Lucerne establishment in high rainfall dairying districts

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LUCERNE is one of the oldest of perennial forage plants. It originated in the Middle East and because it flourishes under a wide range of climatic and soil conditions it is being grown in many parts of the world. Lucerne was introduced to Australia in the early years of British settlement. The original introductions proved suitable for the alluvial flats of the Hunter and Peel River valleys of N.S.W.

Lucerne is basically a summer growing legume with or without winter dormancy.

In the dairy belt of Western Australia it will produce most fodder under irrigation. Because of its ability to tolerate droughts and to respond to the early autumn and the late spring rains lucerne has a very valuable place in dryland farming.

Because the success of lucerne growing largely depends on the success of its establishment this aspect will be discussed in more detail:

**Lucerne varieties**

The well known Australian strain "Hunter River" has been derived by adaptation of the early introductions to the Australian environment. Hunter River has high tolerance of hot and dry summers and is frost resistant in winter. It is a fodder type with slight and short winter dormancy period and persists best under cutting regime. Many stands have persisted well under controlled rotational grazing. This requires quick eating down (within few days) and spelling until first blooms start to appear (this usually takes 6 to 7 weeks). Though most of the seed used in Western Australia is produced in the Eastern States, seed of Hunter River is always readily available.

In recent years the CSIRO has introduced other lucerne varieties.

**Fodder type**

Seed of the following fodder type varieties is also produced in the other States:

(a) Siro Peruvian
(b) African
(c) Du-Puits.

All three of these varieties have been tested by the Dairying Division and have been found to be less persistent than Hunter River.

**Grazing type**

More recently the CSIRO has developed a grazing type variety called "Cancreep." Up to date, because of a shortage of seed, only limited trial work has been done with Cancreep in this State. Although the local trial work is continuing, for any immediate plantings, Hunter River would be the safest variety to grow.

**Climate**

The W.A. dairy belt is located within the 30-inch and 60-inch rainfall areas of the South West. The rainfall in these parts of the State is mainly of winter incidence and the period of effective falls ranges from 7 to 10 months of the year.

The winter rains, particularly in the south, can be excessive and the summer rains are not sufficient for the unrestricted growth of lucerne in any area under consideration.
Soils

Drainage

Good drainage is one of the pre-requisites for the establishment and persistence of lucerne stands.

Soils that become winter waterlogged or where an impermeable layer is close to the surface are not suitable for lucerne growing.

Physical characteristics

Deep, well-drained, loamy soils are usually the best for lucerne. Non-cracking clays outcropping at the surface are also suitable, though the soil preparation is more difficult. Shallow sands or gravel over clay usually lead to temporary winter waterlogging and therefore must be avoided. In recent years considerable areas of lucerne have been established on Tuart sands, and on some other sandy soils along the coast with limestone in the subsoil.

At Denmark Research Station trials are in progress to evaluate the potential of lucerne growing on the deep, acid Banksia sands.

As lucerne establishment requires some knowledge and is also fairly expensive, it is wiser to restrict the initial plantings to the deep heavier soils.

pH and lime requirements

It has been recognised that it is easier to establish lucerne on neutral or slightly alkaline soils. Most of the red loamy soils in the Jarrah and Karri belts would have acidity values ranging from pH 5.5 to pH 6.5 These soils if treated with 1 to 2 tons of Agricultural Lime (minimum 80 per cent neutralising value) per acre will support strong stands of lucerne. It must be noted that lime has many other functions in the soil and does not always change the pH levels very appreciably. Lime applications of 10 cwts. per acre or less have very little or no value. It has also been demonstrated that the lime must be worked into the soil.

Time of planting

Two times of planting are recognised. On new or weed-free ground lucerne can be planted in the autumn (April-May). On old pasture land by far the best weed control and plant density is achieved by spring planting (August-October) after a winter fallowing period.

On quick drying sandy soils along the west coast, autumn plantings have proven the best. In the 60-inch rainfall areas at Walpole and Normalup early October plantings are preferred for well worked and fallowed ground.

Seeding rate

In the 30-inch and higher rainfall areas Hunter River lucerne is usually sown at 6 to 8 lb. per acre under dryland conditions, or twice as much if it is grown under irrigation.

