

Weeds threatening rehabilitation efforts on mine sites in the gold fields of Western Australia and the Northern Territory: competition between *Rumex vesicarius* (Polygonaceae) and Australian native plant species and seedbank studies

Andrea Schatral and Joan M. Osborne

Mine Rehabilitation Group, School of Environmental Biology, Curtin University of Technology, PO Box U1987, Perth, Western Australia 6845, Australia. Email rschatra@cc.curtin.edu.au

Abstract Past mining activities, intentional seeding, and incoming vehicles and machinery have introduced *Rumex vesicarius* L. (ruby dock, bladder dock, family Polygonaceae) to numerous mine sites in the semi arid regions of Western Australia and the Northern Territory. Ruby dock often is the dominant plant species in new rehabilitation sites (Brearley and Osborne 1996, Osborne and Brearley 1997). Removal by hand and chemical control with herbicides have been only partly effective.

Rumex vesicarius is indigenous to desert and semi-desert areas of North Africa, south-west Asia, southern Iran, Afghanistan and Pakistan. It is a much-branched annual herb between 0.1 and 0.8 m tall. *R. vesicarius* produces a large showy fruiting perianth (false fruit) of light brown, pale pink, purplish or dark brown colouration. The fruit contains two main seed types, light and dark seeds. Dark seeds vary in colouration: brown, greyish brown and black. Dark seeds are usually smaller than light seeds and found within the periphery of the fruiting perianth. Light seeds are located in the centre of the fruiting perianth. In general only one light seed, but one to five dark seeds are found per fruiting perianth. The frequency with which each seed type occurs within a fruit greatly varies between populations.

An extensive literature review revealed that there is no published information available on the ecology and germination biology of *R. vesicarius*. A successful management system however, requires a sound knowledge of seed germination, seedling establishment, plant growth, reproduction and survival of seed in the soil.

Our study investigated a management system that focuses on the use of suitable competitive native plant species in newly rehabilitated mine sites. We

investigated competitive and allelopathic interactions between *R. vesicarius* and twelve native plant species suitable for mine site rehabilitation in a series of pot trials. We found that grasses (*Eragrostis eriopoda* and *Monochather paradoxa*) appear to be the strongest competitors, along with *Acacia tetragonophylla*, *Maireana georgeii* and *Ptilotus obovatus*.

Long term control of *R. vesicarius* will be also influenced by the number of viable seed in the soil after the maternal plant has died. We examined the seedbank in a mine site near Meekatharra in order to estimate the number of viable seeds in the soil. In order to examine longevity and dormancy of seeds in the soil, seedbank studies were also conducted in the laboratory. The field and laboratory studies show that ruby dock seeds form a persistent seedbank. The seedbank of *R. vesicarius* at the mine site near Meekatharra has a clustered distribution. The fruits only contained a very small number of light seeds and a large number of dark seeds. Germination trials demonstrate that seed viability is high.

Keywords *Rumex vesicarius*, *Acetosa vesicaria*, weed control, mine site rehabilitation, competition between ruby dock and native plants, seedbank.

REFERENCES

- Brearley, D.R. and Osborne, J.M. (1996). Four rehabilitation ages at the Plutonic gold project: Ecosystem development mid-June 1996. Report, Curtin University of Technology.
- Osborne, J.M. and Brearley, D.R. (1997). Five rehabilitation ages at the plutonic gold project: Ecosystem development Mid-May 1997. Report to Plutonic Operations Limited, December 1997. Curtin University of Technology, Perth, Western Australia.