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PROCEEDINGS

WOODLAND MANAGEMENT

Wivenhoe Field Meeting—October 11, 1985

The second field day of the Tropical Grassland Society in 1985 was held on 11th October on the property of Mr. & Mrs. L. North, near the new Wivenhoe Dam. Talks were presented in the morning on the subject of "Management of Woodland for Animal Production". This was followed in the afternoon by practical demonstrations on methods of chemical weed control of trees and woody weeds.

INTRODUCTION

B. WALKER

President, Tropical Grassland Society of Australia

The Tropical Grassland Society Committee has recently discussed issues which have not been adequately dealt with in field meetings. One topic which has not been covered in recent years is that of native pasture and its management. We could have had a large field day to deal with all topics but decided to break it into smaller issues and handle them more adequately at field meetings over the next two or three years. Today is the first of these meetings. It deals with Woodland Management, but other topics which we will consider later are stocking rate, grazing systems, the use of supplements, recovering land from degradation and use of fire.

We felt that the first topic should be about woodland and trees as there are about 100 million hectares of natural woodland representing about 70% of the total area of the State. It is our major pasture resource.

THE WOODLAND SCENE

E. J. WESTON
Department of Primary Industries, Toowoomba

This address puts into perspective the woodland resource and touches briefly on the areas which could be important in the development and management of this resource.

What is the woodland resource in Queensland?

Using the classification proposed by Specht, the woodlands are those communities dominated by trees where the projected foliage cover is less than 30%, the open-forests are those with 30–70%, closed forests 70–100%.

I have taken the liberty of dividing the plant communities into four simple structural groups:-

Forest — the closed forests (including brigalow)
Woodland — the open forests and woodlands
Shrubland — the scrubs and shrublands (mulga)
Grassland — the open woodlands, grasslands and herbfields.

Table 1 shows the estimated area of each of these groups and their stock carrying capacity estimated as beef equivalents (BE) and expressed in percentages. These data are drawn from the Broad Resources Assessment of Queensland (Weston *et al.* 1981).

TABLE 1
Estimated Area and Livestock Capacity of Plant Groups in Queensland

	Area (millions hectares)	Carrying capacity (BE %)
Forest	16	20
Woodland	83	50
Shrubland	25	5
Grassland	49	25
	173	

Nearly one-half of the State is or was occupied by woodland or associated vegetation types. The estimated stock carrying capacity of 50% adds weight to the importance of this resource in our overall productivity.

The soil resource supporting the woodlands is predominantly an infertile one. While there is a small proportion of fertile soils (clays, fertile loams and friable earths, and fertile duplex soils), three-quarters of the woodland soils are infertile earths, sands, loams and duplex soils (Fig. 1). Land-use for the more fertile soils involves cultivation and the use of replacement pastures. However, on the larger area of infertile soils, native pastures, modified native pastures and a small amount of low key sown pastures are the fodder sources for grazing animals. I suspect that most of the discussion today will be directed towards this larger group of less fertile soils.

The distribution of the woodlands is described in "Australian Grasslands" (Moore and Perry 1970) where they are divided into the Sub-Humid and Semi-Arid. The first can be further sub-divided into tropical and temperate areas (Fig. 2).

Within the tropical sub-humid zone, are the black spear grass communities of the coastal and sub-coastal woodlands and the tropical tall grasses of Cape York

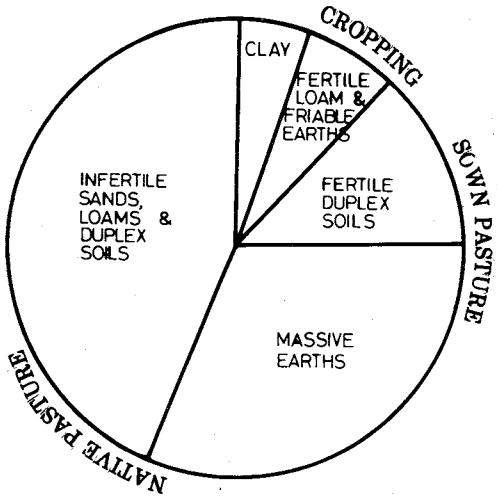

FIGURE 1
The soil types supporting the native pasture (woodland) areas compared with sown pasture and cropping areas.

