Final Report to the Australian Flora Foundation

on the project

Cultivation of Native Potatoes (*Platysace* spp.).

Woodall GS[1], Moule ML[1], Eckersley P[2], Boxshall B1 and Puglisi B[1]

[1]Centre of Excellence in Natural Resource Management,
The University of Western Australia, Albany WA
[2] Eckersley Rural Consulting Bunbury WA

26 January 2009

Development of new root vegetable crops from southern Western Australia's diverse tuberous flora

Woodall GS[1], Moule ML[1], Eckersley P[2], Boxshall B[1] and Puglisi B[1]

[1]Centre of Excellence in Natural Resource Management,
The University of Western Australia, Albany WA
[2] Eckersley Rural Consulting Bunbury WA

Background

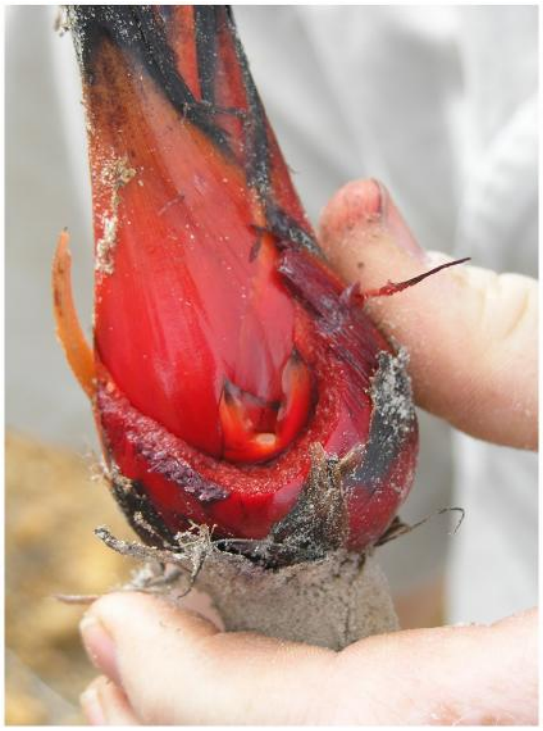
The Australian native edible plant industry is rapidly expanding though most of the products are fruit based products or spices/seasoning. There is a distinct lack of native vegetable products available and a requirement for native vegetable products was identified by consumers, chefs and suppliers of native foods. They identified that their industry needed native vegetable foods that could replace traditional vegetables. That is, they required native vegetable food products to be used as "staple bulk foods" to replace the use of carrots, potato and other root vegetables. The flora of Western Australia contains an extraordinary number of species that form root tubers. Over 85% of 153 tuberous species recorded in Western Australia occur in the south west of the state. This diversity provided an unparalleled resource from which new horticultural crops could be developed. The diversity of the flora is of international significance but had not been surveyed for potential vegetable crops.

Aims/objectives

This project aimed to systematically assess the horticultural potential of southern Western Australia's diverse tuberous flora and commence commercialisation of promising species as new vegetable crops. For each selected target species the study more specifically aimed to concomitantly: develop a reliable and cost effective propagation system, develop a cultivation system, determine the species' productive capacity, investigate the nutritional value of tubers and finally assess the species commercial potential and if warranted, commence commercialisation and product development.

Methods, results and key findings

Although there are many species that produce underground fleshy storage organs many have undesirable properties and or do not have a clear (unambiguous) history of local consumption. An unambiguous history of consumption was a prerequisite for selection into the target group. Plant and product characteristics of tuberous flora native to southern Western Australia were assessed. Field observation and available information were used to make an assessment of remaining species in regard to their vegetative vigour, reproductive vigour and likely ease of propagation. Attributes such as size, colour, flavour, texture and abundance of the potential product were also assessed. This approach suggested that a target group comprised of *Platysace deflexa*, *Ipomoea calobra* and *Haemodorum spicatum* were worthy contenders for further study.



