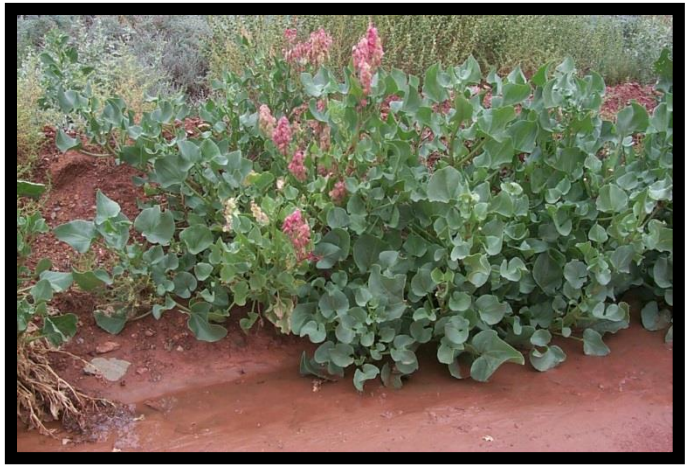
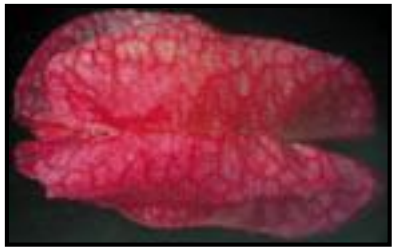
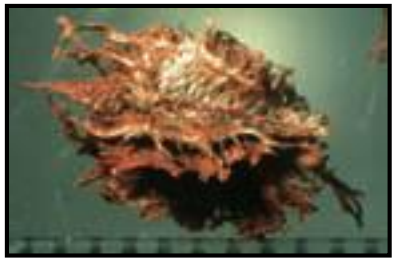
History

- *Acetosa vesicaria* L. also known as *Rumex vesicarius*, ruby dock, bladder dock or ambat chuka is a saharo-sindian species that is indigenous and widespread throughout desert and semidesert areas of North Africa, Southwest Asia, southern Iran, Afghanistan and Pakistan.
- It is speculated that Afghan camel drivers introduced this species to Australia during the latter half of 1800's, though there is no evidence.
- There are reports of this weed being present in most states of Australia and it covers large areas of Western Australia. CALM Flora Base has 53 recorded sites within WA with the earliest in the Perth region in 1892.

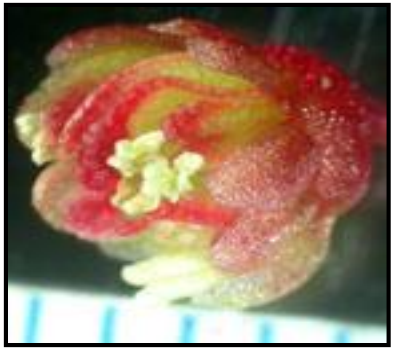




Features



- *A. vesicaria* is a much branched fleshy annual herb growing to approximately one metre.
- Broad to very broad triangular leaves.
- Large showy perianth (fruiting valves) of light brown, pale pink, purplish or red to dark red, that are thin, inflated and finely reticulate.
- The fruiting valves enclose inconspicuous wind pollinated flowers.
- As the fruiting valves age they become brown, tough and fibrous.
- It has been suggested that there are 2 seed types (light usually 1; dark usually 1-5). The dark seeds vary in colouration: brown, greyish brown and black usually the smaller of the two types and are in the periphery of the fruiting valves, with the light seeds in the centre of the fruiting valves.



Acetosa vesicaria

(ruby dock)

Research and development for the management of a serious environmental weed

Janet Anthony
Bob Dixon

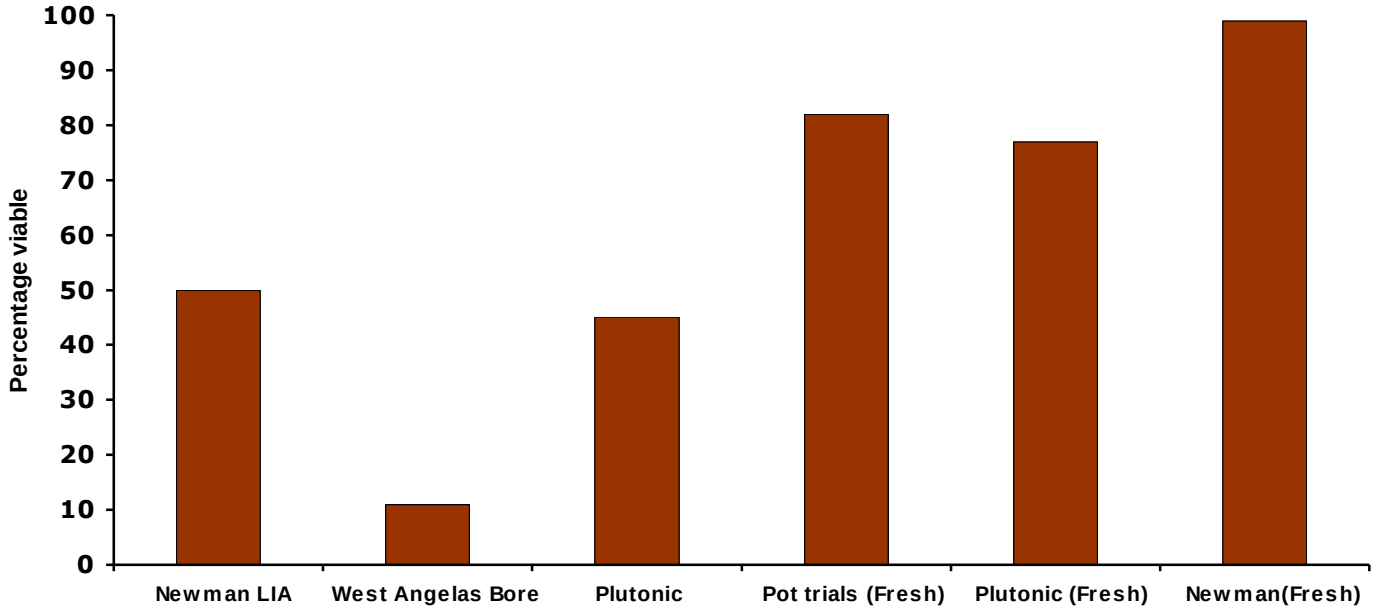
The aim of this project is to develop a suitable method for control of ruby dock by:

•Undertaking seed studies to gain an understanding of relationship between seed and soil seed bank dynamics. The depletion of seed reserves in the soil is dependent upon the rates of germination, death and predation under any particular set of environmental conditions.

•Studying the effects of various herbicides on ruby dock and ‘off-target’ species.

