

# **It Seemed Like a Great Idea at the Time**

**Can the biofuel industry learn anything  
from the experiences  
with pasture plants?**



**John Clarkson  
Principal Botanist  
Queensland Parks and Wildlife Service  
Centre for Tropical Agriculture  
Mareeba**



**Guinea grass**

***Megathyrsus maximus***



**Para grass**

***Urochloa mutica***



**Molasses grass**

***Melinis minutiflora***



**Buffel Grass**

***Pennisetum ciliare***



**Annual mission grass**

***Pennisetum pedicellatum***



**Mission grass**

***Pennisetum polystachyum***



**Thatch grass**

***Hyparrhenia rufa***

**Many of these grasses were  
introduced when pasture scientists  
were well meaning  
but ecologically uninformed**



**Gamba Grass**

***Andropogon gayanus***



**Olive Hymenachne**

***Hymenachne amplexicaulis***

## Fate of species introduced between 1947 and 1985

	Total	Legumes	Grasses
Total spp. introduced	463	277	186
Total useful	21	10	11
Total weedy	60	28	32
Useful & weedy	17	9	8
Solely useful	4	1	3
Solely weedy	43	19	24
No purpose	442		

TURNER REVIEW No. 12

It was no accident: deliberate plant introductions by Australian government agencies during the 20th century

Garry D. Cook<sup>A,B</sup> and Lesley Dias<sup>A</sup>

<sup>A</sup>CSIRO Sustainable Ecosystems, Tropical Ecosystems Research Centre, FMB 44 Winnellie, NT 0822, Australia.  
<sup>B</sup>Corresponding author. Email: garry.cook@csiro.au

**Abstract.** The weedy potential of deliberately introduced plants has been a growing concern in Australia since the late 1980s. Although introduced plants are critical to Australia's agricultural and livestock production, many species that were praised in the past are now declared agricultural and environmental weeds. Nevertheless, weeds researchers appear largely ignorant of the magnitude and intent of plant introductions for agricultural purposes as well as the legacy of unwanted plants. Across more than 70 years, Commonwealth Plant Introductions comprised 145 000 accessions of more than 8200 species. These species include more than 2200 grass (Poaceae) and 2200 legume species (Fabaceae *sensu stricto*), representing about twice the indigenous flora in those families and about 22 and 18%, respectively, of the global flora of grasses and legumes. For most of the 20th century, these and other introductions supported research into continental-scale transformation of Australian landscapes to support greatly increased pastoral productivity in order to achieve policy goals of maximum density of human population. This paper documents some of the scientific developments and debates that affected the plant-introduction program. We argue that recent developments in weed science and policy need to be informed by a better understanding of plant-introduction history.

Introduction

'A very complete collection of grasses and other fodder plants are grown in the garden. Some of the best perennial kinds ... are already spreading wild over the country' (Holtze 1901).

'Most Australian grass weeds are accidental introductions which have become naturalised.' (Lazarides 2002, p. 219).

Introduced crop and pasture plants form the basis of most of Australia's agricultural production. Throughout the 20th century, scientific research in Australia has led to ongoing selection of improved cultivars and species to sustain and improve productivity and take intensive agriculture to new regions (Parbery 1964). By the middle of the century, a vision had developed to increase the livestock productivity of most of the continent by introducing and promoting exotic forage plants (Richardson 1929; Connellan 1944; Davies 1953). Although research towards this vision resulted in the release of many useful species and cultivars, it also led to the establishment of many invasive plants that are now unwanted. Further, attitudes to Australian landscapes and economic and political imperatives have

altered substantially, but the legacy of previous plant introductions remains.

Throughout the world, invasive plants are altering landscape processes, threatening biodiversity and reducing the productivity and amenity values of landscapes. Much research has focussed on these impacts, but study of the initial dispersal of both plant and animal species has been neglected in the invasive-species literature (Puth and Post 2005). The initial dispersal is a critical factor in a proposed model of plant invasions (Lonsdale 1999), in which the number of exotic species,  $E$ , in a region is a function of the number of species introduced,  $I$ , and the survival rate in their new range,  $S$ , as follows:

$$E = IS. \quad (1)$$

Lonsdale suggested that  $I$  could be further broken down into the number of accidental introductions,  $I_a$ , and the number of intentional introductions,  $I_i$ , but he saw that the application of this model was limited by the poor knowledge of the rate of introduction of new plant species.

