INCIDENCE OF *MIMOSA PIGRA* IN PAPUA NEW GUINEA

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Abstract

The presence of the giant sensitive plant, Mimosa pigra L. *at two locations in Papua New Guinea (PNG) is reported. It is a serious weed in South East Asia and northern Australia and is likely to become a serious weed in PNG. The problems associated with it and possible options for control are discussed.*

Keywords: Mimosa pigra*; weed; distribution; Papua New Guinea.*

INTRODUCTION

The giant sensitive plant, *Mimosa pigra* L. (Mimosaceae) (Plates A - C) is a native shrub of tropical America and its presence in Papua New Guinea is of serious concern. The weed's natural geographical range is Mexico to Brazil and it has become a serious weed in many other tropical countries. In South East Asia and Australia, *M. pigra* is a serious weed of wetlands, agricultural and conservation lands, pastoral areas, forest clearings, roadsides, irrigation channels, and water reservoirs (Lonsdale 1992). It is still spreading throughout the tropics.

The worldwide spread of this weed has been largely due to accidental or intentional introductions. The spread to Australia was probably intentional, by botanists intrigued by the sensitive leaves (which close when touched), while introduction in other areas were made because it was regarded as potentially beneficial. Introduction of *M. pigra* into Thailand between 1947 and the early 1960s from Indonesia was initially as cover and green manure crops and later to control erosion on banks in irrigation canals and water reservoirs. However, the plant is now one of the worst and most aggressive weeds in that country (Waterhouse 1994; Lonsdale *et al.* 1995).

In Papua New Guinea *M. pigra* was first reported in Oro Province in the early 1960s (Verdcourt 1979). The recent discovery of the infestation at Sogeri (Central Province) has raised concerns about the potential for further spread. *Although it is not clear how the weed entered PNG several possibilities include the following: to Oro on equipment introduced from Malaysia for oil palm plantations, to Sogeri on cattle or equipment introduced from northern Australia. The nature of this weed, its distribution in PNG and potential problems associated with it are discussed.

DESCRIPTION, BIOLOGY AND ECOLOGY OF *M. PIGRA*

Detailed studies on the biology of *M. pigra* have been reported by Lonsdale (1992) and Lonsdale *et al.* (1995). It is an aggressive leguminous shrub growing to about 6 metres tall (Plates A - C) and found in moist, open areas in the tropics. In PNG it may be confused with leucaena *(Leucaena leucocephala). M. pigra* is chara-cterised by having bipinnate, sensitive leaves, and stems and branches are armed with broad-based prickles up to 7 mm long. Flowers are pink or mauve and borne on tight heads, in upper axils. Reproduction is mostly by seed production. The hairy pods occur in clusters of about seven, and turn black from brown when

* When this paper was in the press, a third infestation had been located in Madang

fully mature. Normally, mature seeds break off in single-seeded segments. The pods are hairy, an important mechanism for seed dispersal as they are able to float on water due to surface tension. Seeds are hard and remain viable for several years.

In ideal conditions, plants could start flowering seven to eight months after germination. Seed production is mostly by self pollination but could also be wind or insect pollinated. Under wet conditions such as in permanent shallow water bodies, seeds could exhibit vivipary, a condition in which seeds germinate in the pods and drop seedlings that may easily establish in the wet soils. Two varieties of *M. pigra* were previously known, var.*pigra* and var.*berlandieri* Gray but the latter is now a separate species and only var. *pigra* has spread around the world (Lonsdale 1992).

M. pigra favours a wet-dry tropical climate and can grow in any moist soil condition. Observations in Darwin, Australia, have shown that the wet season is the time for maximum growth while during the dry months plants survive by losing some of their leaves. Except around dams and watercourses, *M. pigra* causes little or no problems in areas or regions with less than 750 mm annual rainfall (Lonsdale 1992). In suitable habitats in the introduced ranges it is a prolific seed producer, and can form impenetrable monospecific stands. The stems and leaves of *M. pigra* are armed with prickles which are a danger to humans and livestock in infested areas.

Spread of seeds to new areas can also be aided by animals and people. Seeds occasionally consumed by animals may germinate in dung deposited far from infested areas (Miller & Lonsdale 1987). Removal of river sand for uses like construction of roads and buildings assists the spread of seeds to new areas. Seeds germinate along the roadsides and invade unaffected lands from there (Orapa and Julien pers. obs. 1995).