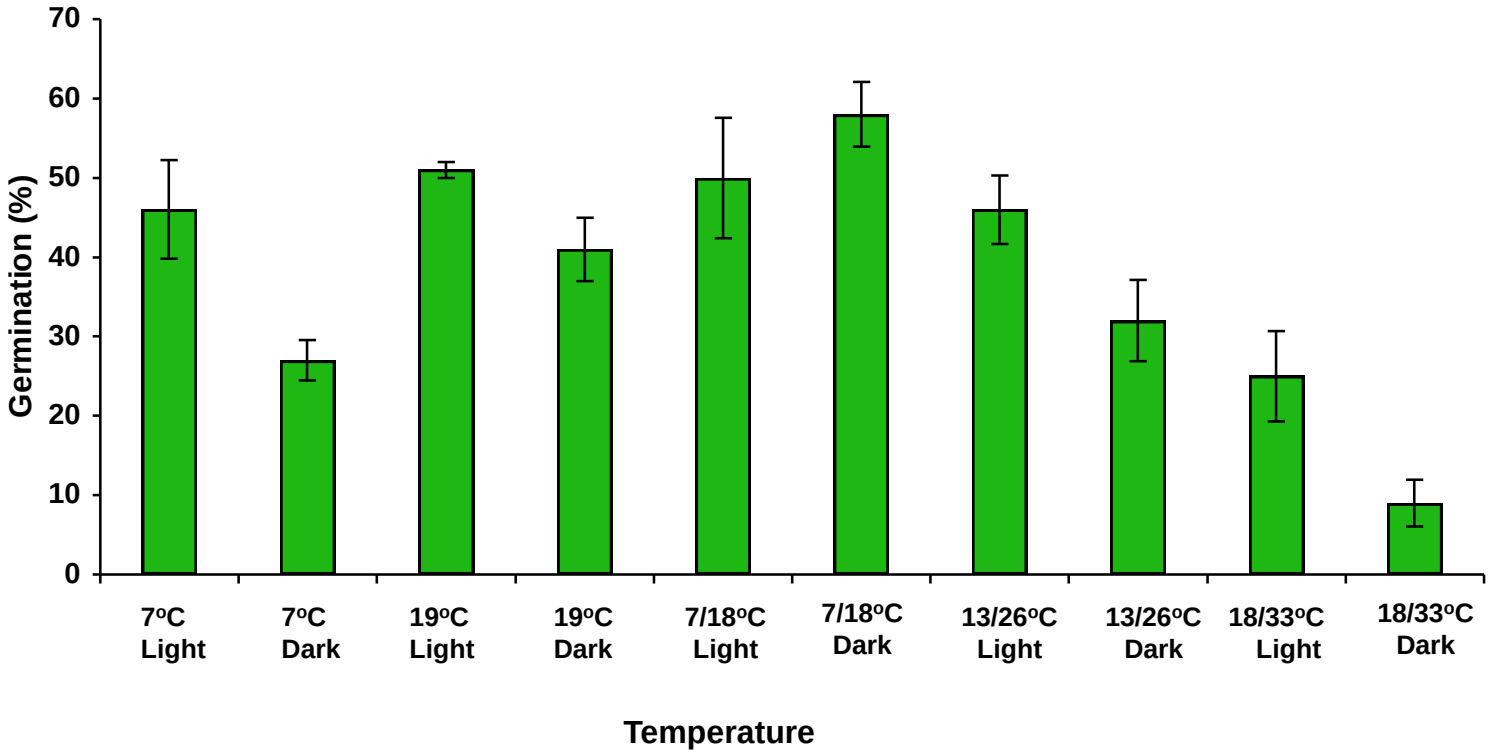
Seed viability

The viability of a seed may be measured as the proportion of a given sample that has the potential to germinate.

