Alien Plant Control guide

compiled by Jon Wyatt, Mondi Wetlands Programme, 1997

SECOND EDITION

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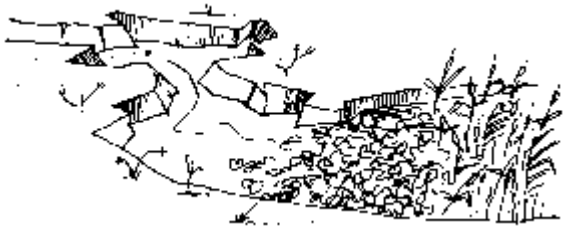
INTRODUCTION

This guide provides a summary of a selection of wetland and streambank alien plant invaders and control methods. Alien plant invaders are not indigenous to South Africa but were introduced either intentionally (for domestic or commercial use) or accidentally. They establish easily and, due to a lack of natural predators or competitors, are able to multiply rapidly and to out-compete indigenous vegetation. By virtue of their aggressive tendencies they are perhaps the greatest potential threat apart from man, to natural habitats and pose as big an economic and ecological threat as any other form of pollution. The invaders may be trees, shrubs , herbs or free floating and rooted aquatic plants. They are called "invaders" to emphasise their ability to spread aggressively and to cause rapid and often irreversible changes in the landscape.



The ecosystems most impacted by alien plants in South Africa are probably those associated with riparian zones. Streambanks are particularly prone to invasion because they are exposed to flooding and human disturbances, the availability of water as a linear dispersal mechanism and the role of streambanks as a seed reservoir.

Weeds in open water situations often cause major problems to angling, boating and swimming activities, or extraction of water for domestic or irrigation purposes. Although these weeds are regarded as major problems, they do serve a valuable purpose by recycling nutrients, and providing food or cover for a variety of fish, birds and insects.

Any aquatic plant can become a nuisance and it is often indicative of a silt build-up or excessive amounts of nutrient being available-Should this situation arise it is advisable to determine the cause. Fertiliser being washed off surrounding lands, washings from a dairy or sewerage can create problems. However if there is no apparent source of nutrients, or if the situation cannot be altered, then it may be possible to control the weed. Dense mats of floating weeds have an enormous capacity for vegetative reproduction and the effects on the aquatic environment include blocking out light, reducing oxygen, increasing evapotranspiration and providing habitat for mosquito breeding and some vectors of bilharzia.

ALIEN PLANT

CONTROL METHODS

Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. The plants that are visible are only a fraction of the problem as there are also wind, water, animal and vehicle borne seeds plus the many already in the soil. Whichever method or combination of methods is chosen for control there are three general principles to follow.

The first is that light invader plant infestations are easier to deal with than heavy infestations. They can also get worse if ignored: heavy infestations may not. So tackle the easiest problems first.

The second is that infestation generally proceeds downhill, particularly with riverine vegetation. It is pointless clearing an area when a reservoir of re-infestation exists upstream : start at the highest point and work downwards.

The third is that no control operation succeeds the first time-One or more follow-ups are essential. So when attempting to clear a large area piece-meal it is better to make the second effort a follow up operation on the first area cleared than to start on a new area. Cleared areas should be inspected at intervals to ensure that alien elimination is complete.

The control method must also take into account other plants present and possible damage or disturbance to desirable plants or to the soil during control as long term site rehabilitation costs need to be further considered. Good results can only be expected if there is careful planning and if attention is paid to detail. Commercial prospects should not be overlooked. Some alien plants might have a market value for use as compost, firewood or even building materials. In cases where large infestations are being tackled it is advisable to consult with the Agricultural Research Council, Plant Protection Research Unit; as their expertise could save time and money.

BIOLOGICAL CONTROL

This describes the use of natural biological agents to control the target weed. The agents mostly include insects, mites and pathogens.

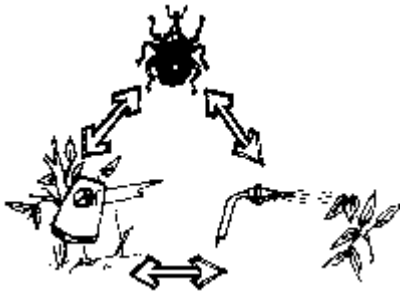
Although livestock and other local herbivores may also feed on the weeds, these are of limited relevance in alien invader control. Bio-control has already played a major role in the control of many alien plants.

Briefly, a biological control programme involves identification of agents which infest and damage weeds in their native land , culturing of the agent in quarantine, screening for host specificity (to ensure that it will not attack other plants, also done in quarantine) and if found suitable release of the agent in the field. The effectiveness of the agent as a control mechanism is then assessed.