Although the rate of accidental introductions is inherently unknowable, the rate of intentional introductions should be more amenable to analysis. Over the past decade,

# Commonwealth Plant Introductions (1924 -2000)

145,000 accessions

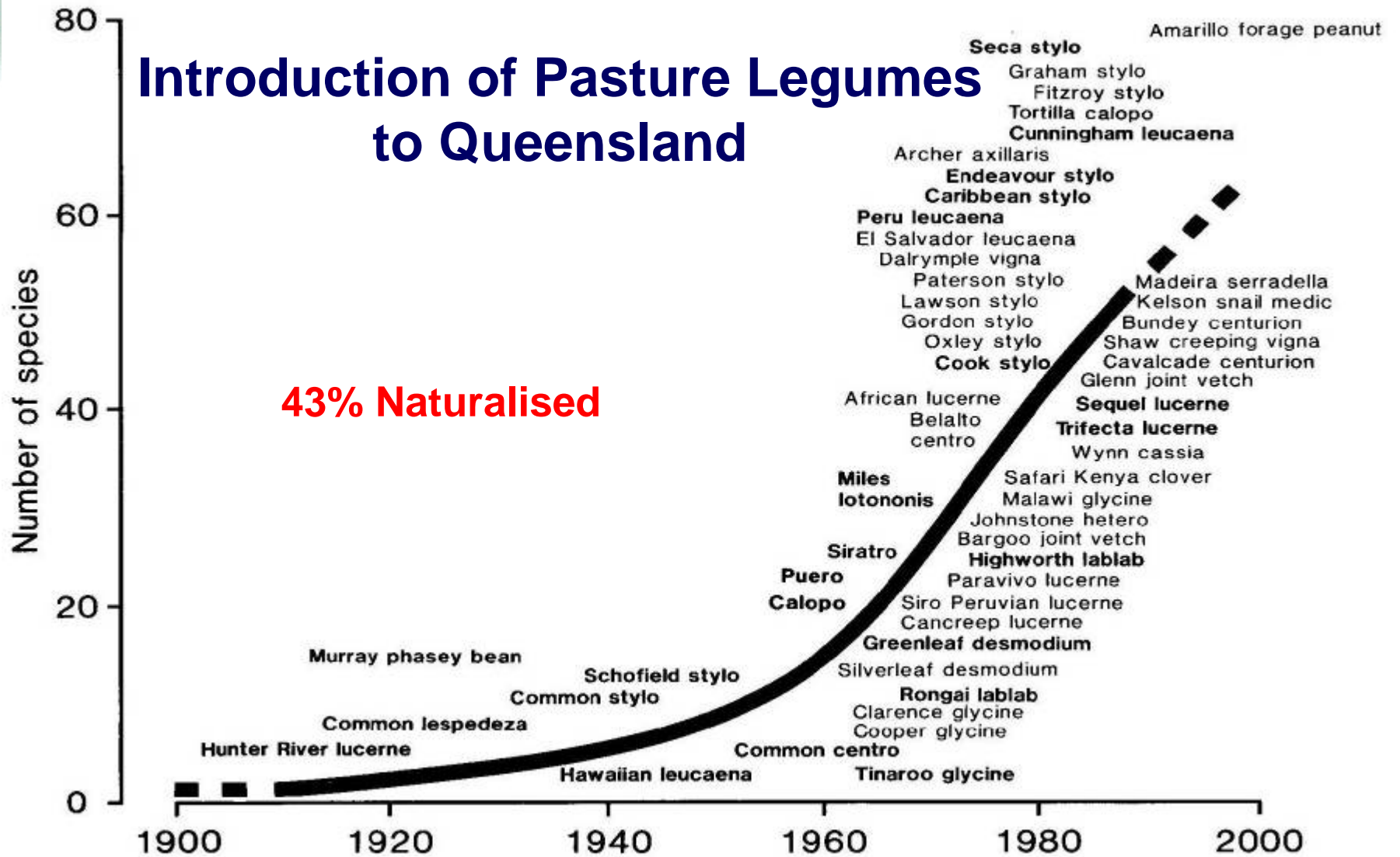
8,200 species

>2,200 grasses

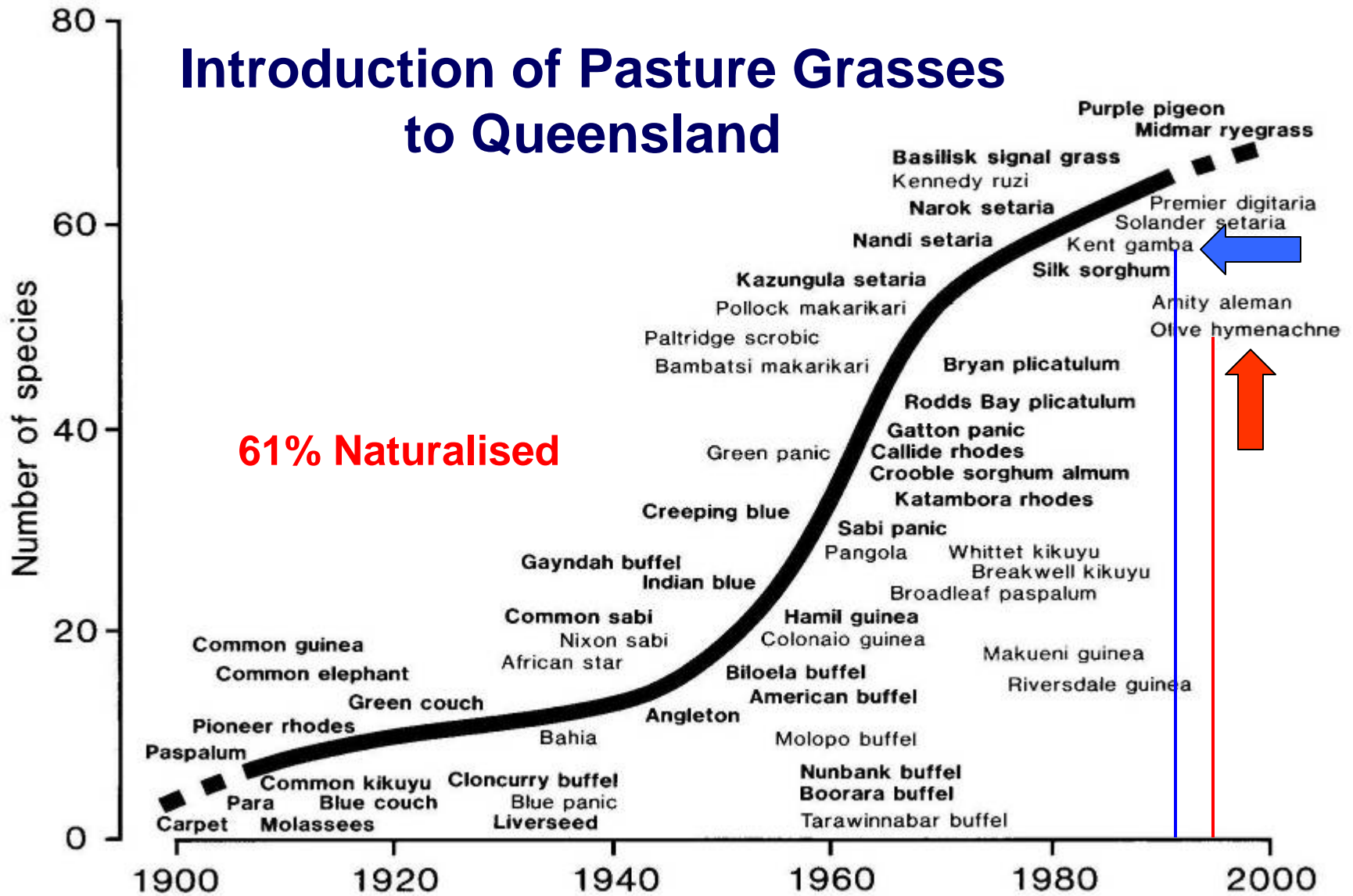
>2,200 legumes

# Introduction of Pasture Legumes to Queensland

43% Naturalised



# Introduction of Pasture Grasses to Queensland



**Most of these grasses were introduced at a time when pasture scientists were well meaning but ecologically uninformed**

**Many of these species would not pass the current point of entry quarantine restrictions**

**Many of these species did not live up to expectations**

**Many of these species are no longer used by pastoralists**

**Many of these species are troublesome weeds**

**The pastoral sector refuses to accept responsibility for the consequences of their spread**

# **How does this differ from the current situation with biofuels?**

**Some of the species targeted are already in the country**

**Many of these would not pass the current point of entry quarantine restrictions**

**Some are already declared plants**

**Not all will live up to early expectations**

**Who will accept responsibility for the consequences of their spread?**



Australian Government  
Rural Industries Research and  
Development Corporation



**Biofuels in  
Australia –  
an overview  
of issues and  
prospects**

**2007**



## 1. What are the drivers for a biofuel industry?

To what extent can biofuels:

- Reduce greenhouse emissions?
- Provide for fuel security?
- Provide land and water benefits?
- Improve human health?
- Provide benefits to regional Australia?



