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# SUBTERRANEAN CLOVER ESTABLISHMENT IN THE WHEATBELT

By M. L. POOLE, B.Sc. (Agric.), Research Officer, Plant Research Division

**Care and attention to detail will greatly increase the chances of establishing good subterranean clover pastures in the wheatbelt.**

PASTURE ESTABLISHMENT usually takes second place to cropping in the wheatbelt, with many farmers "bunting in a bit of clover" and hoping for the best. The worst often transpires, with either patchy stands or complete failure resulting. Using "cheap" methods of establishment is a short-sighted approach and a waste of energy and resources.

For consistent establishment of good sub. clover pastures in the wheatbelt\* a great deal of care and attention to detail is required. Outlined below are the more important points to consider when sowing sub. clover (*Trifolium subterranean* L.). Neglect or oversight of any one of these can result in complete failure.

## Soil type

In the wheatbelt, sub. clover can be successfully grown on the medium and better class light lands with an acid to neutral reaction. These soils include the brown loams, light soils with gravel or clay within 15 in. of the surface and the dark yellow and orange loamy sands of the central and eastern wheatbelt.

Sub. clovers will not persist on the deep white sands of the western wheatbelt and are very difficult to establish on the pale yellow deep sandy and very shallow gravelly wodge soils with rock within a few inches of the surface of the central eastern and north-eastern wheatbelt. They do not tolerate prolonged waterlogging.

## Strains

There are 13 strains of sub. clover which are Certified by the Dept. of Agriculture. Of these only four mature early enough for the wheatbelt—Geraldton, Dwalganup, Daliak and Uniwager. It is important that the strain chosen for a particular paddock is the most suitable of those available. In an article on page 161 of this issue of the Journal of Agriculture the agricultural areas have been zoned so that suitable strains can be readily decided upon. If the strain chosen matures too early for the district, loss of potential production will occur; if it matures too late, the plants will dry off before setting seed, and failure will result.

## Seed

Uncertified seed should not be used unless the source of the seed is well known to the buyer, for it often contains considerable amounts of foreign material, dead and cracked seeds etc., and although the price per pound may be less than Certified seed, the price per pound of seeds

\* In this article the "wheatbelt" is considered as country which receives less than 16 in. annual rainfall in the central and southern agricultural areas and less than 18 in. in the northern agricultural areas.



capable of producing plants is often higher. Uncertified seed may also contain noxious weeds.

Certified seed contains no noxious weed seed and no more than 2 per cent. dirt, straw and other impurities. Its strain purity is at least 95 per cent. and at least 80 per cent. of the seeds are capable of germinating in the establishment year.

### **Inoculation and lime pelleting**

If a paddock has not previously grown sub. clover, the seed should be inoculated before sowing with root nodule bacteria. Care should be taken that the inoculum is the correct type, that it is fresh stock and has been stored in a cool place before use. Systemic insecticides such as Rogor are toxic to the root nodule bacteria and should not be used on inoculated seed.

Clover seed is usually sown in contact with superphosphate and often also with trace elements. These kill bacteria which come into contact with them, so inoculated seed sown in contact with fertiliser should be lime pelleted to protect the inoculum bacteria. A satisfactory method of inoculating and lime pelleting clover seed is given in Department of Agriculture Bulletin 3213.

### **Superphosphate and seeding rates**

Superphosphate and seeding rates are best considered together because a compromise is usually reached between rate of seed used and rate of superphosphate used when establishing pasture.

All light land soil types in the wheatbelt are inherently very low in phosphate. Sub. clovers have a higher phosphate requirement than cereals and adequate phosphate must be available to the plant in the establishment year to give good growth and seed set. The rate of phosphate applied with the seed should depend on how much phosphate has been applied in the past, on the soil type and on how quickly stock numbers are being built up on the property.

### **New land**

On new land which has received very little superphosphate, 180 lb. per acre

superphosphate drilled with 10 lb. per acre clean seed\* is adequate to give good second year stands on sandy-surfaced soils of the western wheatbelt; higher rates of superphosphate up to 250 lb. per acre can be used on very gravelly soils. In the eastern wheatbelt seeding rates up to 15 lb. per acre clean seed are recommended.

### **Old land**

On old land which has received a number of superphosphate dressings in the past, smaller amounts of superphosphate can be used, depending on soil type and phosphate history.

### **Rapid development**

If stock numbers are being built up rapidly and grazing is required from the pasture in the year of establishment, higher rates of superphosphate and seed can be used.

On most soil types rates of superphosphate above 200 lb. per acre sown in contact with the seed, even if it is lime-pelleted, can lower germination percentages. Therefore, if rapid development is required and high rates of superphosphate are used, 180 lb. per acre should be drilled with the seed and the rest top-dressed.

On new land, seeding rates of 20 lb. per acre clean seed and 360 lb. per acre superphosphate (180 lb. per acre drilled, 180 lb. per acre top-dressed) give dense first year stands.