Peninsula. The latter are characterized by *Schizachyrium*, giant spear grass and annual sorghum and the total area is 44.5 m ha. The temperate woodlands, which correspond with the granite-traprock and the Eastern Darling Downs, occupy 2.5 m ha. Characteristic grasses are *Stipa*, *Danthonia*, *Aristida*, *Bothriochloa* and *Dichanthium*. The major grass communities of the 36 m ha of semi-arid woodlands are the *Aristida-Bothriochloa* pastures of the south and the spinifex pastures of the central-west and north-west. Throughout these woodlands, species of *Eucalyptus*, *Tristania*, *Angophora* and *Acacia* occur with or without a range of understory shrubs.

History of settlement and development

Exploration and settlement of Queensland commenced in the 1820s. In 1840, pastoralists moved northwards onto the Darling Downs. By 1841 stock were grazing in the Brisbane Valley and over a period of 2 to 3 decades much of the Queensland woodland had been occupied by "squatters" with herds of cattle, horses and sheep. Clearing or thinning of eucalypt communities commenced at that time. More intensive animal production occurred with the commencement of dairying. This industry struggled through its infancy in the 1860s and 70s and had gained momentum by the end of the 1880s. It was attempted as far west as Roma and was accompanied by subdivision of large holdings and further clearing of woody species. Today, dairying has retreated to the more mesic tableland areas and to the coast. Sheep grazing is practiced mainly in the semi-arid areas and cattle enterprises dominate the coastal and sub-coastal woodlands.

Land development techniques have changed since the early days of tree felling. Ring-barking followed by sucker bashing was an effective method of killing eucalypts and is probably responsible for a large part of the land upon which trees have been controlled. However, it was labour intensive and became uneconomical as wages increased. The use of heavy machinery became popular in the brigalow forests after the second world war, initially with war surplus equipment. It was a logical progression from there to the use of heavy crawler tractors with chain, cable or tree pushing equipment. Stick raking also became part of the land clearing technology, more usually applied where cultivation was to follow. While these methods allowed country to be treated quickly, they often left regrowth problems in their wake. By the 1950s,