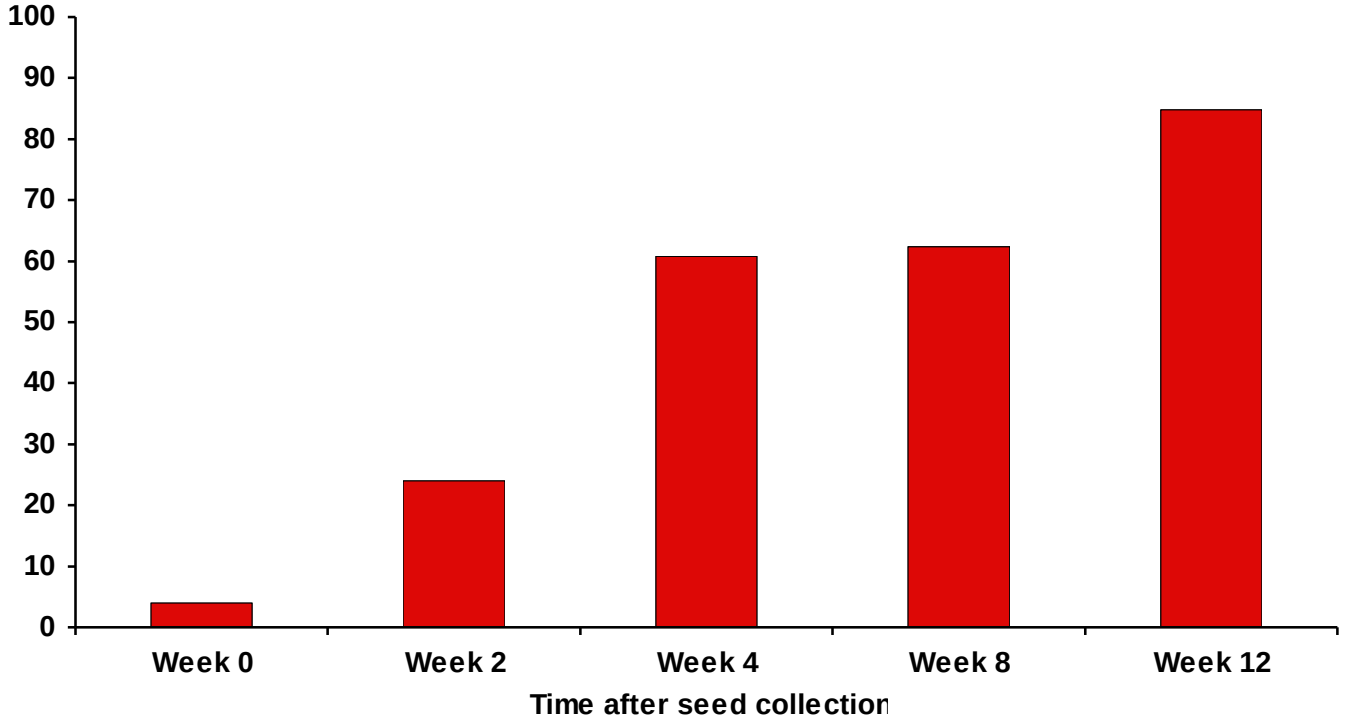


Seed germination

- Temperature
- Light

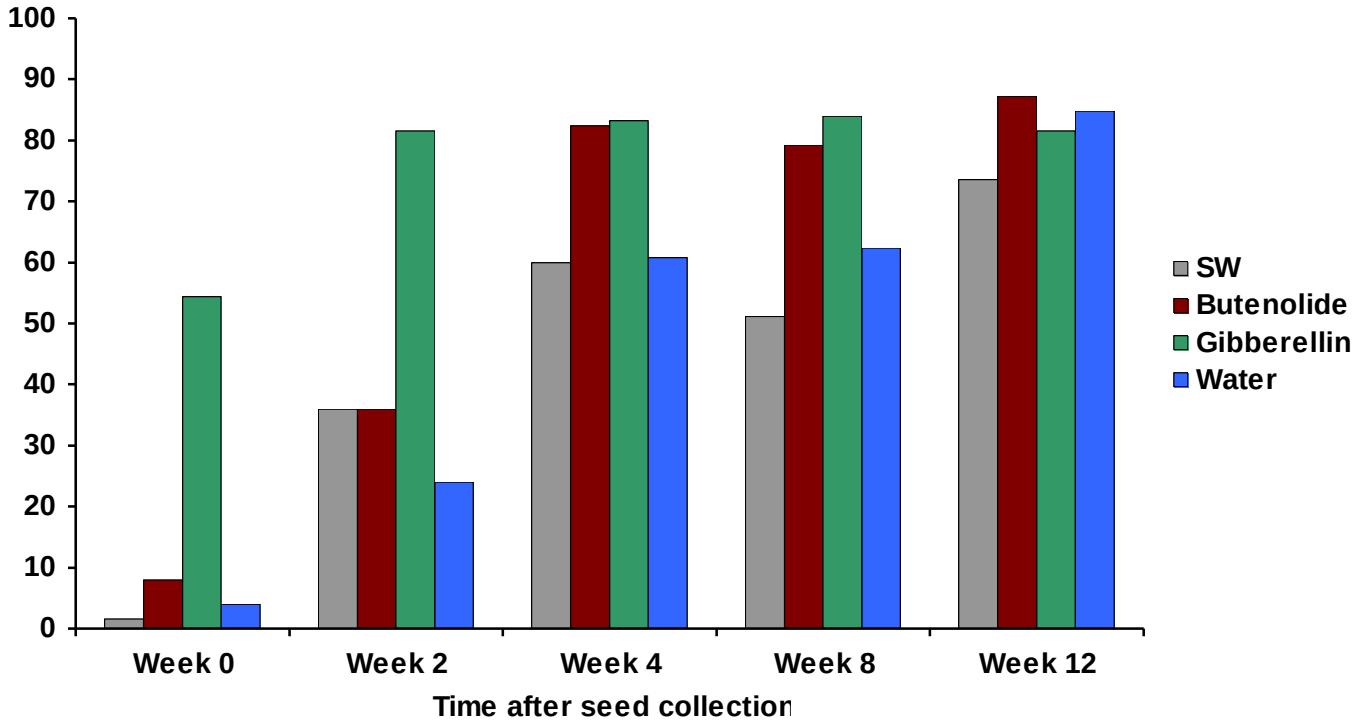


After ripening dormancy

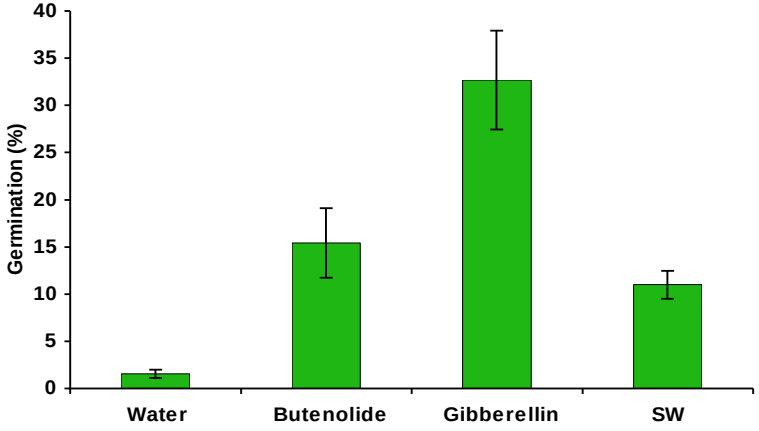


Dormancy

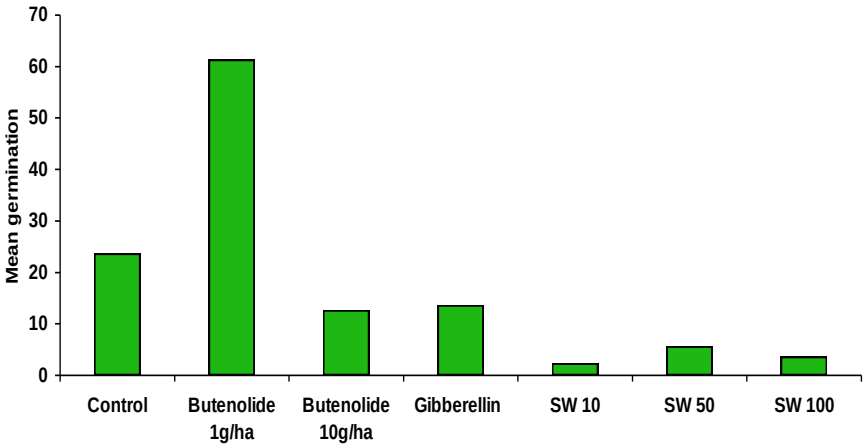
Alleviation of after ripening dormancy using germination stimulants; Smoke water (SW), Butenolide and Gibberellin.