<table>
<thead>
<tr>
<th>Seeding rate (pounds per acre)</th>
<th>Drilled</th>
<th>Broadcast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dryland</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Irrigated</td>
<td>12</td>
<td>16</td>
</tr>
</tbody>
</table>

When seed is planted by drill the lowest seeding rates are sufficient.

Inoculation and lime pelleting

Only inoculated and lime pelleted seed should be sown. Uninoculated plants are unable to fix nitrogen, they remain retarded and do not persist. The lime pelleting performs several functions:

- It protects the inoculum bacteria from harmful soil organisms.
- It neutralises acidity in the immediate surroundings of the seed.
- It reduces fertiliser toxicity to the inoculum bacteria and possibly also to the young seedlings.

Planting

Depth

Lucerne seed is small and should be planted ½ in. to 1 in. deep, depending on soil structure and moisture availability. On dry and sandy soils seed is planted deeper than on moist and clayey soils.

For spring plantings it is essential that the seedbed is well prepared and firm with sufficient moisture at the planting depth to give good germination. This is why drilling is always superior to broadcasting.

Rolling

It has been demonstrated that rolling with tyre rollers after sowing, and particularly after broadcasting, will promote better germination of seed.
Fertiliser requirements and toxicity

Requirements
On most old pasture land the following fertiliser mixture or its equivalent would be adequate at planting time:

- Superphosphate—2 to 3 cwts. per acre.
- Muriate of potash—1 cwt. per acre.
- Urea—½ cwt. per acre.

Trace elements:
- Copper, zinc, molybdenum; as for pasture dressings taking into consideration previous applications.

(* Urea must not be mixed with either seed or super.)

The inclusion of urea in the fertiliser mixture is mainly to promote stronger growth of seedlings in the early stages before the root nodules become functional.

Toxicity
Lucerne seed if deposited in close contact with high fertiliser concentrations, particularly urea and muriate of potash, will have drastically reduced germination and the strike of seedlings. This is because high concentrations of fertiliser are toxic to the germinating seed. Lucerne can safely be mixed with agricultural lime and if some bulky material is required to mix with the seed for more even distribution, 1-2 cwts. of agricultural lime per acre could be kept for this purpose. If the drills cannot be set to deposit the seed and fertiliser separately, it is better to apply the fertiliser before the last harrowing.

Weeds and cover crops
Young lucerne plants do not possess as strong seedling vigour as some of the weeds, e.g., capeweed, dock, etc., and they cannot compete with strong perennials such as kikuyu or couch. The site selected for lucerne sowing must therefore be free of aggressive weeds. In the high rainfall areas any cover crop will have the same effect on lucerne seedlings as the weeds; it will compete for moisture, nutrients and light. For this reason cover crops are not recommended for lucerne planting in the dairy belt.

Pests
The pests affecting lucerne during the early establishment stages are lucerne flea, red legged earth mite, black beetle, vegetable beetle and grasshoppers. Probably the hardest to control are the black beetle and vegetable beetle. They can reduce the density of spring plantings as seriously as lucerne flea and red legged earth mite can affect the autumn plantings.

Topping
When the young spring sown plants reach 12 in. to 18 in. in height, and before the weeds set seed, the crop is cut or slashed. Topping achieves the following objectives:

- The reduced leaf area reduces summer moisture losses through transpiration.
- The leaf mulch, if left on the ground, will have an insulating effect to keep the soil temperatures down.
- It stops seed formation and exhaustion of food reserves.
- If timed correctly, topping will help to prevent the reseeding of weeds.

Summary
Lucerne can be a very valuable fodder plant in the dairy belt of this State. To achieve successful establishment:

- Plant lucerne on weed free, well-drained loamy soil.
- Apply agricultural lime at a rate of 1 ton per acre and work it into the soil.
- Inoculate and lime pellet seed.
- The best planting time is in the spring.
- To avoid fertiliser toxicity keep seed and fertiliser separate or plant the seed with lime.
- Drilling, followed by rolling helps to achieve better germination.
- Do not plant lucerne with cover crops.
- Control insect pests.
- Top the stand before weeds set seed.
- Until more work is done, grow Hunter River in preference to other varieties.