Department of Agriculture, Fisheries and Forestry

Fire

Management of native and invasive woody weeds in the Northern and Southern Gulf

Managing native woodland encroachment

Thickening of native woodlands and encroachment of invasive woody weeds onto grassland causes:

- decline in desirable pasture species
- decrease in land condition, and/or
- introduce toxic plants to the environment that can be detrimental to livestock.

Encroachment of invasive weeds is worse in wet years where massive recruitment of seedlings inhibits germination and establishment of desirable pasture species, while fostering further weed seed dispersal across the rangeland.

Fire can be effectively used to slow encroachment by killing scattered plants on the edge of a dense infestation, preventing them encroaching further into pastures. Two fires in 3 years is ideal.

Pasture must be rested following the fire and follow-up burns conducted every 5 to 6 years to maintain tree grass balance.

Increased Gidyea encroachment is linked to above average wet seasons and has been identified by producers as causing the greatest problems for stock management. Lack of fire in the rangelands has contributed to the problem. Young Gidyea plants are fire sensitive. However, established Gidyea stands are fire-resistant. **Therefore, there is a short time frame where fire is effective in controlling encroachment of Gidyea.**

Rubbervine

Fire can prevent seedling germination and reduce infestations of Rubbervine. However, it is best used late in the dry season. Fire can greatly facilitate the use of mechanical and chemical control to clean up remaining infestations. Rubbervine does not require an intense fire. It prefers a slow burning fuel load.

Germination of seeds on the soil surface or down to a depth of 0.5 cm will be reduced by fire.

The greatest affect has been achieved by:

- First fire – hot fire late in the dry season killing mostly juvenile and some mature plants
- Second fire – similar time the following year to kill remaining mature plants and reduce the old plants to a level that is manageable using herbicide.
- Plants growing in riparian areas are less susceptible.

Rubbervine with fungal rust infestations through it can be burnt successfully after rain. The existing pasture underneath these plants will re-shoot quickly following fire, allowing the pasture to dominate.

To maximize the benefits of fire:

- **Identify the problem woody species and their susceptibility to fire.** Is fire an option? What fire frequency is needed to manage the problem? Problem species under 2 m high will be more susceptible to fire.
- **An effective fuel load for the fire is critical.** A fuel load of at least 1500 kg/ha is required. 2000 kg/ha is recommended to suppress regrowth.
- **Destock, wet season spell and/or lightly stock** the paddock/area prior to accumulate effective fuel loads.
- **Plan to burn** toward the end of the dry season or after the first storms.
- **Appropriate burning conditions** on the day of the fire are vital for a good result – hot with a reasonable breeze.
- **Fire breaks and back burning** are essential to ensure that the fire doesn't escape. Research on some woody species has shown that a slow back burn with a high 'residence' time can be more effective than a fast front burn.
- **Don't introduce cattle back onto the burnt area** until the native pastures have regrown. A good indicator is that the 3P grass species (perennial, productive, palatable) have seeded (usually 3–4 months after rain).
- **Don't burn after Christmas or in El Nino** years when the expectation of a 'good wet' is lower.

Invasive woody weeds

The most common invasive woody weed species associated with thickening across the Northern & Southern Gulf Catchments, and their susceptibility to fire are:

High	Rubbervine	*(Cryptostegia grandiflora)*
	Bellyache bush	*(Jatropha gossypiifolia)*
	Parkinsonia	*(Parkinsonia aculeate)*
	Mesquite	*(Prosopis spp.)*
	Lantana	*(Lantana camara)*
	Prickly Acacia	*(Acacia nilotica subsp.Indica)*
Low	Mimosa	*(Mimosa pigra and Acacia farnesiana)*

Fire is not recommended for control of Chinee apple or Calotrope/rubber bush.

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Bellyache bush

Fire can be an effective tool to control bellyache bush provided there is enough fuel to carry the fire.

The plants will blister, but not catch on fire, hence a large fuel load is required (2500 kg DM/ha) to produce the heat required to achieve this. Trial work with fire has found:

- Up to 90% mortality in juvenile plants
- Large proportion (80%) of the seed bank is able to survive fire. This can greatly increase infestation during the next wet seasons if follow up control is not implemented
- Two annual burns followed by foliar spraying resulted in a 97% decline in bellyache bush population
- Proven to be the least expensive management technique when used as either an initial or follow up treatment.