Successful bio-control is the ultimate in weed control as it is self perpetuating, highly selective, and has no undesirable side effects on the environment. Complete control using only biological control is seldom achieved however. Reasons for the failure or limited control include: the agent becomes the target of predators and fails to achieve the population levels required to suppress the weed; the agent may not be able to complete its life cycle due to local climatic conditions or sensitivity to locally applied pesticides; or the target weed species is dissimilar to the plants from where it originated, for example following hybridization.

INTEGRATED CONTROL

Even though a biological agent might become well established , eradication of the target weed does not usually occur. This is because the levels of the weed and the agent generally follow an out of phase pattern. Initially, the levels of the weed decrease as those of the agent increase until the lack of food supply results in the decrease of the agents population levels. Following a lag phase the weeds population again increases followed later by an increase of the bio-control agent levels. Therefore the main aim of biological control is not to eradicate but to reduce the vigour of the weed and to impair its reproductive capacity.



The possibility of bio-control being successful is not sufficient motivation to stop all efforts at controlling the weed by other means. Should bio-control fail, ground would have been lost in the interim. Integrated control is the use of more than one method for the control of weeds. For instance, chemical and mechanical control are sometimes used in the same control programme.

Although a well planned integrated control approach is likely to be as effective, and possibly more effective than a one sided approach, it is more difficult to implement. However the trend is towards the development of integrated control strategies, especially with the incorporation of biological control.

MECHANICAL CONTROL

This method includes all action in which force is exerted to control the target weed and for the purpose of this field guide includes manual / physical actions which are sometimes referred to under separate headings.

Mechanical control is useful in that it is target specific; however whilst little expertise or training is required it is generally slow, labour intensive and often involves soil disturbance which can lead to re-infestation or soil erosion.

Raking or dragging (Aquatic weeds)

Control of aquatic weeds may be achieved mechanically by raking or dragging of chains , nets , cables etc. through open water but this is only temporary as the plants soon become re-established. Pieces of plant which break loose often float and drift to the side of the open water a day or so after dragging; these should be removed by hand.

Underwater mowers are also available, which operate from a boat and cut the plants off as the boat moves forward. These loose pieces must then be removed from the water. A seine net can be dragged through the water to collect the pieces, or some other form of raking can be employed. Quite a lot will drift to the edges where it can be removed by hand. These underwater mowers are not available locally but can be purchased from overseas suppliers at a considerable price. Areas of open water have been kept clear by these methods, but this has to be done every summer.

Handpulling and uprooting

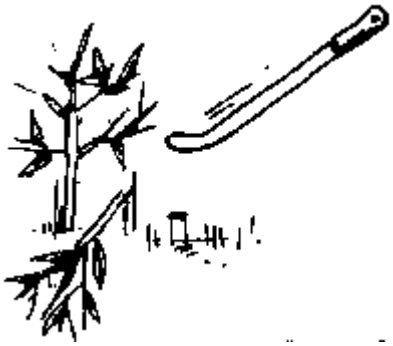
Hand-pulling is effective where infestations are small and the invaders are shallow rooted or seedlings especially in soft or moist soil conditions.

A mattock can be used to uproot larger plants whilst a tractor and chain may be the most suitable way of dealing with saplings.

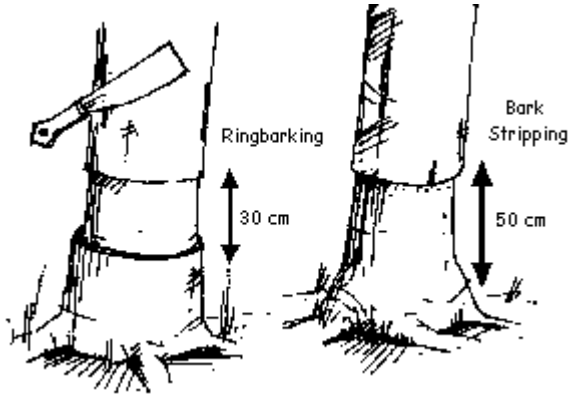
Cutting or slashing

It is often useful to cut down or slash some alien plants as an initial treatment prior to applying a chemical foliar spray on the re-growth.

Nearly all invaders will coppice if cut once but repeated cutting during the growing season causes depletion of root reserves eventually resulting in death. If terrain permits the second and subsequent cuts can be done with a mower. Such treatment favours grass which will then be able to out-compete the weeds and assist in their elimination.