### **Trace elements**

Nearly all wheatbelt light land soil types require the trace elements copper, zinc and molybdenum for adequate nutrition of crops and pastures. Copper is required for animal health on most light land. On new land these elements are usually applied with the first wheat crop after clearing and no additional applications of trace elements are required when sowing the pasture.

Two mixes of copper, zinc, molybdenum and superphosphate are available commercially, one with high levels of copper and zinc plus molybdenum (No. 1 Mix) and one with half the quantity of copper and zinc plus molybdenum (No. 2 Mix). No. 1

\* The seeding rates quoted are in lb. of clean seed per acre. Lime-pelleting increases seed weight by about 50 per cent. for sub. clovers (e.g. 10 lb. clean seed is equivalent to 15 lb. per acre of lime-pelleted seed).



mix is generally used on gravelly-surfaced soils and No. 2 mix on sandy-surfaced soils.

The importance of molybdenum in pasture and crop nutrition in the wheatbelt has only been realised for the past few years\* and much old light land has received copper and zinc, but not molybdenum.

It is important to ensure that all three trace elements have been applied when establishing pastures on old light land. Any that have not been applied in the past should be applied when the pasture is sown.

If trace elements have been applied in the past a second dressing should not be necessary.

### Time of planting

The average wheatbelt farmer is faced with three alternatives when deciding on time of planting for pasture:

- Dry sowing, before the opening rains—in late April-early May.
- Early wet sowing, at the time cereal crops are normally planted—in late May and June.
- Late wet sowing, soon after the cereal crop has been planted—in late June and July.

Because cereal cropping commonly takes precedence over pasture establishment in the wheat belt nearly all pastures are either dry sown or sown late. In many instances this should not happen. Where farm production is limited by infertile soils and poor pasture, pasture improvement should be considered as important as cereal cropping.

Early wet sowing, following the normal weed control measures which a cereal crop receives consistently gives the best results. The clover plants can grow and set seed without competition from other plants for light, nutrients and, particularly in spring, moisture.

Dry sowing is an attractive proposition to the farmer because it does not clash with cereal cropping. It gives satisfactory results on new land where the weed population is low.

Clover should not be sown dry before the end of April/early May. If it is planted earlier than this, a "false break" of perhaps 50 points of rain can cause seed germination and the seedlings may die before the true break of the season. Also if inoculated seed is dry sown too early, the bacteria may die before the rains come.

Dry sowing should not be carried out on old land which has a high grass seed population. If old land is to be dry-sown the weed seed numbers should be reduced as much as possible. A programme of grazing the old grass pasture heavily in spring and summer, followed by cropping and a good stubble burn, reduces grass seed numbers. Careful grazing is then needed during the establishment year to prevent the weeds from shading out the clover. In this case, a "weed" is any plant other than clover.

Late sowing should not be contemplated in the wheatbelt. It is seldom successful except in the occasional season with a wet finish. Usually the plants dry off before setting seed or at best set a small amount of pinched seed.

### Depth of planting

Sowing too deep (or too shallow) is one of the main causes of failure of sub. clover plantings in the wheatbelt. Department of Agriculture tests indicated that a depth range of  $\frac{1}{2}$  to  $1\frac{1}{4}$  in. gave best results on sandy-surfaced soils. Surface sowings and planting deeper than  $1\frac{1}{2}$  in. gave very poor results.

It is not easy to plant clover seed at a consistent depth of  $\frac{1}{2}$  in. over a whole paddock. However, if the following precautions are taken, satisfactory results should be obtained.

1. **BURN STUBBLE:** Heavy stubble makes it physically impossible to sow at a consistent depth. Stubble burning also aids weed control and, further, decaying straw is thought to inhibit germination of sub. clover.
2. **CHECK DEPTH WHEN MOVING FROM ONE SOIL TYPE TO ANOTHER:** Implements sink in on

\* Department of Agriculture Bulletin 3390—"Molybdenum increases cereal yields on wheatbelt scrubplain"—reprinted from the "Journal of Agriculture", December, 1965.



- lighter surfaced soils and depth should be checked when moving from one surface type to another.
3. **PLANT ON A LEVEL SURFACE:** If the paddock is very rough seeding depth may vary from surface to 4 in., and patchy stands will result.
  4. **SET UP THE SEEDING MACHINE CORRECTLY AND USE IT ACCORDING TO THE MAKER'S RECOMMENDATIONS:** It is common in the wheatbelt to see second and third year sub. clover stands with the clover in distinct rows about 14 in. apart. This can occur when the clover is sown with a combine which is not set up and used correctly. The seed sown by the front set of tynes is covered too deeply, often to a depth of 4 in. to 5 in. by the rear set of tynes, so that every alternate row does not come up. This wide spacing may also arise when the machine is driven too fast, or when the clover is sown on heavily-ridged ground, parallel to the ridges. This gives a 50 per cent. wastage of seed and an effective seeding rate of only half that required to ensure a good stand

### **Sowing methods**

Some farmers attempt to shortcut by spinning out seed when topdressing. Although successful stands may occasionally result from this method, there is a high risk of failure, as the seedlings are poorly placed to withstand dry periods and also cannot take full advantage of applied superphosphate.