DISTRIBUTION OF *M. PIGRA* IN PNG

The weed appears to have been introduced after the Second World War. In 1960 seeds were collected from plants growing along the Ambogo River near Popondetta. The weed was later grown at the Lae Botanical Gardens (Verdcourt, 1979). It is not known how much *M. pigra* was present at the time when seeds were first collected but it is now confirmed in Central Province in the Sirinumu Dam, Sogeri and Laloki River areas and in Oro Province around Popondetta, along roads leading away from Popondetta and in nearby rivers (Figure 1).

POPONDETTA, ORO PROVINCE

In August 1994, *M. pigra* was confirmed to be widespread in the Popondetta area. It was observed growing in thickets along the sandy banks near the Girua River Bridge, the Eroro River, near a playing field near Popondetta town, beside the road at Oro Bay and along the entire 40 km of the Oro Bay Road. It is present along the road from Oro Bay to Afore (D. Sands, pers. obs. 1995). Occasional stands were seen along the Kokoda Road as far as the Siai turn-off (15 km) and along the middle section of the road between Kokoda Road and Kumusi River. Isolated plants were seen in some oil palm blocks owned by settlers. The Ambogo River was not checked but it is most likely infested.

SOGERI PLATEAU AND LALOKI RIVER, CENTRAL PROVINCE

In March 1995 an impenetrable stand of *M. pigra* was found growing along one section of the Sirinumu Dam (Plate C) at Sogeri in the Central Province. The reservoir is the only source of water and hydro power for Port Moresby. A survey, carried out on 6-7 June 1995, of the Sogeri Plateau and the Laloki River system, found *M. pigra* was more widespread than previously thought. Several kilometres of the reservoir banks were infested by mature impenetrable stands of the shrub. Eleven kilometre of the Ewarogo River, an upper tributary of the Laloki River which passes through Koitaki Estate was

found infested by mature and isolated stands of the plant. Isolated plants and a few mature stands were found in all cattle paddocks owned by the Koitaki Estate (see Plate B). Except for a single mature plant found and destroyed on the roadside at Itikinimu Plantation no other infestations were found along the road towards the Koiari Mountains. The weed was found on another paddock owned by Koitaki, northwest of Sogeri, approximately 10 km by road along the Kokoda Trail Road, suggesting possible dispersal of seeds by cattle or equipment.

Isolated plants were observed along the banks of the Laloki River for about 30 km between Sirinumu Dam and several km upstream of the Hiritano Highway bridge. The weed was not observed on the floodplains downstream from Hiritano Highway Bridge when surveyed by helicopter on two occasions in August and November 1995.

The exact time of introduction of *M. pigra* is not known, but it may have been present for more than 10 years at Sogeri. At Koitaki, *M. pigra* infestations have been reduced by more than 90% after 10 years of foliar spraying the herbicide 2,4-D (J. Vavasor, pers. comm. 1995).

OTHER INFESTATIONS

The plant was grown in the Lae Botanical Gardens but has now been destroyed. Later a clump was reported growing at Horse Camp near the Bugandi High School but checks during 1995 failed to locate the weed there. Two other reports of sightings near Saramandi in East Sepik Province and Malol Village, west of Aitape in the Sandaun Province were checked during 1995 but proved negative.

POTENTIAL DISTRIBUTION AND PROBLEMS

M. pigra will continue to spread in PNG and possibly at a faster rate because the Sogeri/Laloki areas are readily accessible, used as recrea-tional areas and visited by many people. It is essential that a management strategy is developed for this very serious weed. Kuniata (1994) considered the massive wetlands of Gulf and Western provinces, the Markham Valley, Kimbe-Hoskins area, the Sepik plains and the floodplains of the Ramu River as potential problem areas. Since *M. pigra* favours a dry-wet climate of most lowland areas, particularly those in the south of the country and the Markham Valley are under threat (Figure 1). The altitudinal limit for *M. pigra* is not known but the Sogeri infestation occurs at about 800 metres a.s.l., suggesting that it may grow equally well at higher altitudes.