A

B

C

Figure 1. (**A**) The red bulb of *Haemodorum spicatum.* (**B**) Vigorous vine growth and flowering of *Ipomoea calobra*, at a trail established in Carnarvon WA. (**C**) Tubers of *Platysace deflexa*, collected north east of Albany WA.

Propagation systems for all three target species were developed. The development of a mass propagation system for *Platysace deflexa* was extremely difficult, however a reliable system based on tip cuttings taken at certain times of the year, hormone treated, then planted into a free draining media and kept under water limited conditions, produced quality material for cultivation. Seeds of *Ipomoea calobra* were highly germinable when mechanically or chemically scarified. *I.*

calobra was found to be a prolific seed producer and can be cost effectively established by direct sowing in the field. *Haemodorum spicatum* was easy to establish in the greenhouse and in the field by direct sown seed.

This project has clearly shown that the market would enthusiastically embrace product derived from *I. calobra* and that the product could fit within existing vegetable processing, distribution and retail systems. Its nutritional value is broadly similar to that of sweet potato though some nutritional components differ. The project has also developed a basic propagation and cultivation system capable of producing approximately 35 t/ha of product over a 12 month rotation when cultivated under intensive horticultural conditions at Carnarvon in Western Australia. It can thus be justifiably concluded that *I. calobra* is well on the way to becoming a commercial reality. Consumers and the food industry in general were excited by product from *Platysace deflexa*, though the supply of cultivated product from the field trials was very limited throughout this project which limited the ability to undertake a retail trial or to test integration into an existing or new supply chains. Sampling of wild material suggested that 24 t/ha could be achieved, however harvested plants an age of only 1.5 years produced an equivalent production of 0.75 t/ha which was comprised of very small and unmarketable tubers. Although yield was low it was very encouraging that tuber formation was confined to the mound, and when more mature the species would be well suited to mechanical harvesting. An opportunity for this product in the food industry exists but due to a very limited initial supply base, the commercialisation of *Platysace defl exa* tubers will need to be incremental and carefully managed, with efforts to expand the market occurring only when supply can be ensured. It is recommended that future investment need to focus on optimising the cultivation system for maximal tuber production in the shortest possible time. Following the species selection stage of this project *Haemodorum spicatum* did not demonstrate further potential as a new vegetable product. Preliminary product research through appraisals highlighted key features contributing to consumer's dislike of the bulb these include the staining effect (red pigment), fibrous texture and bitter taste. In addition, it was evident that sizeable bulbs may take several or more years to form, a major factor limiting horticultural development of the species.

Recommendations

Although this project has shown the commercial prospects for *I. calobra* to be exceptionally encouraging, the following recommendations are of paramount importance if this species is to become a commercial reality. Future research needs to determine how the cultivation environment can be engineered to facilitate shallow tuber formation and thus the ability of the crop to be mechanically harvested (a key requirement for profitable cultivation). A participatory development stage needs to commence as soon as possible where production and demand are increased concomitantly. Technical assistance needs to be provided to potential growers and together researchers and growers should aim to optimise production systems. Promotion of the product should reflect the amount of product available. The high level of demand and interest in the product suggests that demand is likely to be larger than supply in the short to medium term and thus too much promotion without the ability to supply could be damaging and should not be encouraged.

It is recommended that *I. calobra* and *P. deflexa* be perused as new vegetable crops. *H. spicatum* should not be perused as a vegetable crop, though it does have considerable appeal as a spicy food colouring agent and as a dye. If *I. calobra* and *P. deflexa* are to become small but significant species in the food industry this project will need to be followed by an industry building phase where larger quantities of product are produced, with production systems continuously improved,

and where promotion of the product reflects the amount of product available. This project has created exciting opportunities for indigenous enterprise and it is recommended that they are encouraged and given the opportunity to participate in the industry associated with these new vegetable crops.

Figure 2. A shopper selecting *Ipomoea calobra* tubers at the first retail trial of the product held at the Fremantle Markets in Perth, WA.

Acknowledgments

Contributions from the following organisations are greatly acknowledged:

Contributions from Tectonic Resources NL and Greening Australia and the Chemistry Centre Western Australia are also acknowledged.