

ISSN 1320-2413

Association of Societies for Growing Australian Plants Inc.

**RHAMNACEAE STUDY GROUP**

Newsletter Number 9

March 2001

Hello members. It's lovely to be getting some cool weather here at last after a rather dry and very hot summer. The Rhamnaceae have stood up pretty well, although I did lose some very small plants of *Pomaderris eriocephala* which I'd planted out during early spring. It was just before a dry spell, and they were at the top of my hill and just a bit too far to carry water to regularly. This is, however, a usually hardy species if given time to establish before harsh conditions prevail. Five others that I planted out two years ago are flourishing, one of them already at fence height, and all are now covered in attractive rusty new growth. I'm always surprised at how quickly Pomaderrises grow – they seem to outdo anything else I plant here.

**Member's Report**

The following is a report of a five year project undertaken by Gordon Limburg. Gordon is a bush management consultant.

**Propagation of *Pomaderris brunnea* Wakef. Classified Schedule 2 - Vulnerable, under the NSW Threatened Species Conservation Act 1995.**

**The project** set out to establish a translocated plant population from a wild population that was in the way of development on the Nepean River flood plain, south-west of Sydney.

**The species** in question is *Pomaderris brunnea* Wakef. (Rhamnaceae), classified Vulnerable under the NSW Threatened Species Act, because it was only known to have a geographic range of 100 km, and considered to be at risk of extinction in the wild within 20 to 50 years, and recognised to have at least one population within a conservation area.

It is a shrub or small tree, with elliptic leaves usually 20 mm, deep green, with greyish and rusty hairs underneath. Attractive, small cream flowers form clusters of pyramid-shaped panicles.

Translocation is only recommended as a last resort to conserve a vulnerable species. The preferred option is assisted regeneration of the habitat where it can thrive naturally. Translocation to a new site was only attempted because the plants were in the way of approaching development.

**AS A SCHEDULED SPECIES, WORK ON *POMADERRIS BRUNNEA* REQUIRED APPROVAL BY THE NSW NATIONAL PARKS AND WILDLIFE SERVICE, WHICH**

**BROUGHT WITH IT THE GENEROUS CO-OPERATION AND VALUED ADVICE OF SCIENTISTS BOTH IN THE SERVICE, AND SEVERAL BOTANIC GARDENS.**

Available literature on the species was searched. People familiar with the species were interviewed, and reported that:

- After many attempts, only one horticultural scientist had been able to grow three seedlings, from more than three thousand seeds. A few more seedlings that germinated only survived a short time, and,
- The species could not be grown from cuttings.

Eight wild populations were visited to identify ecological features common to all sites. All were growing on flood plains, in similar alluvial soil. Habitats were similar, in plant communities and listed fauna, right down to species of ants. Two dead stems were sectioned and dated, and weather and fire records studied for the season identified.

The plants in all eight communities were believed to have germinated in the same season. That season had several periods of continuous wet weather soon after the seed drop, followed by lower humidity than usual.

A five-year plan of management was drawn up

Every stem of the original population was identified with a number and marked on a map. Attempts to discover germination factors included a range of trials by 14 methods, in different seasons.

As a precaution, several kilograms of seed samples from all fruiting parent plants were stored at - 18°C.

DNA extraction procedures and optimal fingerprinting techniques were developed, together with feasibility and utility of DNA sequencing to assess genetic diversity or clonality of the original population.

The original population was sampled to verify that it was genetically viable.

Ten translocation sites were selected to match the ecological features of the eight visited wild populations. Each site was fenced to exclude animals known to browse the plants. Wombat tracks were avoided, since it is not easy to fence out a hungry wombat with a taste for *Pomaderris* seedlings!

A professional horticulturist took a look, and suggested we shouldn't tell the plants that it's impossible to grow them from cuttings. With careful attention to strict nursery hygiene and judicious use of fungicide, he went ahead and produced a few hundred healthy tube stock.

Detailed records were kept at all stages.

Every seedling was identified with its parent plant, and extensive precautions were taken against genetic hazards such as outbreeding depression.