M. pigra is also present on the floodplains of the Maro River in the Merauke area of Irian Jaya in Indonesia (A.D. Wright, pers. comm. 1996). This infestation poses a great threat to Western Province and could seriously affect the low lying areas of the Morehead District including the Bensbach Wildlife Conservation area. It is possible that wild animals such as deer and pigs as well as flooding of the rivers in the border areas may aid the spread of the weed. Invasion of these areas could upset the ecosystem, resulting in native plants and animals being displaced or rare species becoming extinct. This would also have implications on the local people who are entirely subsistence farmers. Several thousand people in the Western Province area depend on hunting, fishing and gardening to survive. *M. pigra* infestations could seriously affect the livelihood of many of those people.

In areas used for economic activities such as cash cropping, *M. pigra* may spread quickly and reduce yield. Young tree crop plantations such as coconut, oilpalm, rubber and cocoa are at risk from competition by *M. pigra*. The weed can invade pastures and interfere with livestock grazing. Any invasion of agriculture and conservation areas would require additional resources for control.

The cost of removal of dense *M. pigra* from about 7,000 hectares of wetlands in the Northern Territory in Australia using a combination of herbicides, chaining and burning was about $7 million over 5 years (G. Cook, unpubl. rep. 1996). The area treated was a small portion of the total infestation in northern Australia. Because

Plate A. **Upper parts of *Mimosa pigra* showing flower buds, sensitive leaves, and a cluster of mature (black) and immature (green) pods. Note that mature pods on the right of the photograph have already dropped their seeds.**

Plate B. **A small stand of *M. pigra* on a paddock at Koitaki Estate, Sogeri, Central Province. The weed is known to have been present here for more than a decade.**

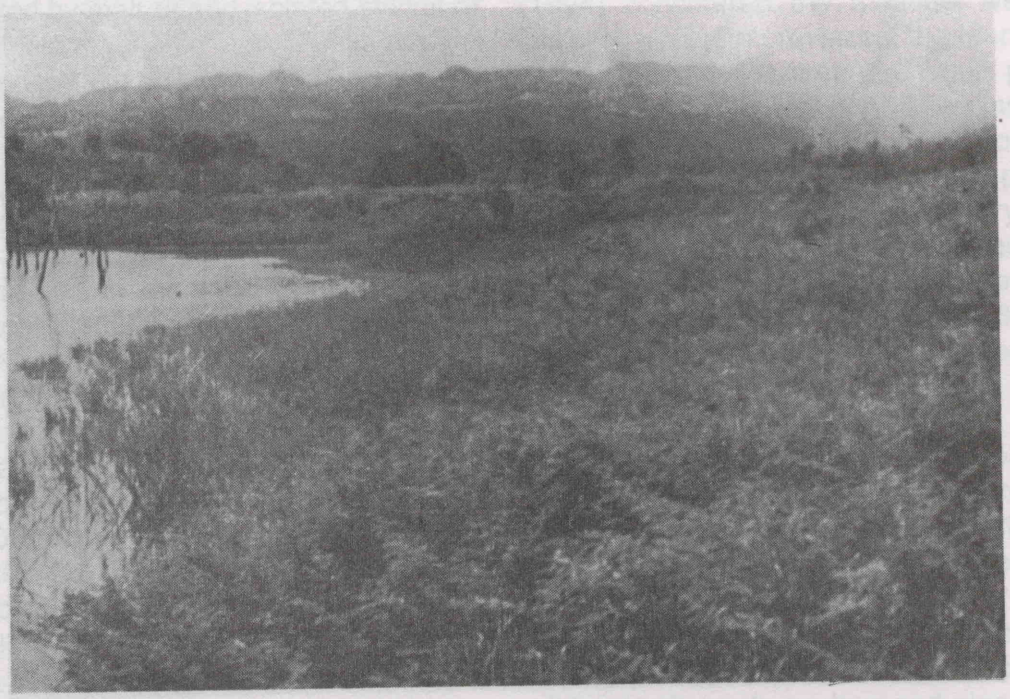
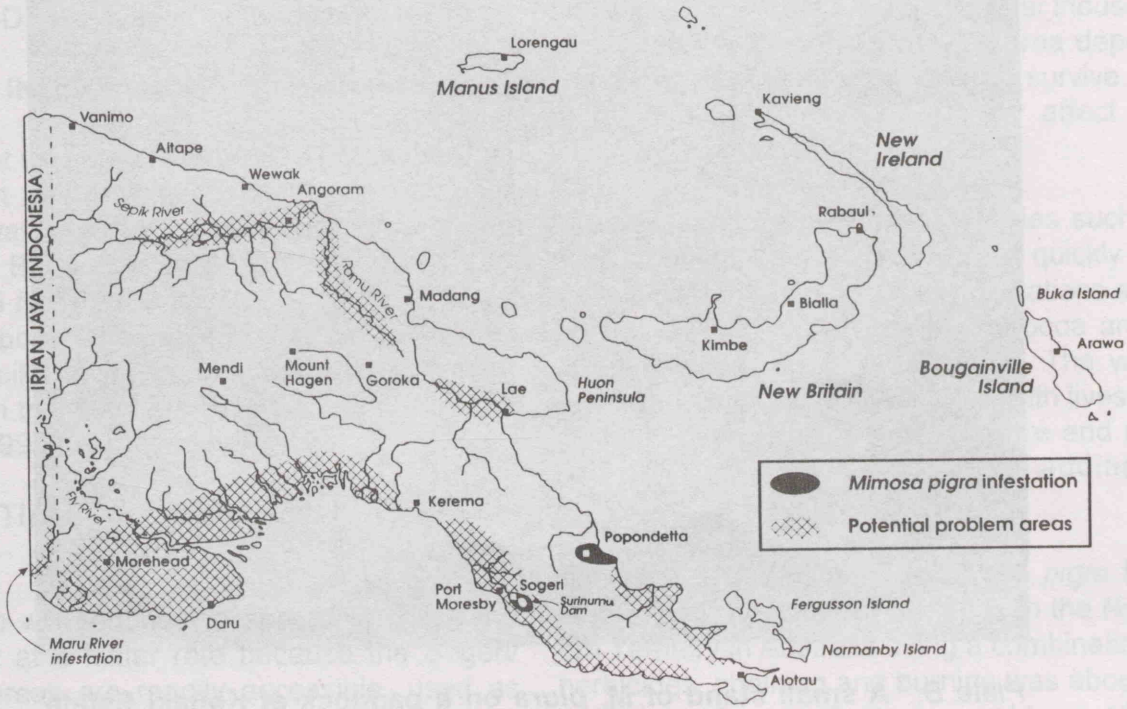


