WEED MANAGEMENT IN RANGELANDS OF SOUTH AUSTRALIA

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Summary Efficient pest management programs are developed by following the logical steps of evaluation, strategic planning, tactical planning, implementation, and review. The process is appropriate for weed management at all scales in rangelands of South Australia – property, district, and region.

To ensure that well planned weed control programs are implemented, managers need to be presented with the information relevant to them. The type of information presented should vary for weeds at different stages of the invasion process. Values, together with knowledge, need to be shared between the land manager and the adviser. Extension materials should be flexible to provide for these differences. Information on weeds that are likely to have significant impact on production or the environment should be presented repeatedly.

It is considered that the planning environment for weed management in rangelands of South Australia is leading to efficient decision making.

INTRODUCTION

Different points of view and knowledge of weeds and their impact on rangeland systems may lead to differing management approaches being applied to develop minimization strategies. An approach to weed management in the rangelands of South Australia has developed, based on generalized models of pest management planning, which aims to increase knowledge and communication between parties at the property, district and regional level.

In this paper an examination is made of planning styles for weed management in rangelands of South Australia. Weed management options and methods to present information are outlined. The value of proclamations under the Animal and Plant Control Act is discussed.

PLANNING FRAMEWORK

In South Australia the responsibility for weed control rests with the landholder.

For proclaimed plants minimum accepted control standards may be established by Animal and Plant Control Boards or the Animal and Plant Control Commission in consultation with soil conservation boards.

For most plants minimum accepted practices are not set.

For all weeds best practices are promoted by animal and plant control staff and by soil conservation boards.

Landholders play an important role in the planning of weed management at all levels in the rangelands of South Australia – property, district, and region.

Knowledge of the planning process A sound planning process assists the decision maker to select the option that will best achieve their goals from a range of alternatives. Weed control goals are normally set at the property level by the landholder, at the district level by a soil conservation board or an animal and plant control board, and at the regional level by the Primary Industries (South Australia) (PI(SA)) team. Support programs of PI(SA) offer help in setting values and in planning through the employment of a District Planning Officer and a Property Management Planning Officer.

Efficient pest management programs can be developed by following the logical steps of evaluation, strategic planning, tactical (operations) planning, implementation, and review.

Incidence and importance of weeds Michelmore (1995) reported the distribution and impact of weeds of rangelands of South Australia. Of 351 species naturalized in rangelands of South Australia, 49 introduced species are troublesome to pastoralists. Seven native plants, and filamentous algae, are also noted as troublesome.

Weeds have so far had relatively little impact on the economics of agricultural production in arid pastoral areas of South Australia. Weeds do affect the profitability of pastoralism, but in comparison to the impact of weeds on adjacent agricultural areas, and the effects of woody weeds in western New South Wales, losses have been relatively small.

South Australia is not exempt from potential problems. African rue (*Peganum harmala* L.), hopbush (*Dodonea* sp.), innocent weed (*Cenchrus longispinus* (Hackel) Fern), mesquite (*Prosopis* spp.), Noogoora burr (*Xanthium occidentale* Bertol.), pimelea (*Pimelea simplex* F. Muell), punty (*Senna artemisioides* (DC) Randell), turpentine (*Eremophila* spp.) and winged sea lavender (*Limonium lobatum* (L.f.) Kuntze) are most likely to spread and have significant impact on agricultural profitability (Michelmore 1996). These plants have the ability to disperse, and there are numerous niches available.

Table 1. Prompts for weed management planning: African rue.

Link with your property plan.

1. Consider your property plan. Would dealing with the problem/issue meet your ultimate aims? If so, then continue with the evaluation and plan.
   It is likely that African rue would have some influence on agricultural business in pastoral areas adjacent farmland.

Evaluate problem.

2. Map current infestation. Are certain habitats or types of land more vulnerable? Can spread rate be quantified? Is the problem increasing? Has there been a change in management practice or some other change in environmental conditions that may have promoted this change?
   Mapping need only be rough, perhaps making four abundance classes: thick, patches common, patches sparse, and absent. It is very difficult to quantify spread rate.
3. Map potential infestation if left unchecked.
   It is likely that roadsides, waterpoints, and creek banks will be most vulnerable.
4. Map areas with highest impact on—current and potential—agricultural production quantity and quality, environmental, management and social losses (and gains). Can losses (or gains) be quantified?
   Losses due to pasture competition with African rue are likely to be negligible unless the population is very high. Management must never over graze as African rue may become very dense.

Management planning

5. Consider treatment options – benefits and faults of each treatment; integration between control methods; link with neighbours. Are there special aspects of the biology / ecology of the problem that must be considered?
   Treatment with Roundup or Arsenal herbicide in mid flowering is the only worthwhile control method. Prevention of overgrazing is the best preventative method.
6. Highlight areas with best benefit/cost ratio – select priority areas. Determine control program – eradication, control to contain, control to minimize economic damage, or monitor. Follow any legal obligations, such as requirements of the Animal and Plant Control Commission or soil conservation board.
   Decisions on intensity of weed control effort for a district are commonly made by Animal and Plant Control Boards.

