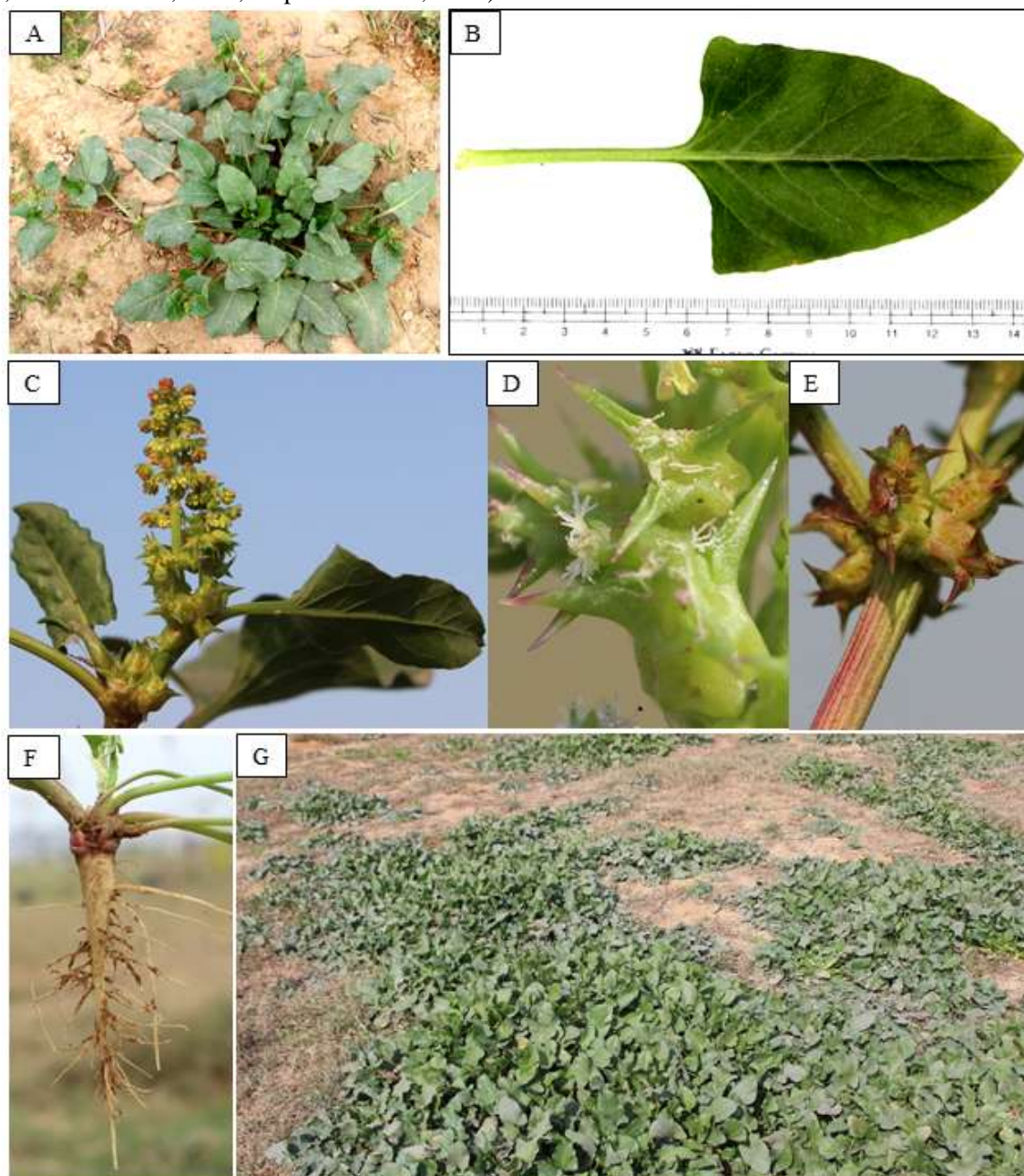


Figure 1: *Emex australis* A - Habit; B - Leaf; C – A twig showing male (upper portion) and female flower (lower portion); D – Female flower with feathery stigma; E - Fruiting perianth; F - Tap root; G - Gregarious population invading the area

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The species is highly invasive and has the ability to invade the landscape if unchecked as plants produce a large quantity of seeds, which have the ability to survive for many years in the soil (Gilbey and Weiss, 1980). *E. australis* has become an invasive species in Australia and Texas in the USA. In South Africa, *E. australis* is most important weeds of wheat and medic pasture (Cairns et al., 1979). In Australia, *E. australis* is a major weed of annual crops and pastures (Gilbey and Weiss, 1980; Parsons and Cuthbertson, 1992). In 1974, in Western Australia over 1 million ha of pasture and 500,000 ha of cereal crops were affected (Gilbey, 1974). In order to restrict the plant's introduction or spread via human intervention, *E. australis* is considered noxious or declared in several countries including Australia, USA, Japan etc. (Parsons and Cuthbertson, 1992; Kurokawa, 2001; USDA-NRCS, 2002).

E. australis has highly adaptable to different climatic conditions as well as have high reproductive potential. These characteristics make the plant to spread rapidly affecting the native flora. As the species is highly aggressive and has ability to grow very fast, it may extend its distribution ranges in future. This requires extensive floristic surveys in northern India for early detection and reporting of infestation and spread of new and naturalized populations of *E. australis* by establishment of plant detection network in prominent research institutions through communication links between taxonomists, ecologists and foresters to monitor and timely eradication/control of alien species.

ACKNOWLEDGEMENT

This work forms part of the research project “Biodiversity documentation of Chithara Village Panchayat, Dadri, Gautam Buddha Nagar, Uttar Pradesh, India” funded by Shiv Nadar University, India. We thank Professor Rupamanjari Ghosh, Founding Director, School of Natural Sciences, and Vice-Chancellor of Shiv Nadar University for her unstinted support during the course of this investigation.

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