Ten translocated populations were planted out to a pattern drawn up to ensure that each population would be a genetically viable replica of the original population.

Within two seasons, the translocated populations grew two metres tall and produced copious seed, but no seedlings resulted.

News that further populations of the species had been recorded, extended the known range to more than 700 km, and the report of a population in a conserved area was found to be based on a single specimen that was wrongly identified! In view of this new information, reconsideration of the species' status would probably result in withdrawal of its Vulnerable listing.

Then came the real challenge, with the questions:

Why did the vast quantities of seed dropped by the translocated plants fail to result in any seedlings?

What unusual combination of factors was present within one season when all the wild populations germinated?

Further questions were listed about seed viability, pollinators, predators of seed or seedlings, and pathogens.

These and other questions were investigated simultaneously. Specimens were sent to laboratories. Seed production from each translocated plant was compared with its parent, and found to be similar.

Germination tests in the nursery were repeated with seed from the translocated plants. The first results happened when a handful of dead leaves was burned on a planted seed tray, and about 90% germination followed.

Nothing before had indicated fire as a germination factor. Earlier trials with smoke water by several methods had no results.

Soon after this success, a laboratory report certified that none of the seed tested was viable!

Wild populations were monitored again.

A few seedlings had appeared in two of the wild populations. The only obvious difference at the two sites was disturbance of the soil surface. On one site, it was caused by dirt bikes, which raised more questions about introduced trace elements, petroleum products, or exhaust smoke particles. At the other site where wild seedlings had appeared, the disturbance matched a wombat track up a steep slope. No smoke there! What about wombat exhaust? Wombat toilet habits were investigated, but nothing suggested the wombat might have eaten and passed ripe seeds. The seedlings were also in an unlikely position for wombat droppings.

Another subject further down the priority list for study involved the circumstantial evidence around one species of ant. The presence of this ant was confirmed at every site where no seedlings had appeared. It was not found where there were seedlings.

A limited literature search on species of similar size in the same genus consistently described them as "nocturnal, predators," and "granivores."

Recent, unpublished reports confirmed that ants collect and disperse the seed of most, if not all *Pomaderris* species.

No likely pollinators were found. In fact, very few insect species were collected at flowering time. Many *Pomaderris* species are strongly perfumed, but not this one, unless it saves its perfume for after dark.

Questions to be addressed at night never found their way far enough up the priority list for study, so the possibility of pollination by a night-flying insect remains.

Suspect fungi were collected from the roots of dead plants, and trays of previously healthy seedlings that suddenly died overnight. They were only identified as fungi, and preserved for later examination if indicated.

It was at about this time that two new wild populations of *Pomaderris brunnea* were discovered about two kilometres away, a hundred metres apart. These populations included numbers of plants of a full range of ages, from first-year seedlings to senescent small trees up to twenty years estimated age. This discovery confirmed earlier suspicions that the natural habitat of the species is well above flood level on the lower slopes of the valley, rather than on the flood plain.

Both populations were more than thirty metres from open grassland.

The flowering plants had been frequently monitored, checking for insects visiting flowers, and later seeds.

The soil under fruiting plants was sieved and studied, but no seed could be found.

When a fruiting plant was shaken, large numbers of seeds were easily seen on the ground. Two hours later, it had all vanished.

Then an ant was seen to be carrying a seed. A few hours spent following individual ants, each less than 2 mm long, revealed that they would carry a seed for about half a metre, put it down and go back to pick up another.

A line of seed was found, leading along a straight line along the ground from under a plant to a tiny burrow almost six metres away. The burrow was not much wider than the size of an ant carrying a seed, in open mowed grassland well clear of the tree canopy.

The seeds along the trail were counted.

Some limited excavation of one ant nest revealed galleries of stored seed, close to the surface. Outside the nest, a few hundred discarded seeds, with their elaiosomes removed, were left in a heap with some husks.

One plant was studied intensively. It was estimated to have produced 100 000 seeds, of which about 40% had dropped and could not be found.

The conclusion was that the entire seed crop was being predated.