Plate C. **Part of the infestation of *M. pigra* on the bank of Sirinimu Dam, Sogeri, Central Province. The weed is likely to spread from these infestation.**

Figure 1. **Known and potential distribution of M. pigra in Papua New Guinea.**



of the costs associated with control and the catastrophe that will occur if *M. pigra* spreads unchecked, it is imperative that control be instigated in PNG immediately while only a few locations require treatment.

MANAGEMENT STRATEGIES

No strategies for the management of *M. pigra* have been developed for PNG as, until recently, it was not recognised as a weed. The reported use of 2, 4-D herbicide at Koitaki Estate for more than a decade is the only known attempt at controlling the weed in PNG. Integrated management strategies have been developed and are in use in Australia and South East Asia and include biological, herbicidal and mechanical contro and the use of fire (see Harley 1992).

No specific control measures have been taken to control *M. pigra* in the Popondetta area despite its longer presence in the area. Despite being widespread, it is not a problem in oil palm planted areas. It is possible that regular application of herbicides for the control of other weeds in oilpalm blocks have kept *M. pigra* in check. Alternatively, seedlings may not establish well in fully grown oil palm groves as a result of low light intensities. The weed grows vigorously in open, disturbed areas and along river banks and road ways.

The most appropriate strategy to control *M. pigra* is an integrated one combining various methods and practises. Practical issues such as the transporting of sand and gravel contaminated with seeds of *M. pigra* for construction work and road maintenance must be addressed as part of the strategy. It is also very important to educate the public of potential problems associated with this weed. The presence of this weed in PNG, problems it can cause and its potential for spread were first brought to attention by Kuniata (1994). Discussions, site inspections and surveys have since been undertaken by DAL but a plan of action, management strategy and commitment of resources have yet to be developed and implemented. The management of this weed, including eliminating as much of it as is possible, keeping the remainder under constant control and reducing the chances of spread to new areas, should be given the highest priority.

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