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Pasture seeds—
Production techniques and the future marketing situation

By B. J. Quinlivan, Adviser, Biological Services Division

Like other farming and grazing industries, pasture seed production has its share of booms and slumps—perhaps more than its share. In Western Australia, the industry reached a high point during the mid-1960's when land development along the south and west coastal districts was at its height.

The drought year of 1969 and the subsequent rural depression saw pasture seed production fall to its lowest level for ten years and it is only in the last 12 months that there has been a revival (Figure 1). However, despite booms and slumps the general pattern of production has remained similar with more than 80 per cent of the crop being subterranean clover seed. Serratella and barrel medic are the most important secondary species; others of lesser consequence are rose, cupped and strawberry clovers, strand and disc medics, lucerne and annual ryegrass.

With the sudden upsurge of interest last summer there will be many potential seed producers now wondering about the future, and it is therefore an appropriate time to attempt some predictions.

The current marketing situation
Western Australia imports small quantities of pasture seeds, mainly perennial grasses, but overall it is a net exporter selling about a third of the total seed crop, mainly subterranean clover seed, overseas or to the Eastern States.

This export of seed has been the factor mainly responsible for the survival of the industry in a reasonably sound state through the recent rural depression. Subterranean clover in particular is becoming increasingly popular in many other parts of the world and over the last 10 years average annual Australian export has exceeded 1 000 tonnes. Most of this has been Western Australian seed destined for Chile, Uruguay, Brazil, Spain, Portugal, New Zealand and the United States.

Seed sales within the State slumped sharply after 1969 because new clearing ceased and finance for reseeding old areas was limited. Another cause of the fall in sales was the disappointing performance of many of the early maturing vari-
eties of subterranean clover and other species through the run of dry seasons from 1969 to 1972. In medium and low rainfall cereal and sheep areas, many sown pastures failed to persist, and in fact the annual statistical returns show that the State "lost" about a million hectares of sown pastures during this period (Figure 2).

Exports are now steady and there has been no varietal improvement to stimulate fresh local demand, therefore the increased seed production and sales last summer can be attributed mainly to improved wool prices since 1972. Current seed production is 6,000 to 7,000 tonnes, about half or two-thirds of which is seed of medium to early maturing species and varieties suitable for the cereal and sheep districts.

**Future demand**

In assessing future demand it is probable that there will be at least one reasonably constant factor, namely export sales. These have varied over the last 10 years from 1,000 to 2,000 tonnes each year, but generally show no marked up or down movement in the long term.

Most seed sold on the local and export markets is certified by the Department of Agriculture. Certification guarantees trueness to type, a high pure seed content, freedom from weed seed and a good germination.

New varieties are produced by crossbreeding and/or selection in small plots, followed by extensive testing. Characteristics considered most important for many future clovers and medics are seed production potential, hardseededness and disease resistance.
The finance for the purchase of these seeds comes mainly from international agencies such as the World Bank or the United Nations Food and Agriculture Organisation and there is no suggestion that this will stop.

Within Western Australia, clearing of new land in medium and high rainfall areas has started again and there will be a demand for seed for pasture sowing. However, it is unlikely that the rate of clearing will come anywhere near the high point of the mid-1960s, particularly with the withdrawal of many taxation concessions for new land development.

The most likely avenue for increased demand is for seed for re-sowing old-established areas. In low-rainfall cereal and sheep districts, regular reseeding is accepted as an unfortunate necessity with existing varieties of subterranean clover while in the higher rainfall districts the objective of most re-seeding is the introduction of a more suitable variety. For example, with subterranean clover the low isoflavone more productive Daliak or Seaton Park varieties are gradually replacing Dwalganup.

There will be a demand for several thousand tonnes of seed of existing varieties of subterranean clover each year for reseeding within the State for the next few years, but a major increase in sales will come only with the development of new varieties.

Since the drought and rural depression of 1969 the area of cleared land in Western Australia has increased only slightly and there has been a "loss" of improved pastures; however, pasture seed production is once again on the increase.

Within two or three years it is probable that new low-iscoflavone, earlier maturing, more hardseeded persistent varieties of subterranean clover will be released for the lower rainfall cereal and sheep districts. These varieties should become generally available at reasonable prices in the late 1970s and will do much to stimulate demand.

By contrast, there is little immediate prospect of an equally productive replacement for the clover scorch susceptible Woogenellup variety in the medium and high rainfall districts.

To summarise, it appears that there will be a basic demand at reasonable prices for some 7 000 tonnes of seed over the next few years and subsequently this figure could increase when new varieties become available.