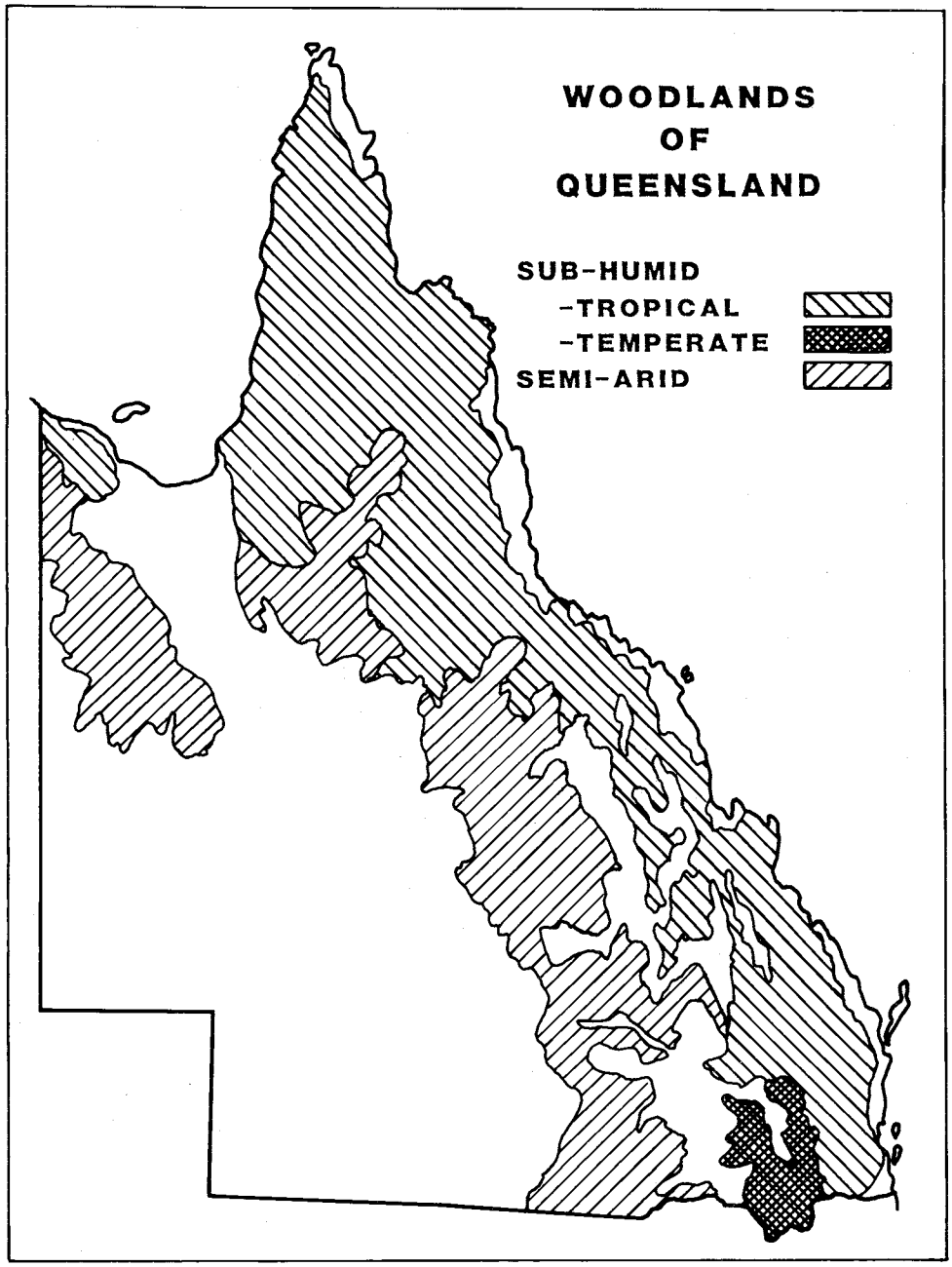

FIGURE 2
Map of the distribution of woodlands in Queensland.

herbicides were introduced as a method of woody weed control and were extensively used in the tropical woodlands. Initially 2,4,5-T and subsequently 2,4,5-T and picloram mixtures proved effective against a wide range of tree and shrub species.

It is interesting to note that much land development aimed at the eradication of woody species has not been permanent. Some woodlands have been treated three or four times since settlement. When the regrowth problem became too big to handle, no further treatments were applied. When grass production fell to a low level, the land was re-treated. The botanical instability caused by disturbance has led to the use of a variety of management practices. The labour intensive methods (grubbing, sucker-bashing) are no longer practical. The two most commonly employed practices are fire and the grazing animal. Both are twin edged swords. While fire destroys some species, it stimulates others. Grazing of sufficient intensity to supress woody weeds may have an adverse effect on other desirable herbaceous species. Additionally, it has an adverse effect on animal production. The most effective method of controlling woody weeds has been full cultivation, but this is usually confined to land which is to be used for cropping. There are now a variety of chemicals available or being tested which may greatly simplify woody weed control in the future.

Discussion

Almost all of the woodlands in southern Queensland, a considerable proportion in central Queensland, and only a small proportion of those in north Queensland have been modified to promote native pasture growth. Data from the Australian Bureau of Statistics suggest that some 30 m ha of woodlands have been modified. However, it is considered that this is not a true reflection of woodland development as most statistics aim to quantify cropping areas and are ambiguous with respect to native pasture and woodland areas.

There is a growing concern about many facets of woodland development including regrowth control, over-clearing, eucalypt dieback, salting, the loss of wildlife habitats, the removal of shade and shelter areas and the loss of the timber resource. Land development should be aimed at trees which are surplus to requirement; we should identify our requirements for trees with as much energy as we have identified our need for additional grass. Research has demonstrated that reduced tree density will increase the level of available nitrogen and moisture in the surface few inches of soil (Walker, Moore and Robinson 1972) and this is reflected in an increase of pasture and animal production (Tothill 1976–77; Burrows 1984). Opinions on land development range from "clear all trees" to "clear no trees" but the majority of people support the clearing of some trees in one manner or another.

Questions we should ask prior to the clearing of infertile soils are:- will increased grass production be permanent or did the tree act as an important nutrient pump from lower levels of the soil profile; will the particular woody weeds of the area (lantana, sandalwood, eucalypts, groundsel, acacias) proliferate following disturbance; will clearing accelerate erosion; will salting result?

Conclusions

Woodlands are the most extensive of the vegetation forms in the State. They support 50% of the livestock equivalents. Clearing or thinning of trees has been an important method of increasing grass and herb production and the number of animals per unit area. However, much land development has been temporary with trees and shrubs developing in weed proportions where not re-treated. This has been wasteful in terms of capital, although it may have been convenient when cash flow was restricted. Are there better methods of land development or follow-up treatments which will minimize the woody weed problem? While accepting the need to maximize the animal product, we should not lose sight of the value of trees and the communities in which they occur. Finally, problems of land degradation may be more prevalent with land development activities in the semi-arid areas.

