RAMPION MIGNONETTE AND ITS CO-ORDINATED CONTROL

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Summary. Rampion mignonette, *Reseda phyteuma* L., is an annual to short lived perennial agricultural weed from the Mediterranean, new to Australia. It has the potential to spread and increase agricultural production costs in southern Australia. Rampion mignonette is well adapted to the climates of southern Australia and New Zealand, and if not contained may become a widespread weed. Eradication may succeed.

INTRODUCTION

Every year new plants become naturalised in Australia. Some newly introduced plants spread and become major weeds. Other have limited impact. Early eradication of a weed will prevent it causing widespread problems (25), however our record of predicting and stopping potential weeds soon after introduction is poor (3,12).

Species unknown in Australia with a similar biogeographic range to plants invasive in Australia may be potential weeds (5,6).

Predictors of potential weeds include the experience in other regions with similar climates (14,17,25), the plant's native distribution (4,6), the behaviour of related taxa (25), seed production and germination (6) and the number of introduction points (6). Competitive ability may also predict the potential to cause problems in a new environment (13).

This paper reports on the potential of the recently introduced plant, rampion mignonette, *Reseda phyteuma* subsp. *phyteuma* L. to spread and impact on agriculture.

Importance of rampion mignonette. Rampion mignonette is an annual to short lived perennial herb (1). The subspecies is native to north Africa and southern Europe (1,3) and is a weed of dryland wheat, chickpeas, faba beans (8), vegetable fields (16), maize (7) and vines (1,2,15), but is not a major weed. In Portugal it is restricted to walls, rocky places and roadsides (Ribeibo pers comm, 1990). It is not a major weed outside of its native range (9) but has spread to northern Europe (24). Rampion mignonette is not on weed lists from North America (23), South Africa (22), Iran (10) or New Zealand (21).

Rampion mignonette in Australia. The first record of rampion mignonette in Australia, was from Nagambie, Victoria (36°47'S, 14°10'E) in 1985 (Cade, pers comm, 1985). It was eradicated within two years (Montgomery, pers. comm. 1991). The introduction was attributed to imported lucerne seed planted in 1980 (18). The lucerne crop failed and was followed by three successive wheat crops. In 1984, when the area was sown to irrigated pasture grasses, rampion mignonette appeared in isolated patches. Stock would not eat it and the owner removed all plants (Cade, pers. comm. 1985). It also appeared in an adjoining paddock planted to lucerne in 1986. The few plants found were destroyed by the land-owner. It last appeared in 1987 (Montgomery, pers. comm. 1991).

The second record was from Clare, SA (33°50'S, 138°37'E) where it was collected in 1987 after it escaped under-vine herbicides. Unfortunately it was wrongly determined as the garden escape

sweet mignonette, *R. odorata* (2). It was only in 1989, after further spread, that specimens were determined as rampion mignonette (Heap, pers. comm. 1989). By 1990 when it was first surveyed it covered five non-contiguous vineyards over 38 ha (2).

METHODS

On visits to the Clare infestation between September 1990 and December 1992 I observed rampion mignonette in vineyards, roadsides, pastures and tree reserves. I obtained management history from land-owners.

I used the literature (1,24) and herbarium records to map the native range of rampion mignonette and matched climates from 29 sites from the native range of subspecies *R. phyteuma* in north Africa and south-west Europe, with climates of Australia and New Zealand using CLIMEX version 4.2 (20). I chose recording stations close to collection sites from herbarium records (Fig. 1). Climates with a match index equal or more than 0.7 are a good match (17).

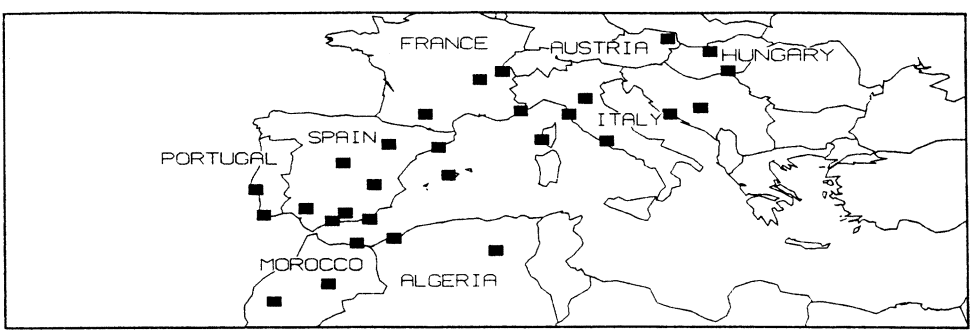

Figure 1. European and North African range of rampion mignonette, *Reseda phyteuma* subsp. *phyteuma*, including sites used for climate matching.