**Biofuels in  
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prospects**

- 2. What is the nature of feedstocks?**
- 3. Will there be competition for crops with alternative markets?**
- 4. Will there be impacts on the livestock industry?**
- 5. What are the sustainability issues?**
- 6. How comparable are biodiesel and ethanol to fuel reference standards?**



**Biofuels in  
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prospects**

- 7. What infrastructure is currently in place and what would be required in the future?**
- 8. What policies will affect biofuels?**
- 9. How can demand be expanded?**
- 10. Are there options for encouraging future capital investment?**



7. What infrastructure is currently in place and what would be required in the future?

8. What policies will affect biofuels?

9. How can demand be expanded?

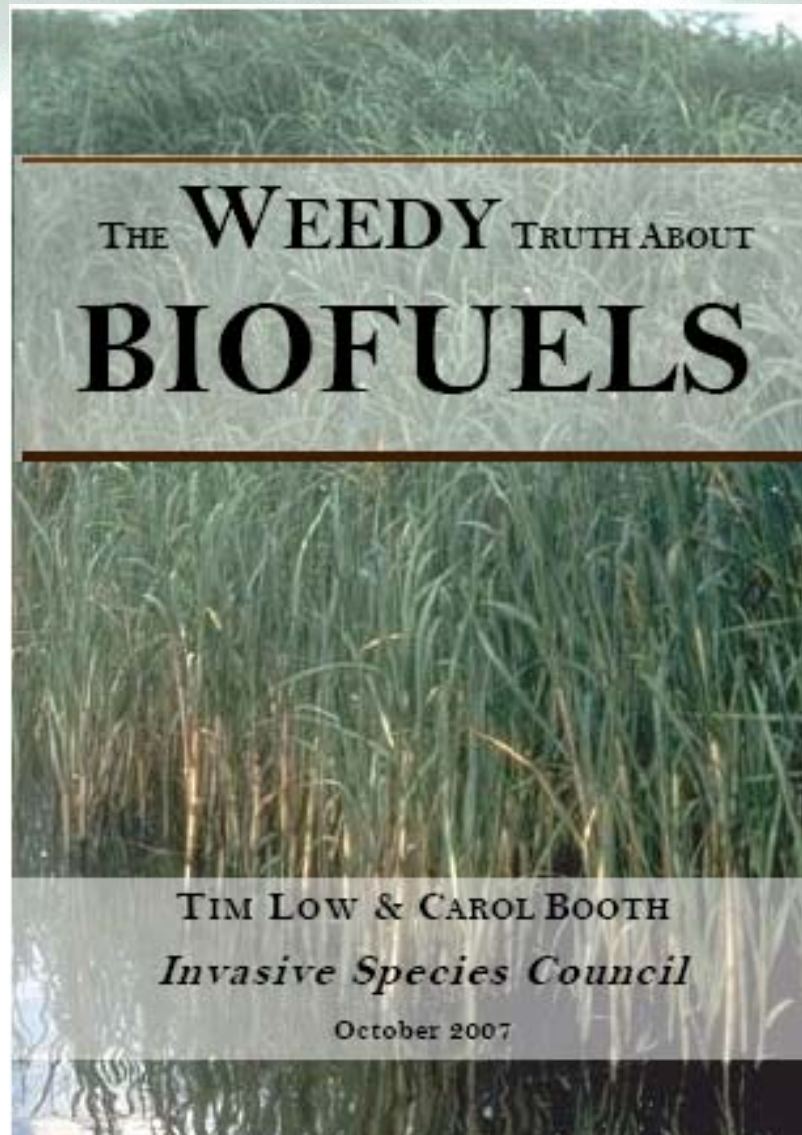
10. Are there options for encouraging future capital investment?

# What policies will affect biofuels?

- Subsidies to fossil fuels
- Assistance to producers
  - Production grants
  - Capital grants
- Banded excise system
- Import tariffs
- Fuel Tax Act 2006

**Nothing on policies relate to weediness**





**2007**

# CODE OF PRACTICE

for

## THE EVALUATION AND RELEASE OF TROPICAL PASTURE PLANTS

*Prepared by the  
Northern Australian  
Pasture Plant  
Evaluation Committee \**

# Northern Australian Pasture Plant Evaluation Committee (NAPPEC)

- Queensland Department of Primary Industries
- CSIRO
- New South Wales Agriculture
- Northern Territory Department of Primary Industries and Fisheries
- University of Queensland
- James Cook University
- Queensland Environmental Protection Agency
- Queensland Department of Natural Resources & Mines
- Western Australian Department of Agriculture
- IAC (formerly CIRAD)
- Agribusiness and rural community