THE WIVENHOE DAM CATCHMENT

G. H. MALCOLMSON
Department of Primary Industries, Ipswich

The Wivenhoe Catchment extends from the Wivenhoe Dam up to the Somerset Dam on the Stanley, and up to the Emu Creek/Brisbane River junction. The area is generally used for intensive beef enterprises, but there are agricultural areas near Toogoolawah, and some dairying. Since the 1840s, man has influenced the woodland of the area. Clearing and timber getting has had adverse effects on tree communities, particularly on the drainage lines.

The alluvial areas of the Brisbane River and its tributaries originally carried blue gum, but only remnants remain today. This land is high class, being used for intensive production in beef, dairying or cropping. In the central area of the Catchment, is the low undulating to hilly country, mainly covered by narrowleafed ironbark, silverleafed ironbark and spotted gum. Most of this area has been extensively cleared. There are also steeper hilly areas surrounding this country, concentrated particularly in the range areas such as the Blackbutt Range, the Great Divide, the Cooyer Range, Brisbane Range, Jimna Range, Collindale Range and D'Aguilar Range. Timber in these areas is less accessible, thus little clearing has been done and these forests remain fairly stable. They consist mainly of narrowleafed ironbark, tallowwood, blackbut, stringybark, bloodwoods and brush box. There are also closed "dry rainforest" areas within these communities, containing areas of hoop pine. These areas have been significantly disturbed and woody weeds such as lantana have taken over.

Timber control in the Brisbane Valley was mainly ringbarking and scrub bashing right up to the 1950s when chemical control became available. Initially 2,4,5-T and then Tordon have been used almost exclusively in this area ever since. Little mechanical clearing has been used, and is restricted to bulldozing small areas, removing woody weed growth such as lantana. Fire has been used to control woody weeds, but this has mainly been as a secondary effect from burning excess grass growth. It has generally had the effect of reducing the regenerating phase of woodland, so that we now have a woodland of mainly old, mature trees.

Timber removal has led to problems in the Brisbane Valley such as soil instability, erosion and lack of animal protection from the sun and other weather elements. This is reflected in poor pasture production and lower animal production. We have also lost a timber resource. It is to be hoped that these points and management suggestions made by other speakers today will be heeded in future timber control.

THE VALUE OF TIMBER TO ANIMALS

D. POLLARD
Department of Primary Industries, Ipswich

There are benefits and problems from having timber in an animal enterprise. The benefits are shade and shelter, timber for farm use (including sale and fodder trees), protection for soils, wildlife and cattle, and water table control. The problems are that pasture growth is restricted, cattle are hard to locate, stock more difficult to move, and shelter is given to unwanted wildlife (carnivores, etc.).

By removing all the timber, we still have benefits and problems. On the benefits side, there are improved pasture and animal growth rates and removal of problem wildlife. On the problem side, we have no shade, and increased erosion.

There are compromises to be made, and there must be a situation where the maximum benefit can be gained from thinning timber. We need to find the best solution

from the cattle production point of view. Reducing the amount of timber does increase carrying capacity, the amount depending on the type of country (up to 100% increase). It also increases pasture growth and availability, and this can result in increased annual weight gain per animal. These two are additive, giving improved animal output from clearing. If too much timber is removed to achieve these improvements, then serious production problems can result. Grazing potential can be lost, particularly where summer temperatures are very high. Cattle will not ruminate in the heat of the day, restricting further grazing and reducing growth rate. This restriction can be removed by providing shade. Lack of shade can also influence fertility due to heat stress. Work at CSIRO Animal Research Station at Belmont has shown that fertility decreases as body temperature increases. With British breeds, calving percentages can be reduced by 15 to 25% while in zebu crosses, the depression is 10%. Heat susceptibility also reduces growth rates by 13% in British breeds. No other factor has such a strong influence on productivity.

The major influences on animal reproduction as a result of heat stress are:

increased length of oestrus cycle; animals come on heat at night rather than in daytime; reduced intensity of oestrus; increased chance of embryonic deaths; and reduced calf size at birth (and small calves are more vulnerable to heat stress).

Because of these factors, the value of shade to cattle must be emphasised. The shade should be provided in clumps rather than scattered over the area. This can be important for cows calving in daytime. Clumped shade areas are more likely to provide shade for the calf throughout the day, compared to single trees. This is particularly important for British breeds where calves do not move far in the first day following calving. Shade should also be located near water and near the main grazing areas.

