BIOLOGY AND CONTROL OF *PARIETARIA JUDAICA* L., AN ALLERGENIC WEED IN SOUTH-EASTERN AUSTRALIA

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Summary. *Parietaria judaica* L., is a weed that causes allergic rhinitis, asthma and conjunctivitis. It occurs in many suburbs of Sydney as well as in Melbourne, Adelaide and Fremantle. It thrives in residential, industrial and wasteland areas. *P. judaica* has high seed production, good seed dispersal, germination under a wide range of temperatures, phenotypic plasticity and competitively excludes co-occuring species. Increasing public awareness of the threat posed by *P. judaica* is desirable in order to control its spread. Glyphosate (as Roundup) can control *P. judaica* provided regrowth is regularly sprayed. Handweeding, and handweeding and/or spot spraying are the most effective control where *P. judaica* is growing with desirable species. After removal of *P. judaica*, an area requires planting with desirable species, otherwise the space becomes open for recolonisation by *P. judaica*. *P. judaica* is is provisionally noxious in the municipality of Mosman and a submission to declare it noxious statewide is before the N.S.W. Minister of Agriculture.

INTRODUCTION

Parietaria judaica is one of two *Parietaria* species that occur in Australia. Forest (or shade) pellitory, *P. debilis* Forst. f., occurs throughout mainland Australia (3) but is not thought to be allergenic (Dr. D.J. Bass, pers. comms., 1990). *Parietaria judaica* (common names pellitory, pellitory-of-the-wall and sticky-weed) was first recorded in Sydney in 1902 at Wooloomooloo Bay but was probably present before this date. *P. judaica* also occurs in Melbourne, Adelaide and Fremantle. It may have been introduced accidentally as a contaminant of ship ballast or intentionally as a medicinal herb or a garden/wall plant. Currently its range extends from Palm Beach in the north to Otford in the south, the Nepean River in the west to the coastal cliffs and beaches in the east (see Fig.1).

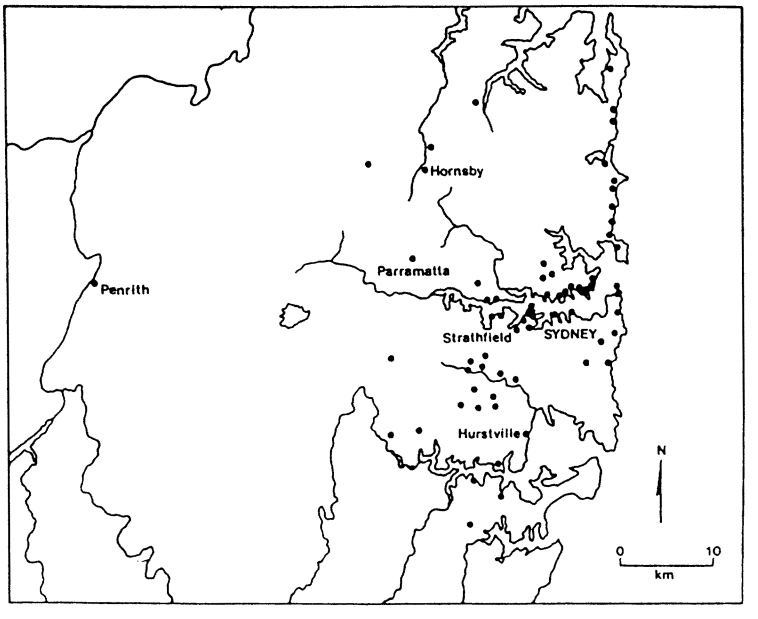

Figure 1. Distribution of *P. judaica* in Sydney. Solid dots represent positive sightings of *P. judaica*. From Bass and Bass (6).

P. judaica is a cause of IgE-mediated rhinitis, asthma and conjunctivitis (7) and may produce contact dermatitis (Dr. D.J. Bass, pers. comm., 1990). It is widespread and causes allergies in Europe (4, 1, 15) and is the most important areoallergen in Naples (9). In 1988 there were 64 *P. judaica* sensitive patients with perennial and/or seasonal rhinoconjunctivitis with or without asthma in Sydney (6). Most of these patients came from a relatively small geographical area centred on the northern harbour suburbs of North Sydney and Mosman. There are now 129 *P. judaica* sensitive patients that come from a wider area (Dr. D.J. Bass, pers. comm., 1990). Forty nine cases have been identified from a longitudinal study being undertaken to monitor the natural history of *P. judaica* pollinosis in Sydney amongst school-aged girls (6).

BIOLOGY

Description.*P. judaica* stands 0.2-1.0 m tall, displaying variable habits, from spreading to decumbent-erect. The alternately arranged leaves vary in size and shape, generally 2-8 cm long, lanceolate but more usually ovate. Both surfaces of the leaves are covered with fine white hairs. The stems are reddish, and like the rootstock become woody with age (13, 19). The flowers are small and located in involucre in the axils of the petioles. The female flowers are approximately 2.0 mm long, with a tufted stigma. The hermaphroditic flowers are ovoid, but after explosive pollen release, form tubular perianths 3-3.5 mm long. Each flower produces a single black achene (13, 19).