**Future supply**

Traditionally, most subterranean clover seed production in Western Australia has taken place on newly cleared land, with some 80 000 hectares harvested each year. New land provides a weed, disease and insect-free situation in the early years, resulting in few harvesting problems and high seed yields.

The rate of clearing of new land land within the State is certainly now much lower than that of the mid-1960s, but it is still adequate to provide a high proportion of the required seed crop. There is therefore little immediate concern about potential supply, which will be determined largely by demand and price rather than lack of suitable areas to sow and harvest for seed production.

**Production techniques**

This article does not attempt to detail production techniques for relatively diverse species such as subterranean clover, barrel medic, rose clover and serradella. However, the techniques for subterranean clover seed production are outlined and these are generally similar to those for other annual legumes, and are summarised below.

**Growing season**

Some six to eight weeks elapse from the time subterranean clover commences to flower in the spring to the completion of burr development. During this period, plentiful soil moisture is needed if maximum seed setting is to take place.

Hence, for consistently satisfactory seed production, it is normally necessary to grow a variety in an environment with a growing season a few weeks longer than that considered necessary for normal pasture growth.
Soil type
Subterranean clover grows well on most acid, sandy, gravelly or loamy soils. It produces satisfactory seed crops off a wide variety of soil types but the best seed setting occurs on sandy surfaced soils where the burrs can bury. These soils frequently have a clay profile close to the surface which holds soil moisture in the root zones.

Deeper sands dry out quickly in the spring and are not always suitable for subterranean clover, but they may be adequate for serradella.

Land preparation
Subterranean clover forms its seed at or close to the soil surface. The seed is usually harvested with air-draught machines which need relatively even surfaces free of large sticks and roots to operate effectively. It is therefore necessary to pay special attention to clearing and levelling if a new paddock is to be used for seed production in the first year.

Seed and fertiliser rate
Most subterranean clover seed production is based initially on new land sowings. However, for a satisfactory seed crop on new land, fertiliser and seed rates need to be higher than those required for pasture establishment.

Superphosphate should be applied at about 300 to 400 kg per hectare. Trace element deficiencies must also be corrected.* Minimum seeding rates of at least 15 kg per hectare should be used and there is experimental evidence to indicate that profitable yield increases take place up to 20 kg per hectare.

If seed is scarce or expensive or both, the seeding rate can be lowered and the fertiliser rate increased.

If the seed crop is being sown on old land, standard preparatory and cropping procedures aimed at good weed control—particularly grass control—should be followed, and the seed should be sown at 20 kg per hectare, the higher seeding rate allowing better competition with the surviving weeds.

Time of sowing
The establishment and nodulation of newly sown subterranean clover pastures is most successful if sowing is done during autumn when soil and air temperatures are relatively high.

The flowering date in spring is also controlled to some extent by the time of germination and an early germination often results in an early flowering. This then allows seed development to take place while soil moisture is adequate.

Early sowing is therefore desirable for seed production, and on new land the seed should be sown immediately after the break of the season.

Harvesting and grading
There is no standard preparatory technique for handling subterranean clover pastures before harvesting their seed. The methods used to remove straw and trash, and to bring burrs to the surface are largely determined by the variety involved and the position of the burrs relative to the soil surface.

Burning to remove surface straw is sometimes possible where the burrs are buried but, if they are on or above the soil surface, burning usually kills a large proportion of the seeds. Where burrs are on the surface the straw should be raked off or broken up by cultivation and harrowing. Harvesting can commence after further cultivation and harrowing to bring the burrs to the surface.

Throughout harvesting and the subsequent grading process special care should be taken to adjust the machines to ensure that the seed is not excessively cracked or chipped. However, scarification must be sufficient to overcome hardseededness and give a satisfactory germination.

Species other than subterranean clover
For other species of annual legumes—barrel, strand and disc medics, rose and cupped clovers and serradella—production techniques similar to those outlined for subterranean clover are applicable. On new land the same fertiliser rate should be used. Where air-draught machines are to be used for harvesting, land preparation should be given careful attention.

Seed rates should be adjusted for each species in accordance with the size of the seed and its expected germination. For medics and the rose and cupped clovers, a seeding rate of 10 kg per hectare appears necessary for high seed yields in the first year.

The seeding rate for serradella should be 10 kg per hectare for new land crops. With this species, however, the final seeding rate should be determined largely by the germination capacity of the seed sown.

* See Department of Agriculture Bulletin 3614—Copper, zinc and molybdenum fertilisers for new land crops and pastures.