Ringbarking and stripbarking



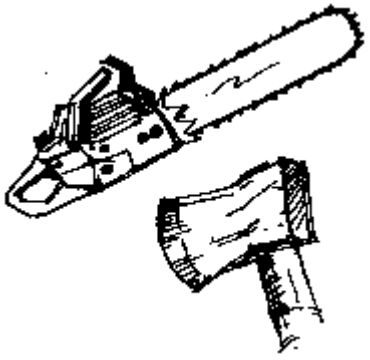
Ring-barking of large trees can be successful but it is slow and can only be preferred to felling and other treatments when the other is impracticable such as when one does not want to cause damage by felling large trees. Every trace of cambium - the growing region between the bark and the hardwood- must be removed from the ring which must be at least 30 cm wide.

In the case of trees that coppice, strip off all the bark from ground level to about 50 cm high. As a general rule, bark stripping is more effective than ring barking. Note that subsequent felling of a dried out tree is much more difficult than felling the living tree in the first place.

Felling

Felling of most invasive woody plants usually results in re-growth (coppice) with the exception of pines and black wattles. Coppice can be prevented by applying a cut stump chemical treatment or by stripping all the bark off the remaining stump to below ground level.

Alternatively felling can be carried out in autumn, the timber stacked over the stumps to dry over winter and the whole lot burnt in spring.



CHEMICAL CONTROL

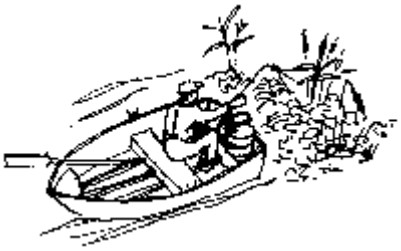
Herbicides, if used correctly, are safe and play an important role in control of alien plants. In certain cases, the use of herbicides is preferable to mechanical methods, for example when the disturbance created by digging and uprooting could be disastrous on steep slopes prone to soil erosion or when chemical control may be more economical than mechanical control.

In choosing a herbicide there are several points to consider. Firstly the herbicide should be one registered for use against the weed to be eliminated. Registered herbicides have been rigorously tested and the optimum mode of use determined. Secondly it is important to note the level of persistency displayed by the herbicide after application. Residual herbicides preclude immediate re-growth or replanting. Thirdly the degree of selectivity of action of the herbicide may be critical. Some kill all plants, others have no effect on non-target species, particularly grasses. Fourthly the effect of the herbicide upon animal life must be considered. Some herbicides are dangerous to particular groups of animals (e.g., fish) and should never be used near water.

Foliar application

Many of the herbicides used in alien plant control are applied as leaf sprays which only kill the plant after being translocated to the roots. For this reason they are not fast-acting and indeed it is essential not to kill the foliage before the herbicide has been transported into the plant. Accordingly spray solutions should be made up as instructed by the manufacturer : stronger solutions will probably be less effective and certainly more expensive.

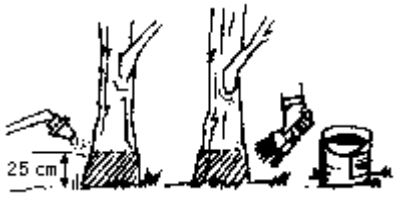
Efficiency of translocation to the roots is further improved if the herbicide is applied to a large leaf area on actively growing plants. Avoid spraying new, unexpanded growth. Use a solid cone nozzle that ensures an even coverage on all leaves and stems- to the point of run off.



The state of weather can greatly influence the success of chemical control. Rain immediately after a spraying operation can more or less nullify the treatment. Similarly heavy dew can dilute spray and cause it to drip off foliage and reduce its effectiveness. Dust is another factor to consider. Some herbicides deactivate upon contact with soil and have little effect upon dusty foliage. Such herbicides are best applied after rain, as soon as the foliage is dry. Avoid spraying in windy weather since spray drift onto non-target plants may occur.

Basal bark treatment (for plants with diameter of 5-15 cm)

A practical, highly selective and efficient method of alien control especially in rugged terrain. Basal bark treatment has a year-round usage with a reduced hazard to non-target plants. Apply by paintbrush or knapsack spray as a course, low-pressure spray using a narrow angle solid cone nozzle. Apply to the basal stem or trunk of the woody plant right around, from soil level to about 25 cm above ground, as well as any exposed roots. In order to obtain satisfactory results a thorough wetting of the indicated area is imperative.



Old or rough bark may require more mixture than young or smooth bark. In the case of multi-stemmed plants, each stem should be treated

separately.