Dormancy

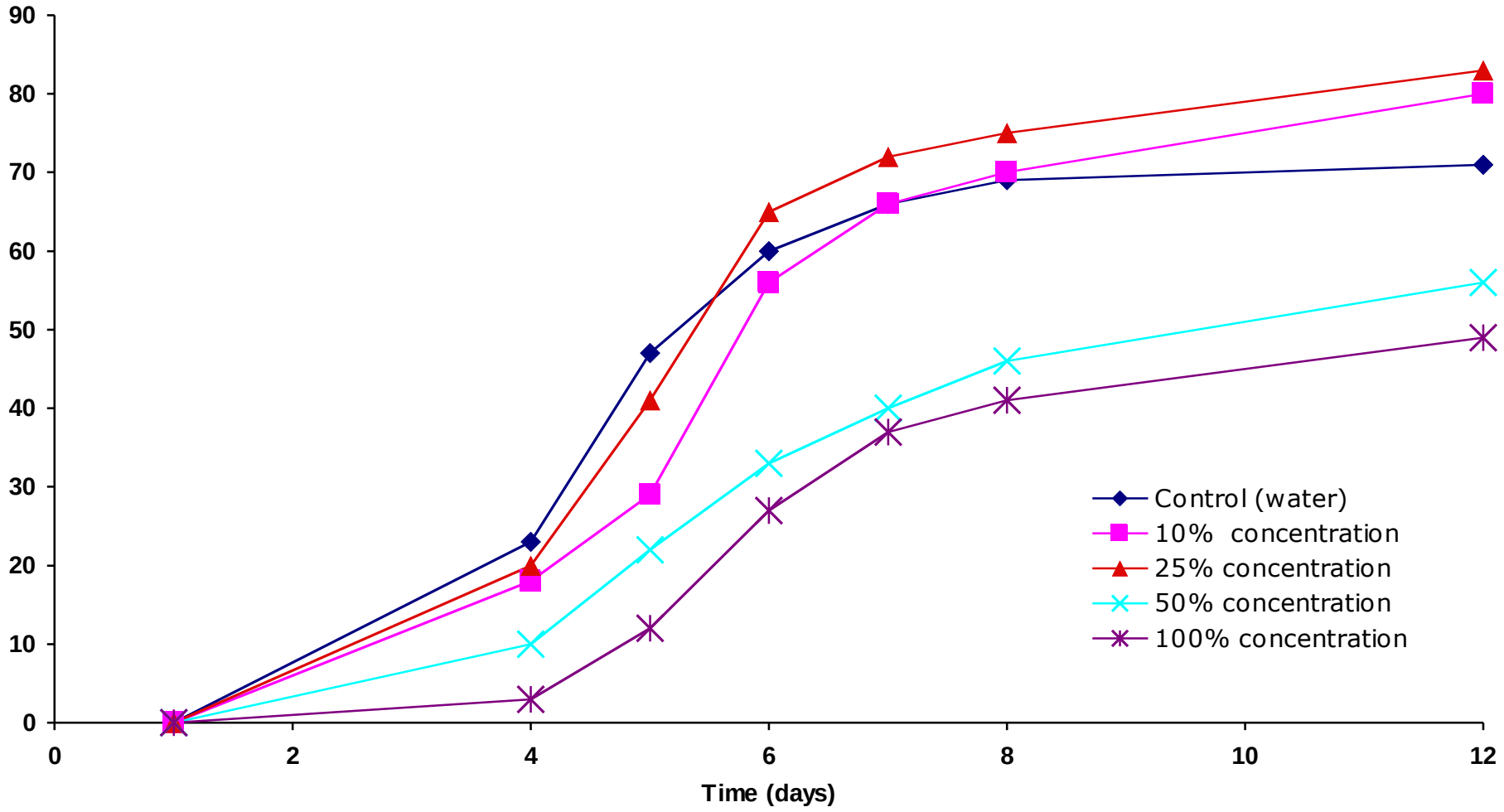


Percentage of seeds germinating from within false fruit (petri dish)



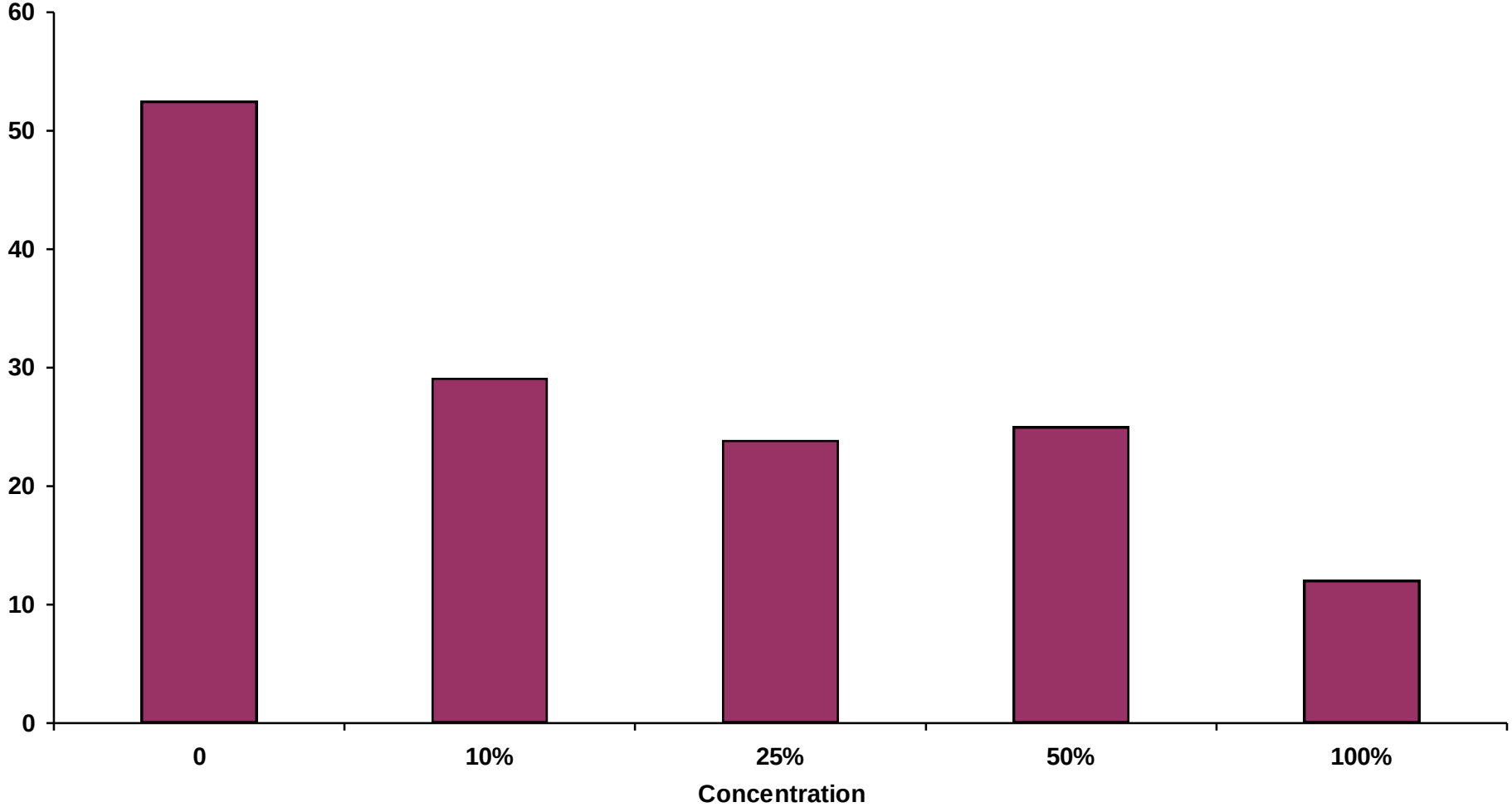
Number of seeds germinating from within false fruit surface sewn on seed trays.