Tactical planning

7. Consider timing – in relation to cash flow; problem biology, spread and impact; treatment availability, success and follow-up.
   Control of primary infestations in mid spring is likely to most successful.
8. Where necessary, prepare special plans for each priority area.

Review plans

9. Look back just before you do it, check that your plans will meet the aims and visions of your business.

Implement management

10. Apply integrated treatments, follow-up and related management that leads to better production!
    As preventative management has been suggested as being of highest importance the doctrine 'Manage the pasture well and let the weeds look after themselves' applies.

Review progress

11. After a while, review management of the problem in relation to your current business aims and objectives.

Relative importance of weeds The current importance of weeds to agricultural production in the rangelands of South Australia is minor compared to the importance of other production issues This relative importance is reflected in priorities of the landholders and members of soil conservation boards.

The threat of a new weed may lead to inconsidered action. Whenever possible, advisers should present to land managers best estimates of the relative importance of weeds. To conjure unnecessary fears or to overstate a problem in order to achieve weed control is a poor service for clients.

INFORMATION FOR WEED CONTROL PLANNING

Decisions are based on scientific knowledge, common sense, untested theories, rule-of-thumb knowledge, and hunches (Provenza 1991). Communities need to be provided with the best knowledge available to help them make the best decisions (Bosch *et al* 1996). Extension programs need to be planned at the regional level so that efficient weed control plans are developed and implemented at the district and property level.

> *Efficient extension programs are a two way process. The adviser needs to understand the values and knowledge of the land manager, and the manager needs to understand the context of values and advice received.*

In some cases, landholders require little information to make a decision; in other cases, landholders request information. Extension materials of the adviser should be flexible to provide for these differences.

Similarly, the type of information required to make weed management decisions needs to be presented differently for weeds at different stages of the invasion process.

Typically, inquiries on weed control are initially focused on control methods. When presented with adequate information, and appropriately coached, landholders are able to construct well thought out weed management plans that have been implemented. When control programs have been prescribed by advisers the program actually implemented is often the landholder's uninformed program – the program is either not adopted, or is applied how the manager sees fit.

Landholders must be fully involved in making decisions on inputs to their property management. Landholders should be presented with information that will prompt them to follow the planning process. Wherever possible, information should be presented so that landholders can consider the management of the weed in a systems approach. An example of prompts commonly used, together with an outline of appropriate information to make decisions on African rue management, is shown in Table 1. This process meets the essential criteria and primary functions for specific land management decision making as suggested by Scrifes (1987).

When weed management programs need to extend across property boundaries, all landholders should have input in the management planning process. By using this approach the use of legislation is not required.

In the rangelands of South Australia, legislation for weed control may be applied by the Animal and Plant Control Adviser. Incentives and coaching are seen to have greatest ability to change landholder practices. When the use of legislation is mentioned, the acceptance of the adviser as a coach is greatly diminished.

WEED MANAGEMENT OPTIONS

There is a range of options available for arid zone land managers in order to decrease the impact or potential impact of a weed. Options vary with changes in the stage of the invasion process, the potential spread and impact of the weed, the state of the range system, and with any legal status applied to the plant. If a plant has many faults and few uses, is dominating, or is likely to dominate a plant community and normal management will not significantly alter its overall effects, then it is a very bad weed. Highest priority should be placed on these weeds early in the invasion process (Michelmore 1995).

When a weed has increased its population to a stage where it has generally naturalized – that is, it is found over extensive areas or is found at numerous sparsely scattered habitats – the options for control decrease markedly. In general, management that aims to conserve the native pastoral vegetation will generally succeed in minimizing the naturalization and spread of weeds. To do this the manager must understand and be responsive to the events that drive the rangeland ecosystem.

Where a manager has insufficient resources to eradicate a widespread weed, he may minimize the impact of the weed. For example, managers frequently alter the timing of shearing or lambing to avoid burr weeds or grass awns.

Rangeland managers have very few opportunities to prevent the introduction of weeds.

CONSTRAINTS ON WEED MANAGEMENT

Economic constraints The insidious nature of weeds and weed invasion can sometimes confuse economic and sustainability goals. Native woody weeds, for example, are slowly encroaching in many areas. Once woody weeds are established, control costs are likely to be much higher than returns. There may be significant delay from time of control to when returns start to be realized.

Management should target preventing the process from happening and addressing primary infestations.

CONCLUSION

When managers and advisers are familiar with the planning process, each others values', and each others' knowledge, then efficient plans can be developed and implemented. Operations of Primary Industries (South Australia) in the rangelands are promoting these processes in several disciplines, including weed control.

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