Parkinsonia

Fire is moderately effective on Parkinsonia with a mortality rate of 60% seen with one fire. Most bare seed or seed pods on or near the ground will be destroyed.

The biggest benefit fire has on Parkinsonia management is the promotion of naturally occurring dieback within the population in years following the initial fire, resulting in very high plant deaths, especially in mature plants. Grass is also effective in excluding Parkinsonia from establishing. By removing thick infestations, pasture can recover relatively quickly if coupled with suitable management of stocking pressure and/or wet season spelling.

As with other woody weeds, success depends on having a sufficient fuel load available to create enough heat to kill the plants.

Mortality of some young plants will occur and the seed bank will be slightly reduced. However, mature plants will generally survive. A major benefit from fire is the reduction in seed produced by the plant after it is burnt.

Lantana

Regular burning will reduce the capacity of plants to survive. However initial kill rates are highly variable. Effectiveness depends on available fuel loads, fire intensity, soil moisture, humidity and season. For effective use, regular burning is required.

Prickly acacia

Fire has a moderate effect on seedlings only.

Gutta percha and breadfruit

Fire successfully kills Gutta percha with mortaility rates of up to 76% seen in trials throughout the Gulf Savannas. A slightly lower mortality rate is generally seen in breadfruit compared to Gutta percha. Best results are achieved in plants under 2 meters in height.

The population structure of the weed infestation is greatly influenced by fire with up to 90% of the plants remaining after the burn being of the lower height classes. This aids chemical control. As with all woody weeds, the extent of weed control depends on the fuel load available and intensity of the fire.

Gidyea encroachment north of Julia Creek

Rubbervine burning near Charters Towers

Bellyache bush on fire

Native woody weeds

The most common native species associated with thickening across the Northern and Southern Gulf Catchments and their susceptibility to fire are:

High	Gutta percha	*(Excoecaria parvifolia)*
	Bread fruit	*(Gardenia vilhelmii)*
	Wattles	*(Acacia* spp.*)*
	Currant bush	*(Carissa lanceolata)*
	Yellow wood	*(Terminalia platyptera, T. platyphylla)*
	Teatree	*(Melaleuca* spp.*)*
Low	Cooktown ironwood	*(Erythrophleum chlorostachys)*

Native eucalyptus species also contribute to woodland thickening. Fire can knock back eucalypts to ground level. However, a high number will re-sprout and high germination will cause a large increase in the number of small trees. This can be managed with follow up burning.

The area to the right of the track was burnt twice – in 2002 and 2003. It illustrates the effect of burning in opening up the mid-storey, which, at this site, was dominated by breadfruit. The eucalypt overstorey was not greatly altered.

Wattles

Wattles can be killed by fire but they have a hard seed which will lie dormant in the soil until triggered to germinate by the heat of fire. Therefore, fire is only an effective management tool if the interval between fires is less than the time it takes for young wattles to set seed.

Currant bush

Trials at *Wambiana*, Charters Towers, have shown that a complete top kill in currant bush can be achieved with fire. However, the bush will return back to its original state within 2–3 years of good wet seasons if regular burning is not used.

Complete top kill of currant bush at Wambiana grazing trial.

An example of woodland thickening control using fire and pasture regeneration on Tabletop Station, Croydon.

An example of woody weed control using fire and pasture regeneration on Springfield Station, Mount Surprise.

Summary

- A planned burning regime can be used to manage the species composition and structure (density and height) of invasive weeds and suppress native woodland thickening.
- Fire frequency, timing and intensity affects woodland structure
- Fire can encourage desirable plant species by suppressing and reducing weed species
- Successful management of invasive weeds depends on good management of grazing pressure after prescribed burns.
- Technical advice should be sought when applying fire as a weed management tool because not all invasive weeds respond equally to fire treatments.
- Development of a well-planned control program with follow-up strategies before fire treatment is essential to reduction of the weed seed bank.
- A permit must be obtained from relevant local authorities prior to controlled burning.

For more information or enquiries contact

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