Over the last 10 years, there has been a large increase in the content of zebu cattle in the Brisbane Valley region. Although they are relatively tolerant of heat, they still need shade or else production losses will occur.

WOODLAND MANAGEMENT IN SOUTH-EAST QUEENSLAND

W. Burrows

Department of Primary Industries, Rockhampton

Eucalypt woodlands comprise the bulk of eastern Queensland's native pasture resource. Management of these communities has been essentially "low key" up to this time; but greatly expanded cultivation is transforming our best grazing country to crop, so ensuring that increased attention is focussed on the eucalypt woodlands for pastoral purposes.

The aims of woodland management should be to:-

(1) Reduce tree/shrub competition on pasture production
(2) Minimise regrowth following initial clearing
(3) Exploit the niche created by the removal of trees (particularly deep moisture) with palatable exotics
(4) Re-establish trees in shade belts or paddocks where existing trees are senescing, or the area has been overcleared
(5) Minimise tree clearing where this may lead to salting, unacceptable erosion hazard, or over-reduction of wildlife habitats.

Tree density (basal cover) vs. pasture production

All natural stands of eucalypts in this region (with the possible exception of *E. orgadophila*) strongly depress pasture production (Fig. 1) which is directly correlated with stock carrying capacity. This is the prime motivation for reducing tree densities.

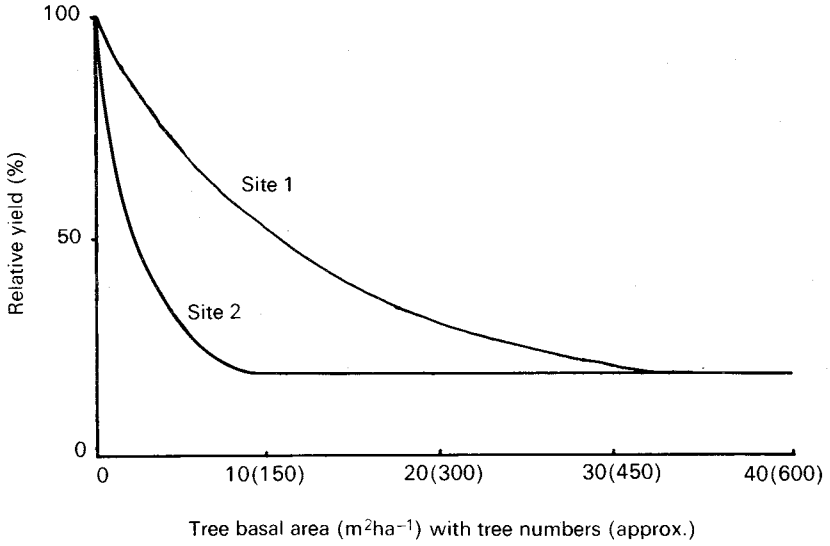

FIGURE 1

Relationship between relative pasture yield (actual yield as a percentage of yield in the absence of trees) and tree basal area for two sites in Central Queensland, site 1 (yield in open 3500 kg ha^{-1}), site 2 (yield in open 1000 kg ha^{-1}).

Also, contrary to some beliefs, this does not appear to result in a less desirable pasture composition (although it does expose the pastures to wider temperature fluctuations). For example, *Bothriochloa bladhii*, *Dichanthium sericeum* and *Heteropogon contortus* increase as tree density declines, while the availability of *Cymbopogon refractus*, *Paspalidium* spp., native legumes and forbs (broad leaf "weeds") decreases with lower tree densities.

Minimising regrowth

Eucalypts and their associated plants (such as *Acacia* spp.) are very responsive to physical disturbance. Therefore if land occupied by a eucalypt community is not required for (or suited to) cultivation it is unwise to clear with bulldozer and chain. These operations usually snap off stumps promoting lignotuber regeneration as well as stimulating the germination of wattles and other shrub species. Most eucalypts allocate considerable resources each year to seed production. This means there is a constant potential for seedling establishment, even though the seed itself is short lived. The continual pulse of young seedlings contributes to a recurring need to "sucker bash" or "Tordon" the area.