RESULTS AND DISCUSSION

Climate matching. The climate of the Western Australian wheatbelt, and south-eastern Australia, is similar to that of the native range of rampion mignonette. The predicted range also includes the major vineyard areas in Australia. In New Zealand the climate of Napier in the North Island, and parts of the South Island match the native range (Fig. 2).

The Australian infestations of rampion mignonette occur at sites which match with its native range. Clare matches with Rome, Italy (match index = 0.72) while Mangalore, 15 km from Nagambie, matches Barcelona, Spain (0.70) and Toulouse, France (0.73).

Distribution in Europe. Figure 1 shows the native range of *R. phyteuma* spp. *phyteuma*. The native range of the sub-species suggests it is adaptable and will become a significant weed in Australia. The European range is broad indicating a potential to spread quickly (4).

Biology. Seed biology and morphology suggest that rampion mignonette is invasive. Invasive species germinate rapidly but have seed dormancy (6). The preliminary biological studies

indicate that rampion mignonette is a prolific seeder (18) and field observations suggest that it germinates over an extended period (19).

Resistance to cultural practices. Rampion mignonette causes most problems in vineyards where herbicides are used for weed control, but will also dominate under the vine where herbicides are not used between the rows. It resists current cultural practices in vines, including triazine herbicides, and its seedlings emerge all year, escaping glyphosate. It invades well managed vineyards at Clare. Agricultural weeds which resist herbicides increase when herbicides are used frequently (11).

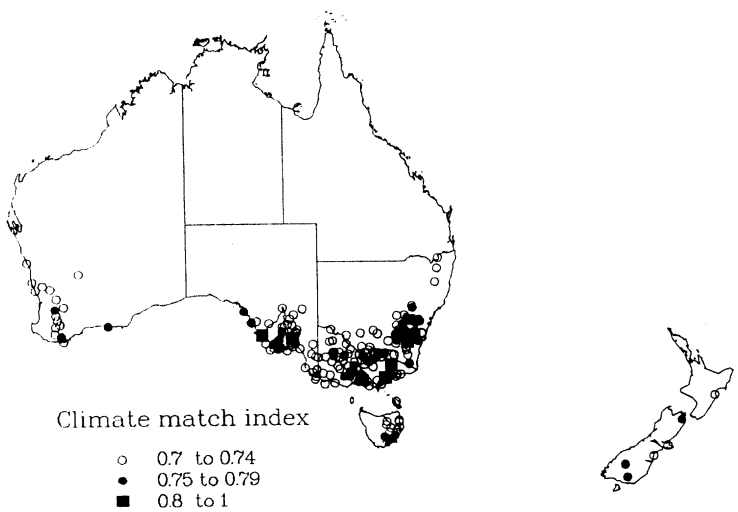

Figure 2. The potential range of rampion mignonette, *Reseda phyteuma* ssp. *phyteuma* in Australia and New Zealand. Match indices > 0.7 are a good match.

At Clare it is also present in a relatively poor volunteer pasture. It is eaten by sheep, but is not preferred. This allows it to dominate under selective grazing. In SA it has not yet spread to cropped paddocks. Tolerance to herbicides may enable rmpion mignonette to become a weed of many annual crops as well as horticulture in southern Australia.

Ability to spread. Rampion mignonette is easily spread and will soon spread to other vine growing districts. It has already spread from one vineyard near Clare to a second under the same management, 7 km away. After field inspections, mud washed fromm boots contained seeds and pods (Heap, pers. comm. 1989). The frequent movement of workers, vehicles and machinery between vine growing districts will enable rampion mignonette to spread.

Coordinated control. A control program for rampion mignonette should proceed because the climate matching indicates it could become widespred in southern Australia; and secondly, the tolerance to triazine herbicides and ability to escape other treatments will enable it to compete with a range of horticultural and annual crops and thirdly, its broad native range and the initial spread within the Clare suggests that it will spread rapidly within Australia.

Weed status

There are two possible aims for a coordinated control program. A *containment* program aims to prevent further spread from the infested areas by regular treatments and local quarantine. The alternative is *eradication.*

Containment program. In 1991 the Animal and Plant Control Commission began a containment program by proclaiming it under the *Animal and Plant Control (Agricultural Protection and other purposes) Act, 1986* and *Seeds Act, 1979-82.* The containment program is locally funded. Landowner are required to destroy rampion mignonette on their properties. A local control board oversees the operation. Landowners are co-operating by spraying any plants with glyphosate (Conrade, pers. comm. 1992). A colour brochure was produced and a publicity campaign including all vineyard areas in South Australia commenced in 1992.

Eradication program. To move from containment to eradication will require extra resources to study rampon mignonettes biology, develop control techniques, carry out control and compensate affected landowners for lost production due to eradication treatments. An eradication program has the advantage that it has no annual cost after eradication.

There are two reasons why eradication is likely to succeed. Firstly, the only Australian infestation is still small and secondly, the successful eradication of the Nagambie infestation suggests it is technically possible to eradicate rampion mignonette.

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