Reproduction. *P. judaica* reproduces both sexually and asexually. Generally there are one female and two hermaphroditic flowers per involucre. However up to eight hermaphroditic flowers per involucre may be present. The flowering season is long, up to ten months in Europe (11, 9) with pollen collected throughout the year in Sydney, with spring and autumn the peak flowering times (Dr. D.J. Bass pers. comm., 1990). Estimated seed production for dense stands of *P. judaica* in relatively stress-free, mesic environments exceeded 250,000 seeds/m^2. In dense shade, seed production fell to c. 90,000 seeds/m^2. In xeric and stressed conditions production was c. 65,000 seeds/m^2 (5). *P. judaica* may also root from buried nodes, regenerate from severed portions or resprout from rootstock.

Dispersal. Upon maturation the hermaphroditic perianths dry and drop under the parent plant. On vegetated surfaces and soil this may result in the development of a large soil seed bank. On impervious surfaces the discarded perianths and enclosed seeds may be washed along cracks and drains. Female perianths remain attached to the involucre bracts and the resultant structure may act as a 'wing' keeping seeds aloft on the wind, or as a 'raft' keeping seeds afloat in water.

The sticky hairs covering the perianths and involucre facilitate dispersal on clothing, hair, and fur. Dense stands of *P. judaica* often develop along pathways and tracks. Seeds incorporated in soil are moved by machinery, footwear and in turf (5).

Germination. *P. judaica* seeds germinate over a wide range of temperatures (see Fig. 2). Optimum germination and early growth occurs at 21°C, with over 60% germination between 10°C and 27°C. At 20° ± 0.5°C germination rates exceed 75% for female and hermaphroditic seeds in light and dark conditions (5).

Growth. The main period of growth extends from mid-winter to autumn, coinciding with the main flowering season. Under xeric conditions, plants develop a spreading habit, with small leaves. In mesic conditions, growth is vigorous both vertically and laterally, giving rise to a decumbent-erect habit. *P. judaica* characteristically forms large, dense, monospecific stands that exclude other herbaceous plants. After devegetation and soil disturbance, germination and establishment of *P. judaica* from the soil seed bank is rapid.

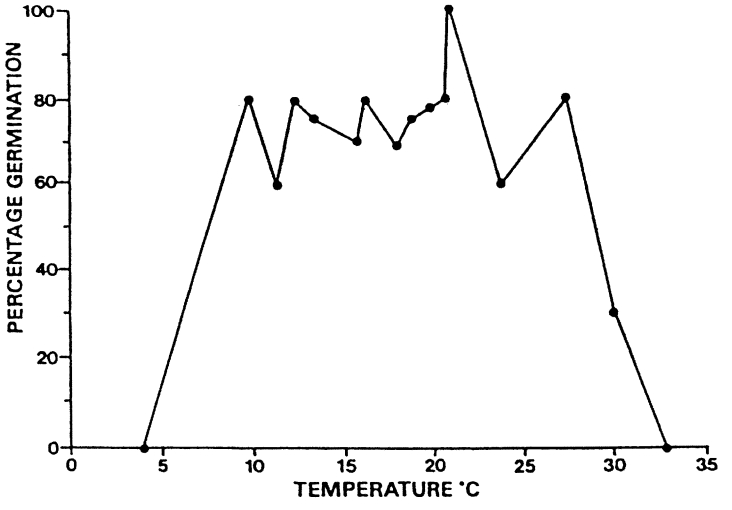

Figure 2. Germination percentage of *P. judaica* seeds between 4°C and 33°C, from Bass (5).

POTENTIAL BIOCLIMATIC DISTRIBUTION

The distribution of *P. judaica* in the British Isles (16), Italy (18) and the Netherlands (14) were compared with mean annual precipitation and mean summer and winter temperatures taken from Perring and Walters (16), Cantu (8) and Arléy (2) respectively. Using overlays, the distribution of *P. judaica* in the northern Hemisphere is delineated by a mean annual precipitation of 500-1525 mm, mean January (winter) temperatures no lower than -4°C, and mean July (summer) temperatures between 16°C and 28°C. Transposing these limits to Australia using Gentilli (12) and Division of National Mapping (10) as base maps, the potential bioclimatic distribution of *P. judaica* includes much of southeastern Queensland, eastern New South Wales, most of Victoria except the high alps, northern and eastern Tasmania, southwestern Western Australia and parts of South Australia, including Kangaroo Island (see Fig. 3).