Chemical inhibitor



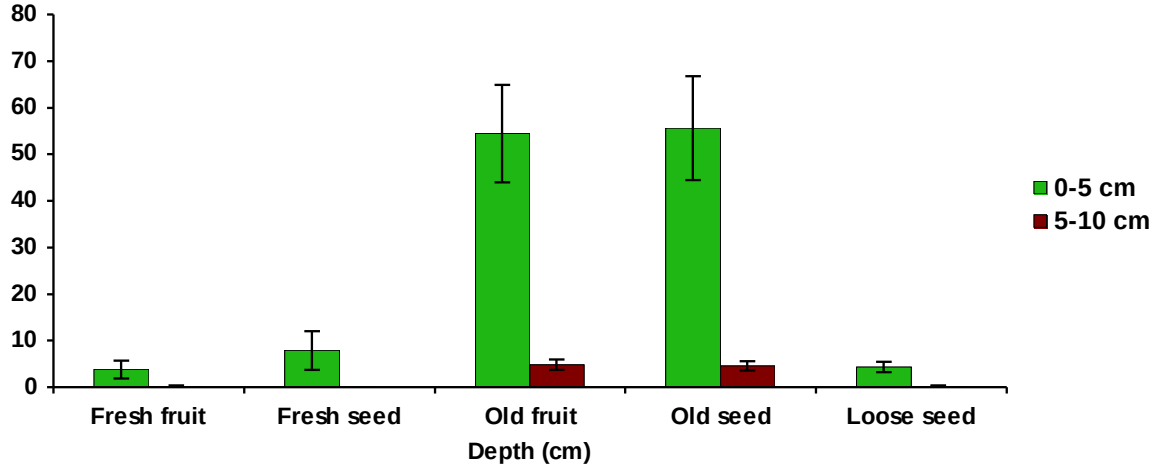
Percentage of seed germinated after application of various concentrations of solution made by soaking fruit valves in water for one hour.

Chemical inhibitor

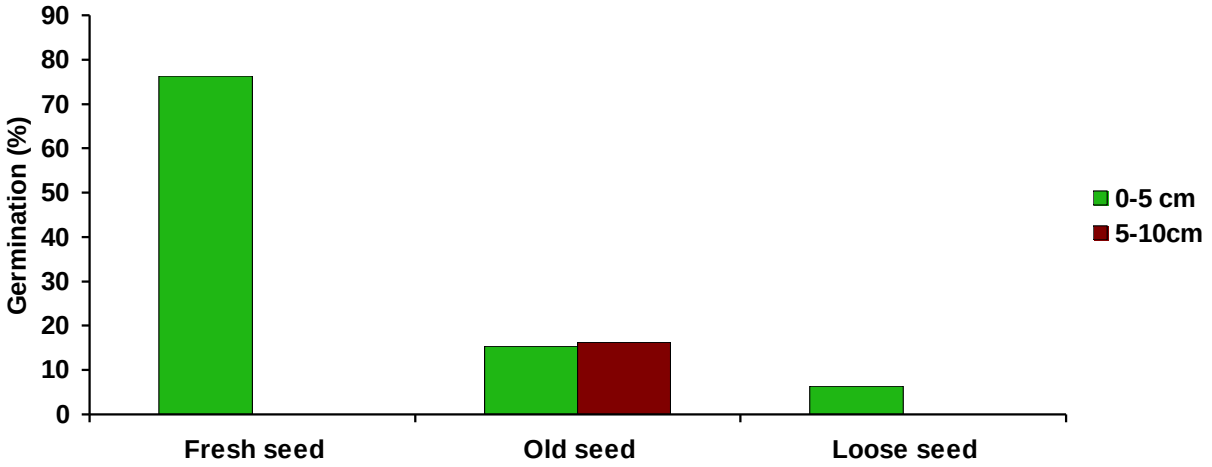


Length of seedlings as a measure of vigour after 12 days exposure to various concentrations of solution made by soaking fruit valves in water for one hour.

Seed Bank



Mean numbers of “fruit” and seed collected from 3125 cm^3 soil cores at sites infested with ruby dock



Germination percentage of seed retrieved from soil cores

Herbicide control

Field trials

Pot trials

Herbicides Evaluated

1. Glyphosate
2. Metsulfuron methyl (Brushoff)
3. Asulam (Asulox)
4. Chlorsulfuron (Glean)
5. 2,4-DB butyl ester (Buticide)
6. Dicamba (Kamba)

All herbicides were tested with;

- three different rates
- a control (water)
- a penetrant (Pulse) and
- a surfactant agent (Agral), (wetta)

Glyphosate

Broad spectrum, nonselective post emergent herbicide
Absorbed by the leaves not by roots via the soil

