Weeds of the Burdekin Rangelands:

Managing prickly acacia, mesquite and chinee apple

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Table 1 Preventing new weeds from establishing

Summary of key processes: what do we know?

What are the key bio-physical processes and at what scale do they operate?	What factors regulate them, in order of importance? Are they 'manageable'?	Do we have enough data to set benchmarks? Do these vary with landtypes and/or seasons?
Seed production	Biological control agents—seed production has been a primary target in biocontrol against prickly acacia and mesquite.	A seed-feeding beetle that was introduced against prickly acacia is well-established and widespread but it is having minimal impact on the spread of the weed; two seed-feeding beetles were introduced against mesquite: they are well-established but their impact is limited.
	Rainfall and temperature—these climatic factors influence when and how much seed of is produced by these species; the processes are not manageable.	
Dispersal	Water: seeds of these species can be spread downstream, but this is probably a minor means of dispersal; the process cannot be managed.	The importance of this process will vary with seasonal conditions. It is probably especially important in flood times
	Livestock—can transport large numbers of seeds of these species following ingestion of fruits; transported cattle can result in new infestations long distances from source populations; these processes are manageable at scales above the level of the paddock	There is sufficient information to form protocols and establish practices for controlling cattle-aided dispersal of these species
	Other animals—mesquite is dispersed by feral pigs; chinee apple is dispersed by feral pigs, wallabies and some birds; most of these factors cannot be managed; feral pig control programs will reduce the risks.	There are well-established techniques for controlling feral pigs though pigs can never be eliminated.
Germination	Seed-bank age structure will influence the proportion of the seed-bank that will germinate following rain; unmanageable	

Table 1 Preventing new weeds from establishing (cont.)

Summary of key processes: what do we know?

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Germination (cont.)	Fire—will increase the germination percentage of legume seeds (prickly acacia, mesquite) by burning; fire could be used to synchronise the germination of a large proportion of the seed-banks of these two species and so deplete their seed-banks.	If fire is used to deplete the seed bank, there will be some cost to ensure that any resulting seedlings or juveniles are controlled. This will involve monitoring and control activities.
	Soil moisture and temperature—these will determine when germination will occur; in Burdekin Rangelands, germination will mostly take place between December and March; germination cannot be managed (though see comments about Fire above).	While the climatic determinant of germination and establishment cannot be managed, they can be predicted. Management should involve identifying specific occasions when large-scale establishment is likely to occur.
Plant growth and survival	Climate—rainfall (via soil moisture) has a strong influence on growth and survival rates; unmanageable.	
	Grazing—prickly acacia and mesquite are browsed by cattle and growth rates may be retarded somewhat as a result; however, this is unlikely to kill plants.	Using high grazing pressure to suppress prickly acacia or mesquite is likely to put undue pressure on other pasture components. Currently, some pastoralists are exploring the possibility of using camels to control prickly acacia.
	Fire—causes very high mortality of one species of mesquite (*Prosopis pallida*); manageable prescribed fires are suitable.	Burning regimes to control mesquite have been defined on the basis of sound research.
	Competition— healthy perennial grass pastures compete with seedlings of these species and so reduce the survival and growth rates; the herbage layer can be managed.	Maintaining healthy perennial grass pastures as a means of weed management is consistent with generally sound land management.
	Biological control—a number of leaf and stem feeding insects have established through biocontrol programs against prickly acacia; insects are well established.	The long-term impact of biocontrol agents on prickly acacia and mesquite are unknown. They may reduce plant vigour without causing significant mortality.

Table 2 Key processes for management

Management Options		
Based on current scientific understanding, what management options are available to achieve the objective? How can we monitor their effectiveness?	What confidence do we currently have in these options?	Do the options conflict or interact with other management objectives? Will trade-offs be needed?
Continue biological control programs for mesquite and prickly acacia.	New agents can be identified, introduced, released and established; we can be less confident about established agents reducing weed abundance and spread.	Biological control is generally compatible with other management objectives and with other weed control options. It is important to ensure that, while new agents are establishing, they have access to adequate populations of their host weed.
Monitor to detect downstream incursions as a result of water-aided dispersal. Monitoring should target areas of suitable habitat downstream from known infestations.	Success in this action will limited only by capacity to find and identify small infestations of young plants	This will require a capacity to identify seedlings and juveniles of these species. Monitoring can be time-consuming. It can be carried out in conjunction with other activities (eg mustering) but will require targeting particular locations.
Develop and implement facilities and protocols to minimise risk of cattle-aided dispersal across fencelines.	Suitable protocols will be effective in greatly reducing the risk of spread.	Effective protocols will place some restrictions on the movement of livestock for sale or agistment.
Control feral pigs.	Feral pigs are a lesser means of dispersal of these weeds; the risk of weed incursion will be reduced in accordance with this importance.	Control of feral pigs is a time-consuming and expensive exercise. Ideally it should be co-ordinated across large areas to get maximum benefit. It is unlikely to be acceptable as a management practice just on the basis of weed control; weed management is more likely to be a side-benefit of pig control for other reasons.
Burn to control mesquite (*P. pallida* only).	This method of control is very effective if the appropriate fire intensity is achieved.	Burning to control mesquite will impinge on forage supplies esp. where it is necessary to destock beforehand to facilitate fuel accumulation and afterwards to allow desirable species to recover. Construction/maintenance of fire breaks needed.
Use appropriate mechanical and chemical control techniques.	Reliable chemical and mechanical control techniques are available for all three species; existing stands of chinee apple can only be reduced by using chemical and mechanical techniques.	Chemical and mechanical control techniques are expensive. Herbicide techniques (eg basal bark spraying, cut stump applications) must be applied to individual plants. So do some mechanical techniques. The efficiency of these methods will rely on targeting outlying infestations, small infestations, those that are likely to be serious seed sources, and infestations in key areas of a property or conservation reserve etc. As example is the control of bore drain populations of prickly acacia.

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