# Northern Australian Pasture Plant Evaluation Committee (NAPPEC)

- **Product Quality**

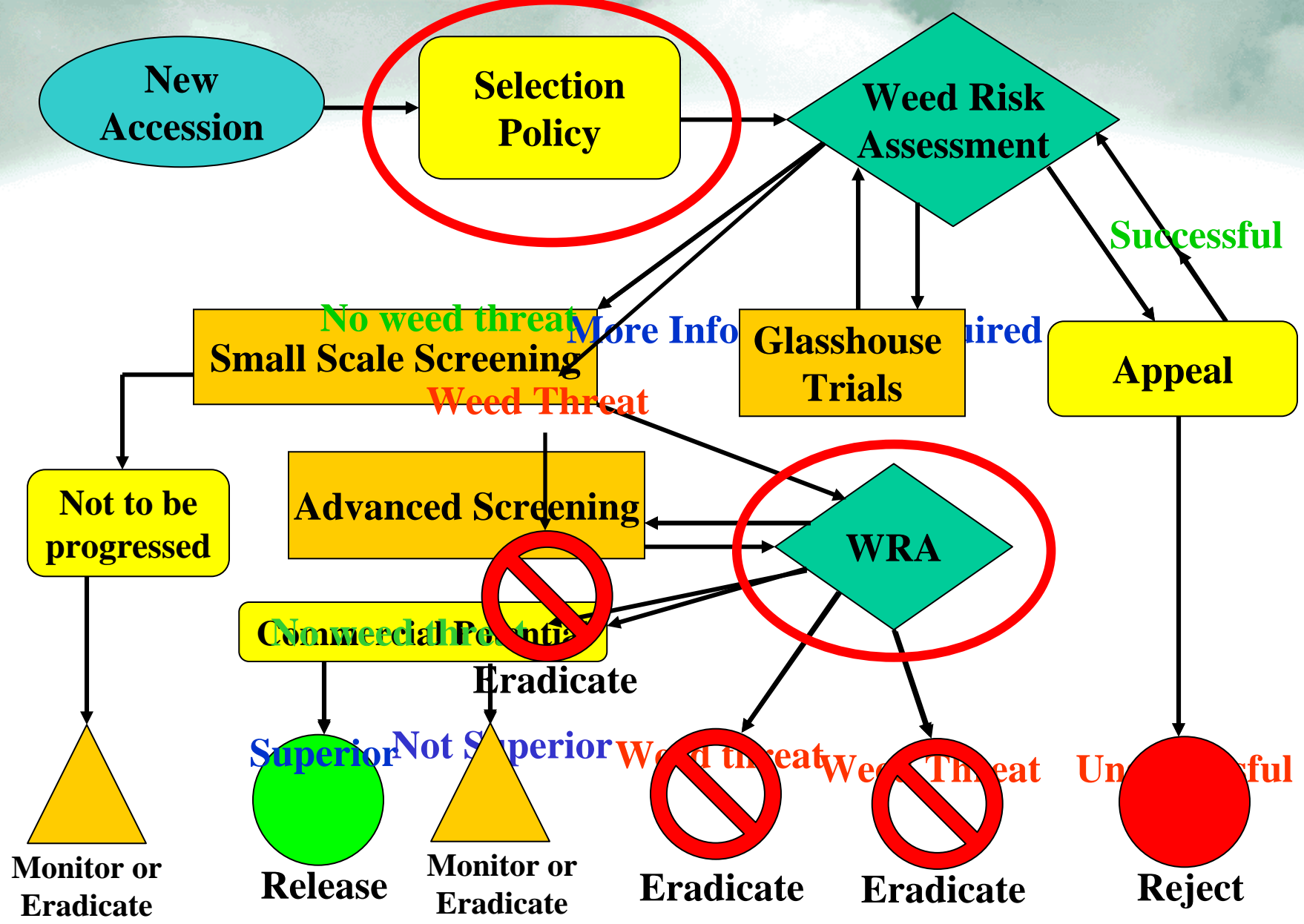
- New cultivars must have benefit over existing cultivars

- **Environmental Weed Threat**

- All reasonable precaution must be taken to avoid environmental harm

- **Ethical Approach**

- Activities, or the products of the activity, do not adversely impact on the rights and sensibilities of other members of the community



# **THE LEUCAENA NETWORK**

**A CODE OF PRACTICE FOR THE SUSTAINABLE USE  
OF LEUCAENA-BASED PASTURE IN QUEENSLAND**

**April 2000**

## **Aims of the CODE**

- **Limit where leucaena is planted**
- **Reduce seed production**
- **Limit seed dispersal**
- **Control plants which escape**

**Will the biofuel industry be  
more than just a good idea?**