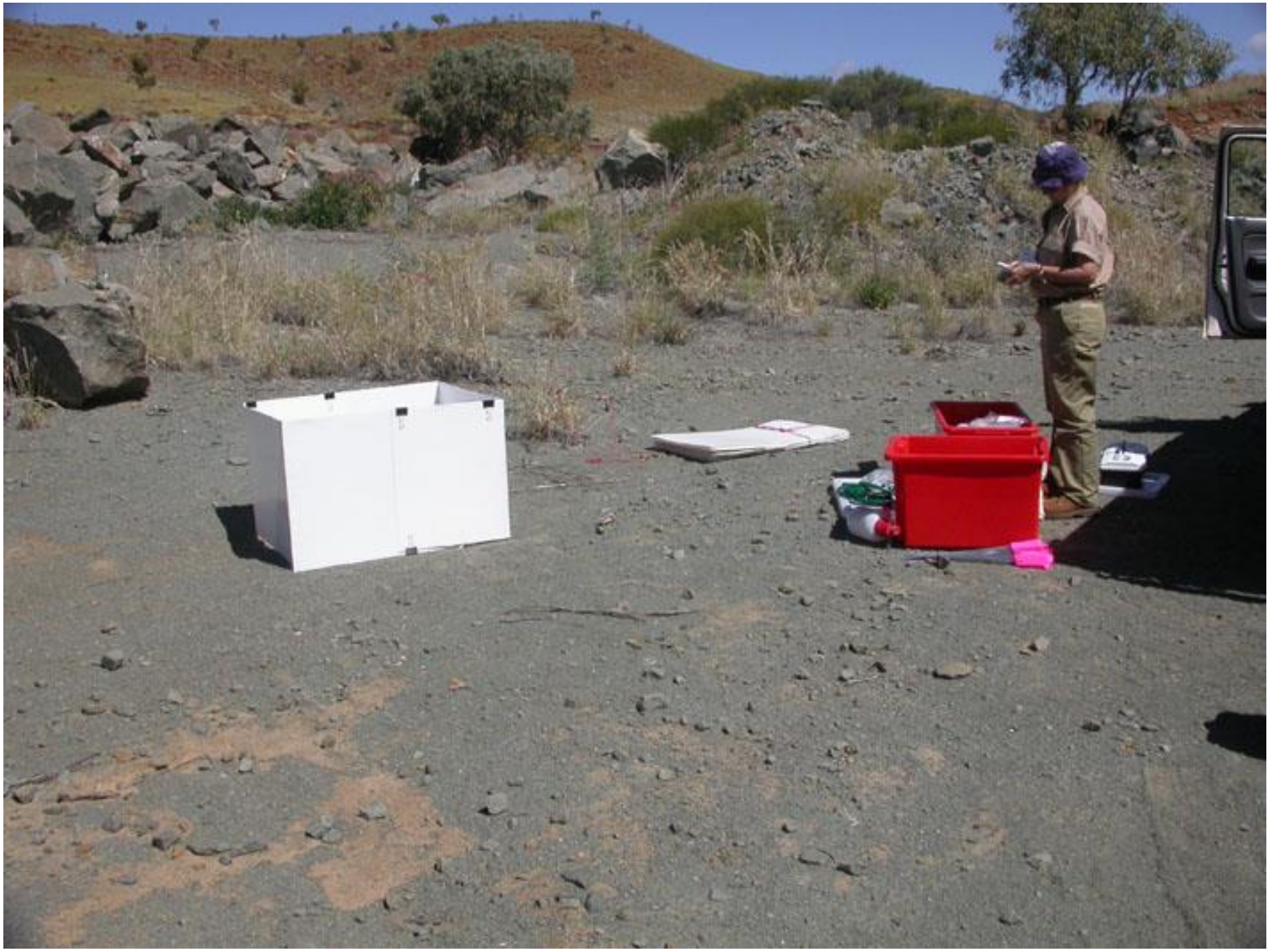
Rates used in trials:

1. 1L/ha, 1L/ha + wetta, 1L/ha + pulse, 1L/ha +pulse + wetta
2. 3L/ha, 3L/ha + wetta, 3L/ha + pulse, 3L/ha +pulse + wetta
3. 6L/ha, 6L/ha + wetta, 6L/ha + pulse, 6L/ha +pulse + wetta
4. Water, water + wetta, water + pulse, water + pulse + wetta

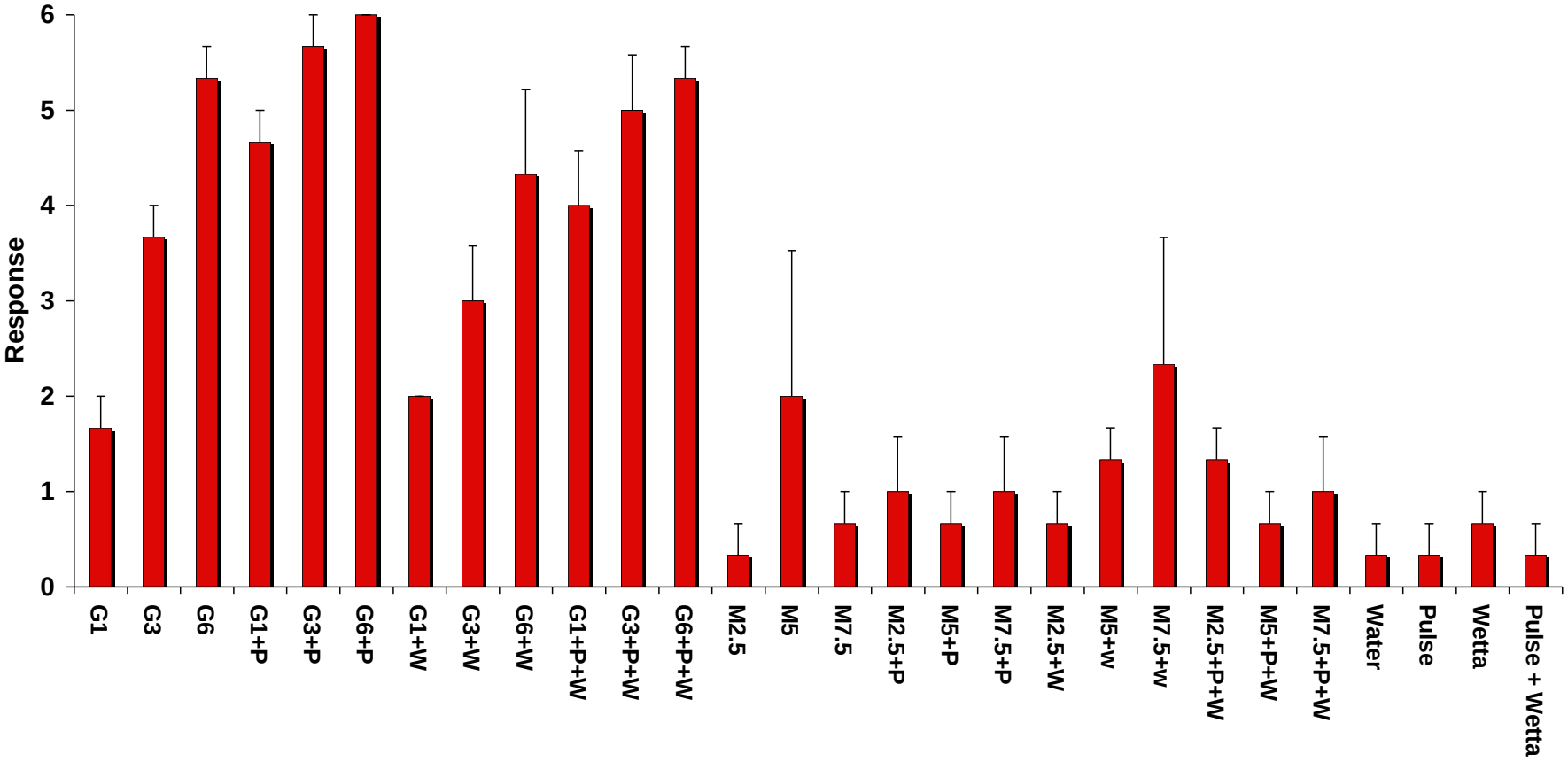
Field trials were conducted at three sites;

1. Main roads quarry 90 km from Newman
2. Joffre entry station, Karijini National Park
3. Old quarry, Tom Price and
4. This year only, Plutonic mine site.

All pot trials were conducted at Kings Park.