When clearing eucalypt woodlands it is therefore desirable to clear on a face and leave shade and shelter trees in strips or clumps. These also provide useful fire breaks. As few as 12 trees (8 m tall) ha^{-1}, scattered savanna-like (as single trees) over the landscape, is sufficient for all the area to be susceptible to seedling regeneration (Table 1). For a 400 tree ha^{-1} stand thinned to 10% in strips, 40 trees ha^{-1} would be left. This is equivalent to one tree every 16 m on a grid basis, which would be an acceptable "savanna" density. Similarly, strip thinning to 20% would leave 80 trees ha^{-1} which is a greater density than would normally be left under traditional clearing patterns!

There is increasing evidence that fire can promote tree and shrub regeneration. But fire also helps to keep regrowth within the browsing height of domestic stock which can check, if not eliminate, such regrowth. Tree seedling establishment is also kept in check by vigorous grass growth.

TABLE 1

Differential effects of clearing a narrowleaf ironbark (E. crebra) *open forest community from an initial stand density of 300 trees ha^{-1} (7m tall) and 50 per cent projective foliage cover (PFC) to a net 10 per cent PFC.*

Condition	Original Stand (50% PFC)	Cleared to 10% PFC as:			Totally Cleared
		Savanna	Shade Clumps	Shade Strips	
Area susceptible to seedling regeneration[1] (% *of total area*)	100	100	28	25	0
Potential annual herbage yield (*kg ha*$^{-1}$)	900	2700	2900	2900	3600

[1] from seed drop around existing trees or clumps of trees.

The best time to control regrowth is within the first two years of tree seedling establishment, or while vegetative regrowth remains within browse height. It is important to note in this context that in natural stands of eucalypts only about *half* of the stand density comprises adult trees. These are the ones most likely to be treated during initial clearing. The remainder are saplings and juvenile trees which are ignored or "not seen" and usually require "follow-up" treatment, as their growth accelerates after the removal of competition from the older trees.

Exploiting tree niches

Trees and shrubs are long lived compared with grasses. They have deeper root systems and can exploit moisture and nutrient resources unavailable to pasture plants. Most trees and shrubs retain green leaves, with a high protein content, throughout the year. Unfortunately this material is generally inaccessible and unpalatable to domestic stock.

When we remove trees from communities to promote grass (because the tree has no fodder value) we create a niche which can be exploited by more suitable *woody* species. Shrubby stylos and leucaena can utilise this "space" and make a positive contribution to pastoral production because they are palatable and nutritious. Thus by understanding the ecology of the woodland system we can "reconstruct" it to more closely satisfy our needs.

Such reconstructed systems could be amenable to further treatment such as fertilisation. On the other hand it would be unwise to fertilise a woodland system *in situ*, irrespective of any undersowing by improved species, since the fertilizer would be largely taken up by the trees.

Re-establishment of trees

Trees are organisms and as such have a finite life. It is common to see single blue gums left in paddocks under the obvious assumption that they will provide shade for all time. We are deceived by the longevity of trees into presuming they are immortal!

The best way to re-establish trees is to fence off an existing shade area from domestic stock. This can easily be achieved without interfering with on-going requirements for shade and shelter by *initially* leaving shade clumps or strips of sufficient dimensions! Generally stock will need to be excluded for at least 5 years to allow natural regeneration to grow beyond browsing height, after which the fence can be moved to another area to be regenerated. An initial fire could be beneficial to promote seedling establishment, but after this fire should be restricted. However fuel loads should never be allowed to build up to excessive amounts in the enclosed area.

Where the natural habitat has been drastically changed, exotic trees may provide faster and better shade than natives and should be considered. In such cases nursery or plantation procedures to introduce the trees may need to be used.

Where not to clear

Tree clearing should never be applied universally. The necessity for shade, shelter and fire break maintenance has been mentioned. Timber reserves should be kept for the future needs of fencing, yard timber, etc. Erosion risks increase greatly where land with slopes of 20% or more are cleared of trees. Care should always be applied in clearing land with texture contrast soils, especially those with sodic B horizons. Induced salting through rising water tables is also a risk that should be avoided.

Conservation of flora and fauna is of real concern to thinking Australians. Such requirements and those of the grazing industry can be met within a woodland management framework. They are best served by strip clearing and especially by maintaining "wildlife corridors" around the boundary of paddocks and along rivers, creeks and drainage lines. In this context wildlife does not simply refer to large marsupials but includes birds and the less conspicuous fauna as well.

A sound woodland management programme will thus improve grass production, minimise regrowth, not promote erosion or salting and will not ignore real needs for shade, shelter, timber and wildlife habitat. The mechanisms for achieving all these objectives are available today.

