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SHORT COMMUNICATIONS

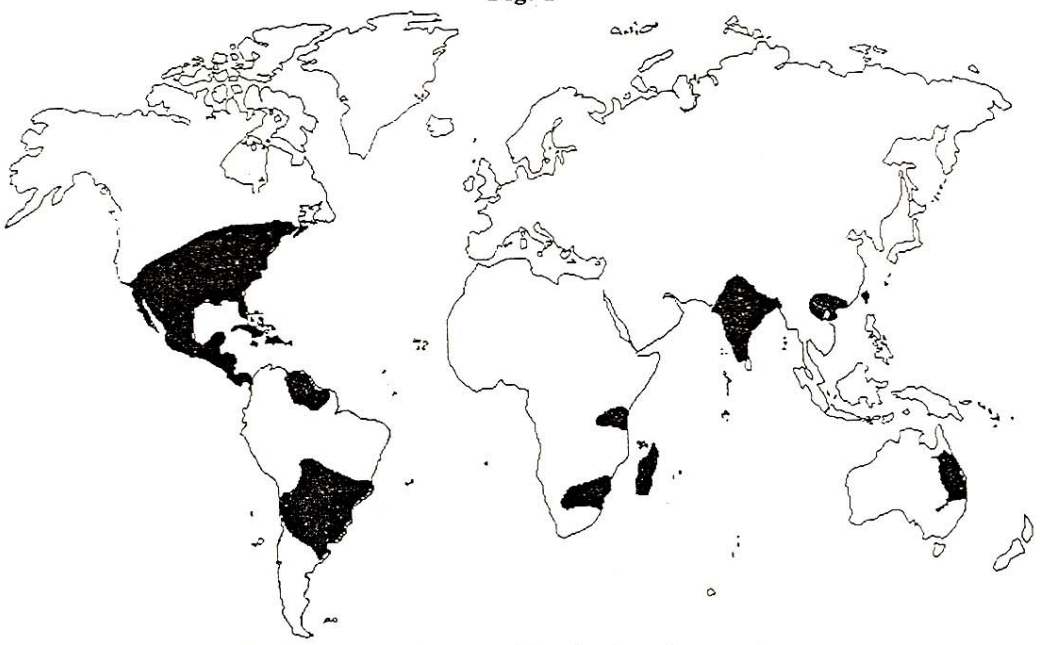
(I)

DEFOLIATION OF *PARTHENIUM* BY MEXICAN BEETLE (*ZYGOGRAMMA BICOLORATA*) IN RAJAJI NATIONAL PARK

Parthenium (*Parthenium hysterophorus* Linneaus) is one of the ten worst invasive species in the world. It is popularly known in India as 'congress grass', 'white top', 'star weed', 'carrot weed', 'gajar ghas', 'ramphool', 'fever few' etc. The origin of *Parthenium* is considered to be in Mexico, America, Trinidad and Argentina and within last 100 years it has spread to Africa, Australia and Asia (Bhan *et al.*, 1997) (Fig. 1). It was first observed in India by the East India Company in its Tea Gardens at Calcutta. Dr. Brandis collected *Parthenium* in 1880 for the herbarium of Forest Research Institute, Dehra Dun (Bennet *et al.*, 1978). Rao (1956) published some important features of *Parthenium*.

Parthenium, a herbaceous plant grows to a height of 1-2 m, with alternate leaves which are simple, greyish-green, deeply

Fig. 1



Worldwide Distribution of *Parthenium hysterophorus*

lobed and hairy. It bears cream coloured cluster of flower about 4 mm diameter at the top of each branch. Seed germinates in a profuse manner after showers of rain. It belongs to the family of Asteraceae, sub tribe Ambrosiinae, of the tribe Heliantheae. Plant produces number of seeds, which are transported by water, on vehicles and equipment, or in soil or mud adhering to vehicles, or with movement of animals.

In India, *Parthenium* has widely spread across majority of States. The overall spread is extensive and thus, it has acquired a status of one of the most prominent invasive plants. The main affected States are Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, West Bengal, Madhya Pradesh, Gujarat, Orissa and Bihar. It is estimated that about 5 million ha area has been encroached by *Parthenium* in India (Bhan *et al.*, 1997). It has become a noxious weed of crops, causing high losses to agricultural yield. It is capable of invading grazing lands, as well as roadside and other disturbed areas. It has the ability to spread rapidly, as it is quick growing and produce large quantities of seeds. In addition to this, the plant becomes a serious human health hazard causing allergic reactions in the form of dermatitis, asthma and bronchitis which is now a great concern due to weed abundance on amenity land and in urban situation. New out-breaks in clean areas have been linked with movement of earthmoving and harvesting machinery and transport of stock, fodder and grain from *Parthenium* infested areas. Seeds remain viable on the soil surface upto two years, or longer if there is no rain to stimulate germination. Buried seeds may become dormant and remain viable for much longer period (Bennet *et al.*, 1978).

Biological Control Agent - A Potential Regulator of *Parthenium*

In India, the Mexican beetle, *Zygogramma bicolorata* (Coleoptera: Chrysomelidae), was introduced in 1984 after host specificity tests for controlling *Parthenium* (Kumar *et al.*, 1997).