To save at least some of the seed for germination, the ripe seed was shaken to the ground, and the ground under it immediately scuffed with a Dutch hoe so much of the seed would be covered with a protective layer of soil.

Very small fires were burned under each plant, using ply shields to protect the plants from scorching. All the fire sites were then kept damp by daily watering for three weeks.

**Result:** Hundreds of seedlings came up. About 35% of them grew on to maturity.

From the ten original translocation sites, three separate translocated populations were confirmed on 22nd June 2000, when 207 seedlings were counted.

Five years after the program started, these three populations can be recognised as successful translocated, genetically viable populations.

### Conclusion:

The ants resembled specimens of the small *Pheidole* under earlier suspicion from circumstantial evidence gathered at the wild population sites. Their identity was eventually confirmed as the same species.

They were only found in open, mowed grassland adjacent to the translocation sites, which were all small areas of woodland.

The ants only appear to move under the tree canopy for about six metres. Pitfall trap lines revealed no specimens further from the open grassland than seven metres.

The wild habitat of *Pomaderris brunnea* was consistently found to be under open woodland canopy, usually less than 30%.

Provided the seed is protected from open grassland by a wide enough buffer zone of this habitat, it germinates and thrives in favourable seasons. A very small fire appears to assist germination and establishment of seedlings, when the ground is subsequently kept damp for several weeks after germination. The individual factors of this assistance are unknown.

*Pomaderris brunnea* grows readily from cuttings struck within a few hours. It is particularly susceptible to fungal leaf damage that tends to kill entire trays of seedlings overnight if not controlled with minimal fungicide treatment.

While the species is found there, riverflat flood plain does not appear to be the favoured habitat for the species.

Preferred habitat for the species is probably on valley slopes above flood level.

11th March 2001

Gordon E. Limburg

### Other News: Visit to Victoria

In February, I travelled down to Victoria to hear Neville Walsh's talk on *Pomaderris* given at the Maroondah SGAP meeting. Neville is a botanist at the National Herbarium of Victoria, and has recently completed a revision of the genus *Pomaderris* – which has left us with over 70 species, sub-species and varieties to study! Maps of the distribution of the genus were interesting: they showed a 'hot spot' for *Pomaderris* in the coastal and ranges area of the NSW/Victorian border with more than half of the known species occurring in or close to this area. The range of the genus extends to New Zealand, but, interestingly, species that are upright shrubs here are often represented by prostrate forms in that country, for example *P. prunifolia* var. *edgerlyi*. It was a very informative talk. Since then, Neville has identified some

of the *Pomaderris* specimens from our Victorian trip a few years ago. He has also given us a copy of his *Pomaderris* key which should be very useful.

Natalie Peate generously provided me with accommodation and drove me around to places of interest during my stay. We visited Bob and Dot O'Neill's lovely garden and saw the *Pomaderris* plants that Bob grew from seed – now planted out and already sturdy little shrubs. We also saw Evan Clucas' garden (and his Kuranga Nursery). Evan has *Pomaderrises* and *Spyridiums* in his very attractive garden, and I acquired some new *Spyridiums* for my collection from him. We did a short walk in Warrandyte State Park where we saw *Pomaderris prunifolia*, *P. racemosa*, *P. aspera* and a fourth *Pomaderris* we couldn't identify (later, we found one of these in Natalie's garden). We also spent some time identifying the *Pomaderrises* that Natalie has growing in her spectacular (and still expanding!) garden – including *P. vacciniifolia* which I haven't seen before. Altogether a very worthwhile trip.

#### **For the Next Newsletter**

In the next newsletter, I would like to review what we are all growing and with what success (or otherwise!). I hope to get the next Newsletter out in July or August, so please put pen to paper before then and tell me all about the *Rhamnaceae* you are growing.

SUBSCRIPTIONS DUE IN JUNE: Subscriptions will be \$5.00.

Jo Walker

Rhamnaceae Study Group Leader

159 Poppet Road WAMBOIN NSW 2620

Ph. (02) 6238 3415