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Incidence and Spread of an Invasive Weed, *Mimosa invisa* Mart. In Benin City Metropolis, Nigeria

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Abstract: We document the incidence and distribution of the giant sensitive plant, *Mimosa invisa* Mart. in Benin City metropolis. Field data and oral interviews revealed that it has become the most noxious weed in Edo State capital. It has invaded many farms, fallow fields and undeveloped building plots within the Benin City metropolis. The spread of the weed is being facilitated by goat, sheep and cattle. Oral interview with residents and farmers indicate that the weed was not in these areas ten years ago. The incidence of the weed is negatively affecting the ability of farmers within the metropolis to establish home gardens and farms. The rapid spread of the weed is also leading to the loss of the native fodder, *Panicum maximum*. The results suggest that roads do play a significant role in initiating *Mimosa invisa* infestation. We suggest strategies that will help to curtail the spread the noxious weed.

Key words: Exotic, infestation, weed, legume, invasive, farmer, crop, tropical

INTRODUCTION

Invasions by alien species are considered to be one of the biggest threats to the ecosystems of the earth and the services that they provide to humanity (Kaiser, 1999). Increased human movements and commercial transportation is resulting in the transportation of organisms around the world (Vitousek *et al.*, 1996). An alien invasive plant is one that can, has, or is likely to spread into native flora or managed plant systems, develop self sustaining populations and become dominant and/or disruptive to those systems. Transported plants that become naturalized in new communities may cause several kinds of damage. Their most common impact is the competitive exclusion of native plants and associated animals at the new sites (Merriam and Feil, 2002). For example, *Mimosa pigra*, invading over 80, 000 ha of tropical Australia, have displaced native plants as well as water birds (Braithwaite *et al.*, 1989).

Another example is the black wattle which is native to Australia and was imported to South Africa in the mid nineteenth century. It has been widely planted in South Africa and now forms the basis of a small but significant industry. The species is highly invasive and has spread over an area of almost 2.5 million ha in South Africa (Versfeld *et al.*, 1998) where it has significant negative impacts on water resources, biodiversity and the stability and integrity of riparian ecosystems.

Aggressive invaders reduce the amount of light, water, nutrients and space available to native species; alter hydrological patterns, soil chemistry, moisture holding capacity, erodibility and change fire regimes (Milberg and Bryon, 1995). Some exotics have been found to harbor plant pathogens (Mack *et al.*, 2000); others are capable of hybridizing with native plant relatives, resulting in unnatural changes to a plant's genetic makeup. Recent findings have also pointed to the possibility of release of allelochemicals that are relatively ineffective against long-time neighbors in their natural communities, but to which plants in invaded communities lack co-evolved tolerance (Callaway and Aschehoug, 2000; Hierro and Callaway, 2003). Ironically, many biotic invasions are apparently facilitated by cultivation and husbandry, unintentional actions that foster immigrant populations until they are self-perpetuating and uncontrollable. Whatever the cause, biotic invaders can in many cases inflict enormous environmental damage.

Mimosa invisa Mart. is an erect, climbing, ascending or prostrate biennial or perennial shrub that often forms a dense thicket, the root system strong, often woody at the decumbent base. The stem is conspicuously angular throughout the length, up to 2 m tall with many randomly scattered recurved spines or thorns 3 to 6 mm long. The leaves are bipinnate, sensitive to the touch; pinnae four to nine pairs; inflorescence a head; fruit a pod, spiny, three-to four-seeded, borne in clusters, seeds flat, ovate, 2 to 2.5 mm long, light brown" (Holm *et al.*, 1977).

Common sense, experience and theory predict that control of invasive species is most economical and successful when these species occur in small populations (Williamson and Fitter, 1996). At low abundance, non-indigenous plants may have no or only minor undetectable ecosystem impacts. The objective of the present research is to report on the incidence, distribution and current management of an exotic weed, *Mimosa invisa* Mart. which has recently been observed in Benin City, Nigeria.

MATERIALS AND METHODS

Field visits were made to four LGA within Benin City metropolis, Edo State, Nigeria in May, 2006 (Fig. 1). The frequency of occurrence and cover of the weed in the selected locations were determined using 4 m² quadrats. A total of 100 quadrats was randomly established at each site. Informal interviews were also undertaken with local residents and farmers. The density of the weed seedling was assessed using 1 m×1 m quadrat.

RESULTS

The survey reveals that the level of occurrence and cover of *M. invisa* in the major towns/villages around Benin City is high (Table 1). The frequency of the weed is

especially high in open areas such as fallow fields as well as farms (Fig. 1). There were numerous young seedlings of the weed in new farms planted with corn, okra, cassava and melon. The weed is also common on home garden within the Benin City metropolis. There is large scale infestations of the weed in building plots, especially along Oluku, Sapele, Oko, Onitsha and Auchi roads. It was observed that the abundance of the plant decreased significantly with distance from the roads or trails. The weed was most frequent in outlying Local Government Areas of the metropolis such as Ovia Northeast and Ikpoba Okha (Table 1). The weed was also abundant along the cattle trails.