HISTORY OF PROPERTY

L. NORTH
Property owner

We were involved in the Wivenhoe dam resumptions, and the majority of the property was resumed and is now under water. We retained 130 ha of freehold country. We have also been able to lease country which was originally resumed, but is now not needed for the dam. The property size all up is about 1220 ha. We know that we have unstable country and that we must be careful with our management, especially not to graze too heavily. We also try to burn only when necessary, certainly on far fewer occasions than many of the Brisbane Valley graziers. The paddock we are in was originally a back paddock which had some timber removed, but no real development had been attempted. It was stocked by store cattle, which were moved to the flats for fattening.

When we decided to stay after the resumptions for the dam, it was in the knowledge that this 130 ha was by no means a living area. We decided to improve the area as much as possible, calling on the help of local DPI officers. Our first concern was erosion as much of the land is quite steep. We aimed to improve pasture production without too much clearing. I personally do not like overcleared country for the same reasons as suggested by previous speakers.

The area was surveyed for contour banks and all development was done on the basis of this survey. This proved most successful with the result that little erosion has occurred in our developed areas. The first areas were cleared using a D9 tractor, mainly because of the availability of heavy equipment from the Dam construction. The cost of this was $55 an hour, which worked out at $62 per hectare cleared, and stacked. The area we are in here was cleared using a D5 about 7 years ago. The timber was smaller than that in the original area. We left about 30% of the original timber, taking out useful timber for yards and fencing prior to starting. The basis for removing further trees was to take out millable timber and useless timber. The basis for leaving trees was to decide which would eventually become millable timber, and I decided to leave these trees as scattered timber rather than clumps.

To get the dozer driver to leave the required numbers and type of timber, we painted rings around those we required. We have not cleaned up regrowth since clearing because we were advised that they provide the basis of younger, replacement

timber. That decision has been vindicated by earlier speakers today. We have done little since then, partly because I was uncertain of the next moves. The talks today have given me helpful advice on what to do for the future.

WEED CONTROL METHODS

T. ARMSTRONG
Lands Department, Sherwood

The first principle in weed control is to identify the weed before doing anything else. The main weeds to treat in the Brisbane Valley are goundsel and Noogoora burr. When young, these can be pulled manually or grubbed out. This was certainly a popular method before the second world war.

With chemical control, the better the growth at the time of treatment, the more effective will be the treatment. With cut stump or axing, the secret is to apply the chemical as soon as the woody weed has been cut, while the sap is still drawing. This pulls the chemical down into the roots or lignotuber quickly, allowing the chemical to move into the area where it can do most damage.

With basal bark spraying, the cost of diesel and chemical is going up rapidly, and we have devised methods of reducing application costs without reducing effectiveness. By halving or even quartering the amount of stem sprayed, and doubling the strength of the chemical, you can still get good kills. As long as the chemical is applied to the base and it runs down on the lignotuber, good kill can be achieved from a 1 to 20 mixture instead of a 1 to 80 mixture of 1% active. Basal bark application will work on most woody weeds provided you get the chemical on to the base of the weed.

Overall spraying is the best method of controlling dense groundsel, lantana or seedling eucalypts. Lantana should be sprayed after a good wet season, preferably March to May, but Christmas to July can still achieve kill. The whole bush should be sprayed. Missing a branch or side of the bush can result in incomplete kill. The chemical used is 2,4D amine. There are low odour formulations now available which result in less complaints from neighbours or environmentalists. For large areas, a boomspray is necessary with broadcast or offset nozzles to get over logs. Misters are effective for herbicide applications, but they have the problem of getting higher chemical drift. We discourage their use, particularly for hobby farmers. Wick weeders can be effective using Roundup (at 1 part of chemical to 2 parts water) for selectively taking out weeds which stand up out of pasture or crop, i.e. Johnson grass or Bracken fern.

One effective method of controlling eucalypts, groundsel, lantana, etc. is the splatter gun which applies Roundup at a rate of 1 part of chemical to 12 of water (3% active). It is calibrated to apply 2 mls per foot of height, applied direct to the foliage. It was effective and cheaper than basal bark spraying, and was selective, particularly useful in forestry for pine forests. The aim is to give a spray of large droplets and reduce spray drift.

Granules have not had a good record in Queensland because of the unreliable rainfall. A new chemical which we hope will be registered by the end of the year, tebuthiuron (Grasslands), is one which will take out woody weeds and leave grasses. The chemical can be applied from the air. It appears effective for groundsel, but is not very effective for lantana.