Study on host specificity and damage potential of the Mexican beetle *Z. bicolorata* were conducted at Indian institute of Horticultural Research, Bangalore and the beetle was found host specific. Field releases of the beetle were carried out in Sultanpalya area in Bangalore (Jayanta and Nagarkatti, 1987) for experimental testing.

Subsequent to the initial field trials on this beetle, attack on sunflower crops in Kartanaka was recorded and it was observed that the beetle was able to complete its life cycle on sunflower (Sridhar, 1991). Sunflower crop is an important oil seed crop in India. It was also reported that the beetle mostly preferred 2-4 leaf stage of 20-days old sunflower plants. A Fact-Finding Committee (FFC) was constituted by the Govt. of Karnataka and Indian Council of Agricultural Research (ICAR) in 1992 to decide the further release of this beetle till the controversy was resolved. Further studies were carried out by the Committee and concluded that the beetles have fed only on the peripheral areas of certain crop fields having sunflower crop which were adjacent to the *Parthenium* dominated areas.

Rajaji National Park – Defoliation of *Parthenium*

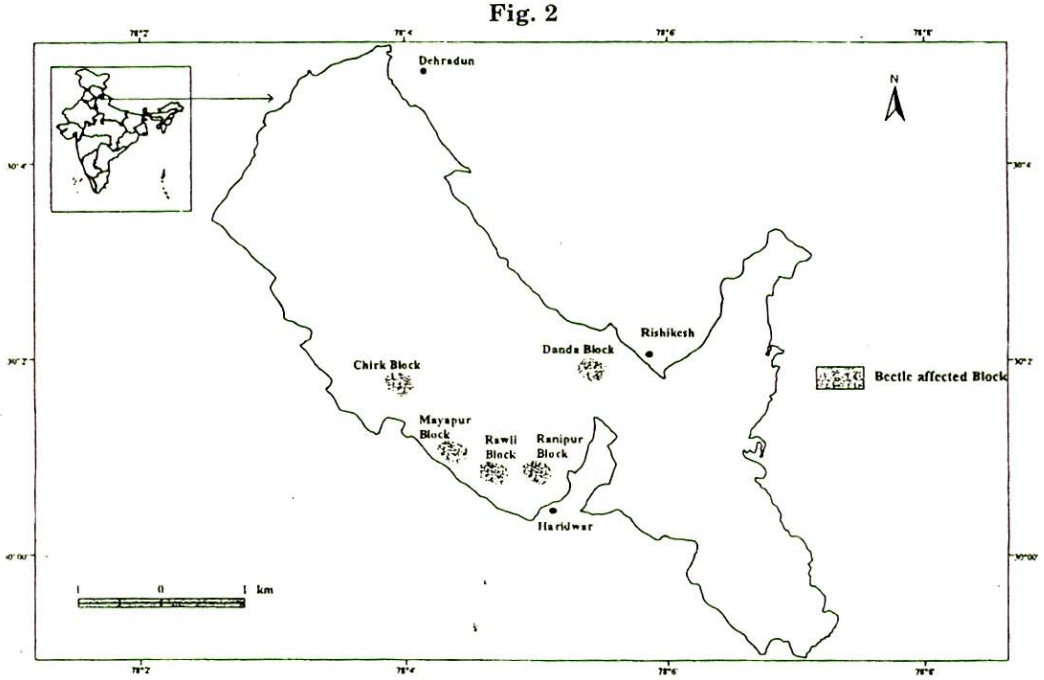
Rajaji National Park is situated in

the Shiwalik hills, and is representative of the Shiwalik ecosystem, which lies between the Himalaya and the Upper Gangetic plains. The area is among the better preserved remnants of the Shiwalik ecosystem and represents one of the North-west limits of tiger and elephant populations in India and harbours diversity of flora and fauna with dominance of Sal forests (Bhagwati, 1997). The park covers an area of 820 km^2 and was established with the integration of the Chilla, Rajaji and Motichur Wildlife Sanctuaries. Important towns *viz.* Dehra Dun, Rishikesh and Haridwar are situated at three corners of the park.

The attack on *Parthenium* in Rajaji National Park by *Z. bicolorata* was observed for the first time by park authorities during July, 2000 and therefore, select field sites in three forest ranges *viz.* Motichur and Haridwar (Fig. 2) were visited to ascertain the attack, its distribution, extent, developmental stages, dispersal and migration pattern. Affected areas were observed in Danda block of Motichur range, and Rauli, Mayapur, Chirak and Ranipur blocks of Haridwar range.

The beetle was found gradually dispersing from peripheral areas towards interior region of the park where large healthy patches of *Parthenium* were available. Leaves and flowers of *Parthenium* were completely eaten and dry plants were largely observed in the fringe areas of all three forest ranges. The historical account of the beetle shows that it has migrated from Southern India to Central India and finally for the first time in the North Indian region. Entomological survey in the park was earlier conducted

Fig. 2



Infestation of *Parthenium* by Mexican Beetle in Rajaji National Park

during 1998-1999 but there was no record of this beetle in this region at that time (Joshi *pers. com.*).

Future Need for Research and Monitoring

There is an urgent need to assess the distribution and extent of *Parthenium* in PAs, which occupies vital wildlife habitats in most of the Indian PAs. Safe and cost effective strategies to control *Parthenium* on long term basis, its monitoring and research on the biological control agent are urgently needed so as to address the menace of this weed and to safeguard from unexpected large scale damage to agricultural crops and native flora.

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