DISCUSSION

Mimosa invisa Mart. is native to Brazil but has become a major weed in upland rice, corn, coconut, rubber, sugarcane, cassava, subsistence gardens and non-productive areas in Australia, Asia and Pacific Islands (Holm *et al.*, 1977; Space and Flynn, 2002). The weed is suspected to have been introduced into West Africa (Akobundu and Agyakwa, 1987). In Benin City metropolis, populations of the weed were observed in four Local Government Areas of Edo State viz: Oredo, Egor, Okha and Ovia North East (Table 1). It was especially common in disturbed areas such as road verges, fallow

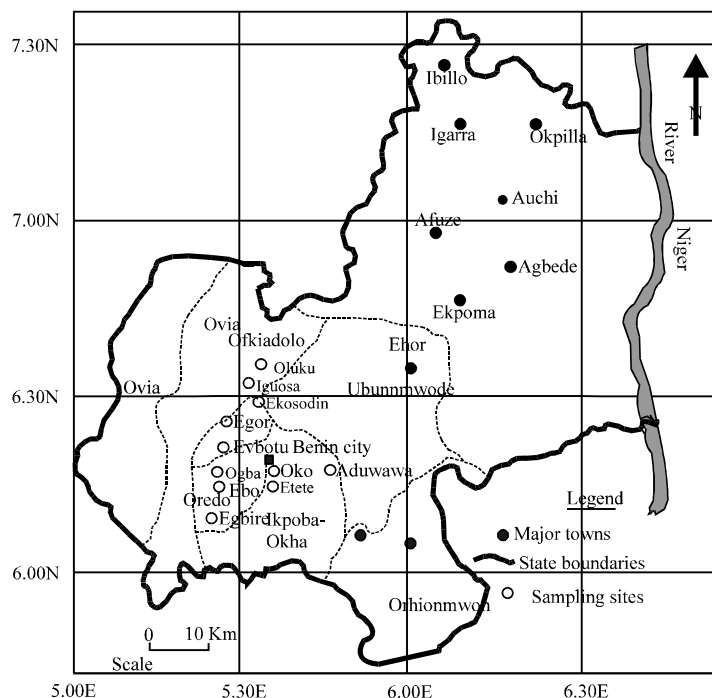


Fig. 1: Map of Edo State of Nigeria showing the sampling sites

Table 1: Frequency of occurrence and mean cover of *Mimosa invisa* in four Local Government Area (LGA) of Edo State, Nigeria

LGA	Egor		Ikpoba okha			Ovia northeast				Oredo		
Town/village	Egor	Eybotubu	Etete	Oko	Aduwawa	Oluku	Iguosa	Ekiadolor	Ekosodin	Ogba	Egbire	Ebo
Frequency of occurrence (%)	56	35	60	68	90	96	80	67	90	70	56	45
Mean cover (%)	60±12	56±5	78±7	65±5	78±12	85±9	87±4	73±10	95±9	68±5	65±10	64±6

lands and farms. It forms single stands in many locations and is in active competition with Siam weed (*Chromolaena odorata*) and Guinea grass (*Panicum maximum*) (Fig. 2). Information gathered from informal interviews reveals that the weed was first noticed in about 1989. Akobundu and Agyakwa, (1987) reported that the plant is a problem weed of cassava and other perennial crops and plantation agriculture in West Africa. Some farmers in Benin City suspected that the weed was being spread by caterpillars during road construction. It can also be spread by vehicles and flood waters (Cronk and Fuller, 2001). One major dispersal agent is the herd of cattle that are brought to Benin City for slaughter. The rapid spread of the weed is promoted by the dissemination of its seeds which stick to their body and hoofs. These animals usually graze around the metropolis and populations of the weed are observable along their trails. Another important factor contributing to the competitive advantage of *Mimosa* is the grazing of the native grass *Panicum maximum* by sheep, goats and cattle. The grazing pressure on guinea grass is indirectly reducing competition against *Mimosa invisa*. It is a fast growing annual leguminous creeper that reproduces by seeds. The plant has prickles on the stem and leaf stalks which makes travel difficult (Fig. 3). It forms a dense ground cover and thickets, preventing reproduction of other species. It is also a wild land fire hazard when dry. Field observations indicate that fire enhances the germination of *Mimosa invisa* seeds. Bush burning, which is usually carried out by the cattle rearers and subsistent farmers at the beginning of the farming season, helps to increase the population of the weed. There is presently no effort to curtail the threat posed by the plant.

We propose that burning of roadside vegetation should be restricted and that fire prevention policy should be adopted for road verge management. It is also important that isolated populations of the weed be removed to prevent widespread infestation. Chemical control using herbicides may also be applied in areas with large infestation. Physical control of the weed is very difficult because of the numerous spines on the plant body. The management of non-indigenous plants requires



Fig. 2: A population of *Mimosa invisa* actively competing with guinea grass *Panicum maximum* (arrow) in Benin City



Fig. 3: Part of *Mimosa invisa* shoot showing the recurved spines on the leaf and stem

multiple decisions at various local, regional and national levels and involves regulatory agencies and land managers. Effort should be made to publicize the incidence and negative effects of the weed with a view to preventing inadvertent spread into new areas.

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