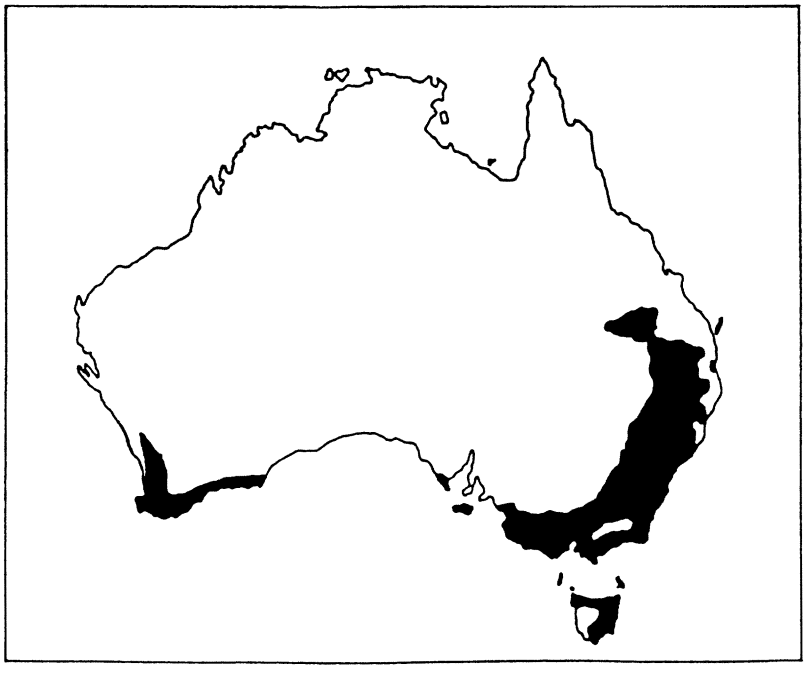

Figure 3. Potential bioclimatic distribution of *P. judaica* indicated by shaded areas, from Bass (5).

CONTROL

P. judaica, is reaching plague proportions in the inner city suburbs of Sydney, especially in the North Sydney Municipality. It is rapidly displacing another southern European exotic, Ivy-leafed Toad Flax, *Cymbalaria muralis* and the naturally occuring Sickle fern, *Pellaea falcata*, which once dominated the high open joined stone walls; taking over entire gardens and colonising urban bushland.

Effective, safe and easy to use weed control method(s) was needed. In N.S.W., weed trials are a prerequisite for declaration of *P. judaica* as a noxious weed. Trials in February 1989 using nine treatments with four replicates were conducted in randomly selected quadrats of a minimum size of 5x5 m on the south facing slope of Anderson Park, North Sydney.

Treatments. Staff of Monsanto and Dupont (Sydney) advised possible suitable herbicide solutions for use in the trials (Table 1.). The nine methods tested consisted of herbicide only, matting, application of herbicide to regrowth after mowing, handweeding and no treatment (Table 2). After treatment all sites were mulched and tubestock of local native species planted.

Table 1. Herbicide mixtures recommended by Monsanto and DuPont for weed control trials on *P. judaica* at Anderson Park, North Sydney, February 1989.

Monsanto solution	DuPont solution
20 l water	20 l water
200 ml Round-up	2 g Brushoff
60 ml Pulse	20 ml Pulse
	50 ml Assure

Table 2. Weed control treatments used in weed control trials on *P. judaica* at Anderson Park, North Sydney, February 1989.

Treatment	Description
A	Mow[a], rake then 3 weeks later spray with Monsanto
B	Mow, rake then 3 weeks later spray with DuPont
C	Spray with Monsanto twice 3 weeks apart
D	Spray with DuPont twice 3 weeks apart
E	Mow then weed mat over quadrat
F	Hand weed only
G	Hand weed and then Monsanto spot spray
H	Hand weed and then DuPont spot spray
I	No treatment

[a]Mowing was conducted using a 'whipper snipper'

Results of trials. Of the two herbicide mixtures Monsanto gave the best kill of *P. judaica*. There was no difference between mown and unmown sites. Significant regrowth of dense *P. judaica* (with almost no other species present) after 3 to 4 weeks occurred when no follow up spraying occurred. Regrowth was attributed to persistant rootstock and recruitment from the soil seed bed. Regrowth from rootstock was killed using 1:4 solution of Roundup and seedlings with 1:100 mixture of the monsanto solution. In devegetated patches recolonised by *P. judaica* seedlings three follow up Monsanto sprays and mulching and replanting with natives gave good results. Spot spraying following handweeding was discontinued to avoid accidental

spraying of native seedlings. Handweeding is being applied to these areas with good success.

Glyphosate (as Roundup) is used widely by local councils for routine weed control. Care must be taken to follow up initial treatments to avoid regrowth flowering and adding to the soil seed bank. Protopapadakis (17) reported resistance by *P. judaica* to glyphosate but it is likely that the spraying regime lacked follow-up sprays to control regrowth.

CONCLUSION

Asthma and related allergic diseases are a major cause of discomfort to humans and represent significant costs to the public health purse. The suitability of *P. judaica* to urban environments and the coincidence of the potential bioclimatic potential distribution with major temperate urban centres in Australia suggests that the incidence of *P. judaica* pollinosis will increase unless checked. The need to raise the public awareness of *P. judaica* is imperative but is difficult without financial assistance from State and Federal governments. This paper outlines the biology of, problem posed by, and control of *P. judaica*. It is unknown to what extent *P. judaica* induced pollinosis occurs in other cities but it is likely to become serious with time and requires immediate attention.

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