For lantana, the best control method is to incorporate dozing, pasture, fire and chemical treatment. It is suggested that after dozing and obtaining a pasture, each paddock should be treated individually. It should be locked up to build up fuel for a hot burn. Then the regrowth should be brush-gun sprayed with DP60 (1 litre in 200 litres of

water) when it reaches 0.3 to 1 m high. Spot spraying still leaves sufficient Siratro (if included in the pasture) to seed, building up a seed bank for regeneration. Leucaena is another legume tried in lantana control. Its deep-rooted habit allows it to compete with lantana, and the lantana actually helps to protect it during its susceptible establishment period.

The principle used to obtain biological control for woody weeds is to go back to the country of origin of the pest to obtain insects which attack the weed. The insects must then be checked for possible damage to economic crops or ornamentals. There have now been successful biological control measures against prickly pear, harrisia cactus, salvinia (in New Guinea), lantana (partially), Noogoora burr (naturally occurring rust), skeleton weed (rust), and now groundsel bush. The control of the latter is being achieved by a groundsel gall fly which lays red eggs on the growing tips and reduces its seed production. The fly is now starting to reduce groundsel growth particularly in the cooler areas.

COMMERCIAL TIMBER CONTROL

S. SAVIGE

Tree control contractor, Savco Pty. Ltd.

I have been working in the area of timber control for about ten years now. Ringbarking has disappeared and all timber control is by chemical means. We work an area extending as far south as Wagga Wagga in N.S.W., as far west as Walgett, and into central Queensland. We run a gang of about 25 men.

One of the earlier speakers commented on how expensive Tordoning has now become. Although I agree that it is quite expensive in the short term, Tordoning is a long term investment and on this basis the cost is not high. For example in central Queensland, mechanical clearing of flats containing box will cost about $17 an hectare, but this pulling will result in a massive suckering problem. We could tordon these same areas for about $30–35 an hectare. The difference is that the chemical treatment is permanent, but the mechanical clearing might need to be done up to 3 times to get complete control. In the Brisbane Valley area, selective clearing of Eucalypts has been resulting in wattle regrowth problems. Wattle can be controlled easily by overall spraying if the country is accessible to vehicles.

Suckers are fairly difficult to control even with chemicals because of the root mass below the ground to provide regrowth points. Seedlings on the other hand can be fairly easily controlled by overall spraying although it is expensive. Scattered seedlings, where they are too small to stem inject, are best treated by overall spraying with diesel and chemical. The cost of treating this area we are in today would be $30–35 per hectare (including chemical). We treat a lot of similar country in the coastal areas.

We suggest that areas of trees are left in patches and in gullies, preferably up to a chain back from gully edges. However many graziers do not accept our advice, suggesting that they cannot grow beef and trees.

There are four or five chemicals which we use to kill trees. Velpar will kill trees over an extended period, with each successive rainfall resulting in suckering which would then be again killed by the chemical. The 2,4,5-T amine used to be mixed with it for increased effect but it is now unavailable. Roundup is becoming cheaper and is effective on trees. It will soon be equivalent in price to Tordon. It is most effective on pink box or Tristanias. It kills both the tree and suckers at one hit, but unfortunately is currently too expensive to use commercially. Tordon is still the cheapest chemical but its price is increasing. 2,4,5-T amine was effective on small ironbark and blue gum trees, and it was cheap. Unfortunately the alternatives are much higher priced.

SUMMARY

L. R. HUMPHREYS

Department of Agriculture, University of Queensland

The day resulted in a very good marriage between theory and practical knowledge on woodland management, including very good demonstrations on control methods by Sandy Savige and Trevor Armstrong.

I see three main messages from this day's proceedings. Firstly, there are so many different objectives in property management and these have to be worked out at the individual property level. People, on the one hand will be concerned with getting as much pasture as they can but at the same time will have different reasons for keeping timber. This will have different values and will throw up different problems. We do have a better technology now so that the property holder has better information on which to base his decisions than he did thirty years ago.

Secondly, we must be aware that clearing is one aspect of property management and that just how the property is burnt and grazed will determine the nett result of the clearing activities. Thirdly, where we are thinking about replanting trees, it would be nice to replant with a tree like leucaena which is going to provide extra, high quality feed for animals, rather than sow an inedible tree which would be a negative factor in stock production.