Field trial



Plant response to various rates of glyphosate (G) and metsulfuron methyl (M) (0= no response and 6= dead)

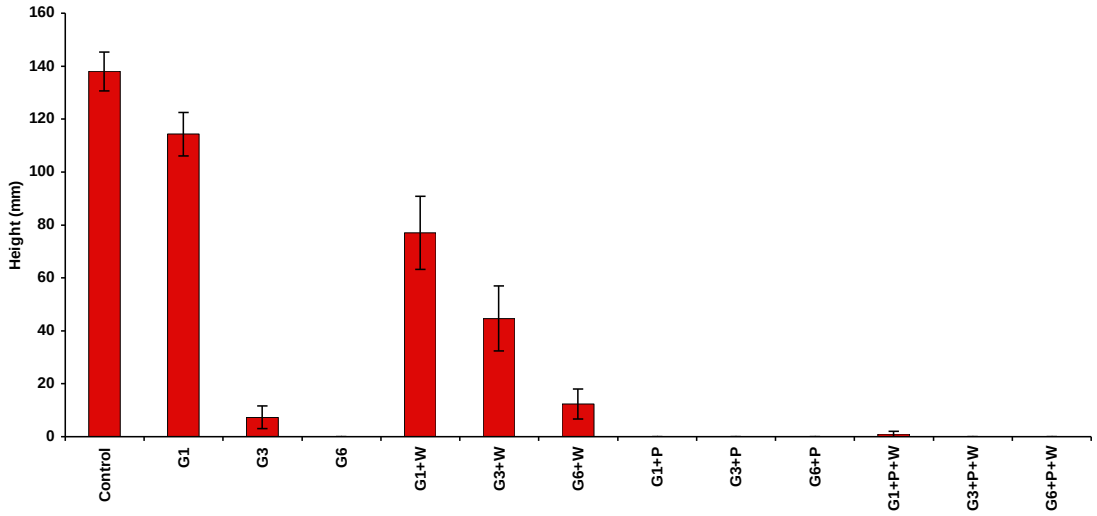
Glyphosate

Chlorsulfuron

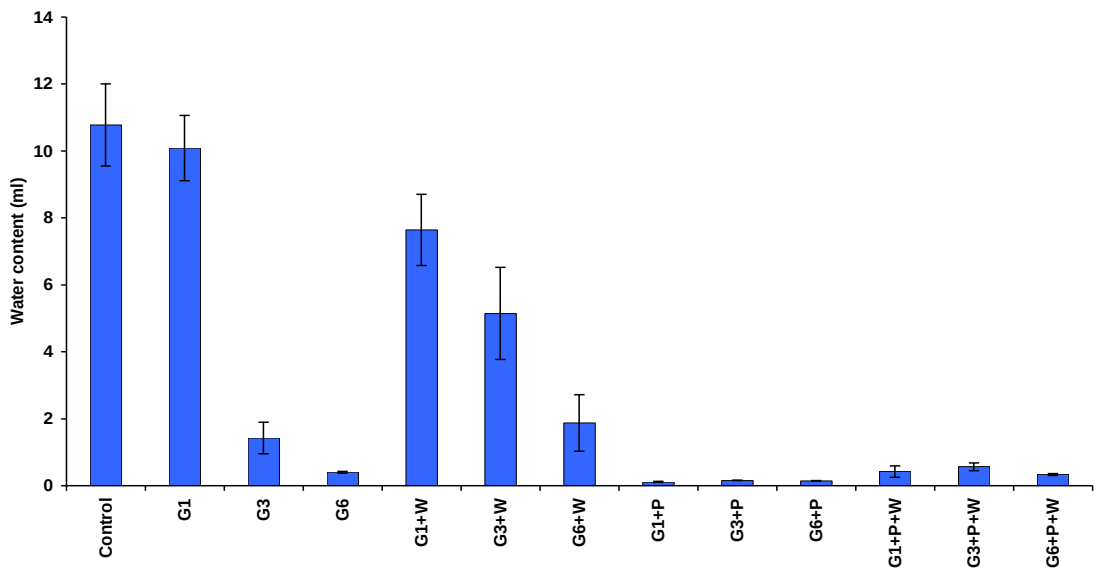
Asulam

Metsulfuron methyl

Pot trial



Plant height 8 weeks after exposure to various rates of glyphosate

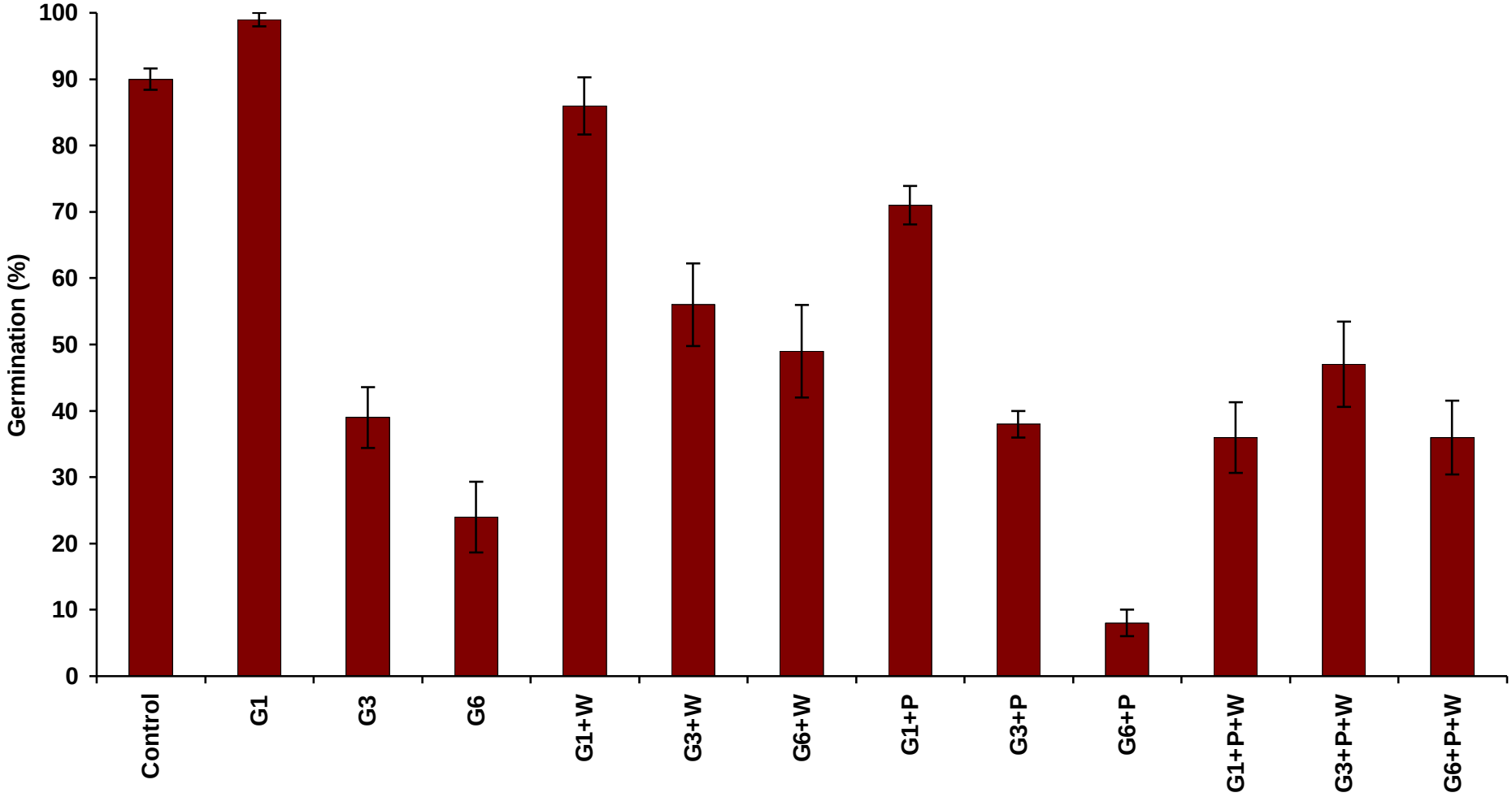


Water content of plants harvested 8 weeks after exposure to various rates of glyphosate.


Control
1L/ha
1L/ha+P
1L/ha+W
1L/ha+P+W

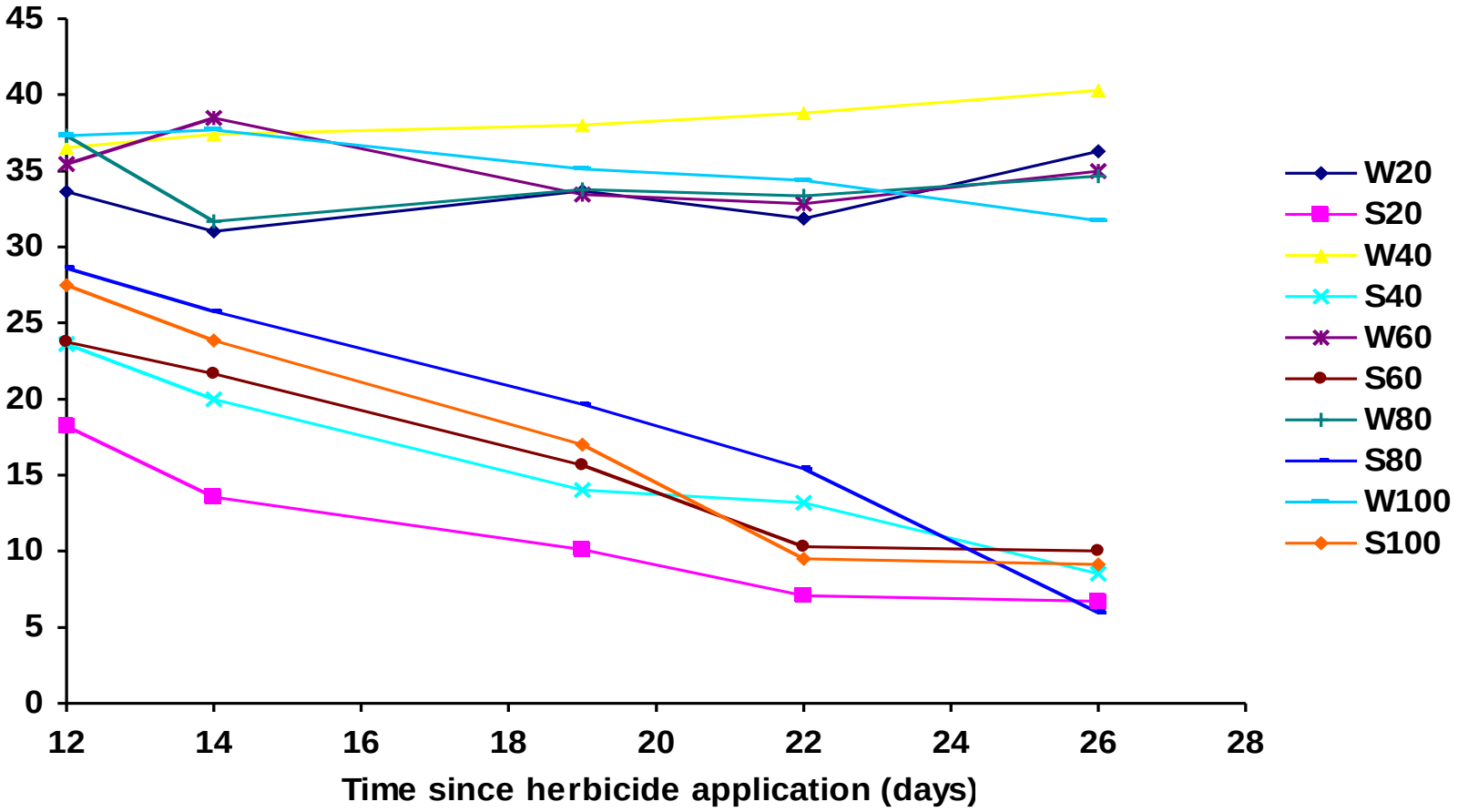

Control
3L/ha
3L/ha+P
3L/ha+W
3L/ha+P+W


Control
6L/ha
6L/ha+P
6L/ha+W
6L/ha+P+W



Percentage of seed germinated after exposure to various rates of glyphosate

Water Stress



Conclusions

- Ruby dock can germinate and set seed with sufficient rainfall.
- Seed reaches maximum germination 12 weeks after falling from plant.
- Seed germinate over a range of temperatures but the best is 7^0C-18^0C (winter conditions).
- The perianth (false fruit) contains a chemical that inhibits germination.
- The number of seed germinating can be increased using gibberellin or butenolide (not yet available and requires further field testing).
- The most effective herbicide is glyphosate combined with the penetrant Pulse.
- The wetting agent Agral is ineffective and decreases the success of glyphosate.
- Glyphosate combined with Pulse reduces the germination rate and the vigour of the germinants.
- Glyphosate remains effective when the plant is water stressed.
- Glyphosate is a non-selective herbicide and potentially will kill many of the native species, particularly *Ptilotus sp.*

Recommendations

- Hand pull when plants are present in small numbers.
- Herbicide application for larger infestations after <u>every</u> germination event (following rain).
- Use glyphosate without a wetting agent.
- Apply glyphosate 3L/ha (1234g/ha) plus a penetrant (pulse, 2ml/L) for small plants.
- Apply glyphosate 6L/ha (2468g/ha) plus a penetrant (2ml/L) for larger flowering plants.
- Burn areas with a large fuel load

Acknowledgements

Robe River Mining (Rio Tinto)

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