Cut stump treatment (for plants with diameter of greater than 15 cm)

Some herbicides are effective when painted onto cut tree stumps as an alternative to stripping the bark. This treatment can be more effective than foliar spray and should be considered whenever practical and especially in more sensitive areas. Trees should be cut down and the herbicide applied immediately to the freshly exposed cut bark. Treat the whole of the cambium and avoid excessive run-off onto the soil.

Soil applied herbicides (not recommended for general use)

The modern soil applied herbicides for controlling bush encroachment are proving very effective in certain circumstances. The principle here is that the chemical is placed on the soil surface, dissolves in rainwater, is transported into the soil and is taken up by the roots of the target plant.

NOTE: The most important consideration in the use of soil applied herbicides is that they will either kill or damage all plants whose roots are present in the locality of the application site. It is nearly impossible to determine the extent of a plant's roots and therefore this herbicide application technique cannot be used for selective weed control. Also, soil applied herbicides are comparatively persistent in the soil and therefore suppress the establishment of tree species for sometimes two years or more.

A SELECTION OF WETLAND / STREAMBANK WEEDS AND CONTROL MEASURES

	Biological	**Mechanical**	**Mechanical**	**Mechanical**	**Mechanical**	**Chemical**	**Chemical**	**Chemical**	**Chemical**	**Other**
Alien Plant Species		**Hand-pulling**	**Cutting or slashing**	**Ringbarking barkstripping**	**Felling**	**Foliar Spray**	**Cut Stump**	**Basal bark**	**Soil treatment**	
Barbados Gooseberry		Seedlings and re-growth				Garlon				Burn heaped material
Blackwood		Seedlings		✔	✔					
Bramble			✔			Garlon Roundup Brushoff Escort			Reclaim Grasslan	
Brazil Pepper		Seedlings				Garlon				Veld Burn
Bugweed		Seedlings				Garlon Roundup Chopper Starane	Chopper	Garlon Starane	Reclaim Grasslan	
Guava							Chopper Tordon super	Tordon super		
Gum-saligna				✔	✔	Garlon Chopper Escort	Garlon Chopper		Reclaim Grasslan	

Inkberry		Seedlings		✓						
Kariba weed	Leaf feeding weavils					Igran				
Lantana		Seedlings	✓			Roundup Chopper	Tordon super Chopper		Reclaim Grasslan	
Mauritius thorn		Seedlings	✓			Garlon Roundup				
Parrots feather										Raking or dragging
Pine		Seedlings	✓	✓	✓					Veld burn
Poplar-grey				✓						
Port Jackson willow	Seed borrer	Seedlings				Garlon Roundup			Reclaim Graslan	
Prickley pear	Sap-sucking cochineal and leaf eating cactoblastis					Roundup MSMA				Inject Masmar
Rooikrans		Seedlings				Garlon			Reclaim Grasslan	
Sesbania red	Flower or seed feeding weavils					Garlon Roundup	Garlon		Reclaim Graslan	
Spanish reed										
Syringa		Seedlings		✓	✓	Garlon		Garlon		
Triffid weed		✓	✓			Garlon roundup Brushoff Escort	Garlon Chopper		Reclaim Grasslan	Veld burn
Water fern										Raking or dragging
Water hyacinth	Leaf feeding weavils					Roundup Igran				Raking or dragging
Water lettuce / cabbage	Leaf feeding weavils									Raking or dragging
Wattle-black	Seed feeding weavils	Seedlings		✓	✓	Garlon Roundup	Tordon super	Garlon Tordon super	Reclaim Grasslan	
Wattle-Longleaf	Wasp causes galls	Seedlings		✓						
Wattle-Silver		Seedlings		✓		Garlon	Garlon Tordon super	Tordon super		
Weeping willow				✓	✓					
Wild tobacco		Seedlings								

GLOSSARY OF TERMS

Alien	Plants or animals introduced from one locality to another, where they had not occurred before

Aquatic	Growing, living in or frequenting water.
Coppice	The re-growth of branches or roots from cut down trees or damaged roots.
Ecology	The science that deals with the relationship between plants and animals, (including man) and their environment.
Evapotranspiration	The process by which water is withdrawn by plants from a land area by both transpiration and evaporation
Evaporation	The process by which water is withdrawn by radiation from a moist land area, or water surface, and passes into the atmosphere as vapour.
Herbicide	A chemical substance used to destroy plants, especially weeds.
Indigenous	Belonging to the locality; not imported.
Mattock	A digging tool with a head like that of a pick and often a blade like that of an axe.
Pollution	The contamination of the purity of the environment.
Riparian	Occurring on the banks of streams or rivers.
Sapling	A young tree
Transpiration	The process by which water in plants is transferred to the atmosphere as water vapour.

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FURTHER READING

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