To take full advantage of the superphosphate, seed should be placed very close to the fertiliser in the furrows. Seed is usually sown with a combine or disc drill either through the grain box using a reduction gear or mixed with the fertiliser in the fertiliser box. Both these methods are satisfactory because the seed and super are placed together in the furrow, being mixed either in the fertiliser box or in the boots.

If the seed and super are sown through the fertiliser box, they should be well mixed, otherwise the machine may sow

seed for a few feet, then super, then seed and so on. Both seed and super will be wasted under these conditions. Mixing of seed and fertiliser should be thorough but not so vigorous that the lime pellets are knocked off the seed.

Small seeds attachments have given mixed success in sowing sub. clover. Considerable difficulties can be encountered with lime-pelleted seed as free lime often "blocks the runs."

Many farmers, particularly in the inner wheatbelt, sow sub. clover pastures with a wheat crop. Department of Agriculture trials over the past few years have shown that this practice nearly always results in some loss of wheat yield even when sub. clover seeding rates as low as 4 lb. per acre are undersown. Losses of 4 bushels per acre are common and losses up to 7 bushels per acre have been recorded.

The amount of clover seed set under the crop is usually reduced to about a quarter or less of that set in a pure sub. clover stand. Often this means that only a few pounds of seed are set under the crop and consequently the stand the following year is thin and patchy. In the wheatbelt the losses incurred rarely compensate for the time gained by sowing clover under a crop.

Oats are often sown with clover for protection against wind blast and to provide early winter feed. If this is done an oat seeding rate of 10 to 15 lb. per acre should be used and the oats should be completely grazed off by the end of July so that the clover does not have to compete with them when flowering and setting seed.

### **Grazing**

Poor grazing management of first year pastures is one of the main causes of failure of sub. clover stands. Often, after a good germination of healthy plants, all the work is undone through incorrect grazing.

Management of first year stands should be aimed at giving the plants every opportunity to set sufficient seed to ensure a good stand the following year.

On weed-free new land and on wet-sown old land where good weed control has been obtained, grazing is not necessary in the first year. If moderate rates of seed and super have been used (10 lb. per acre seed, 180 lb. per acre superphosphate) the

stands are better left to seed down undisturbed; light summer grazing, at half a sheep an acre or less, can be carried out. Heavy summer grazing may deplete seed reserves and is not advisable.

If high rates of seed and super have been used for rapid development, the stand must be stocked in the first year to justify the high capital outlay. The stocking rate used will depend on the farmer's assessment of carrying capacity. As the stand may be very nearly a pure clover pasture, stocking rates should be kept low during winter to allow the plants to develop a strong root system. A month to six weeks after germination, stands can be stocked at half a sheep an acre or less; this can be increased to one sheep an acre in spring and this rate maintained over summer.

For dry-sown and weedy wet-sown stands, grazing is essential during the growing period to prevent weeds from shading out the clover and competing for moisture during flowering and seed setting. Continuous stocking from germination, at about half a sheep an acre is generally adequate to control weeds. This rate should be varied to suit conditions: If the grasses are "getting away" the stocking rate should be increased; if the clover is being "hammered" by the sheep, the stocking rate should be reduced.

"Flash" grazing of weedy stands with large mobs of sheep has not proved as successful as continuous stocking at low rates.

### Insects

Red-legged earthmite are the only insects which attack sub. clover in the wheatbelt to any significant degree. The damage inflicted by red mite seldom justifies spraying; however, in some seasons mite may cause enough damage to warrant spraying, particularly if they attack the stands soon after germination.

### RECOMMENDATIONS IN BRIEF . . .

- Check that sub. clover is the most suitable species for the soil type to be sown.
- Make sure that the sub-clover strain chosen is the most suitable for the district and soil type.
- Use certified seed.

- Inoculate and lime-pellet unless good sub. clover has been grown on the land before. Use fresh inoculum, store it in a cool place. Do not use systemic insecticides on inoculated seed.
- Choose rates of seed and superphosphate to suit the district soil type, phosphate history of the paddock and rate of development required.
- Check that adequate amounts of copper, zinc and molybdenum have been applied. If they have not, apply when sowing the clover.
- Early wet sowing with good weed control gives best results. Dry sowing is satisfactory on new land and on old land where the weed seed population is low. Late sowing is not recommended.
- Sow  $\frac{1}{2}$  to 1 inch deep. To maintain consistent depth:
  - (1) Burn stubble
  - (2) Sow on a level seed bed
  - (3) Set up combine correctly
  - (4) Check depth when moving from one soil type to another.
- Do not topdress seed. Drill with superphosphate for maximum benefit from the fertiliser. Sow lime pelleted seed either mixed with fertiliser or through the grain box using a reduction gear. Do not use small seeds attachments for lime pelleted seed.
- Do not sow with a full crop. If a light cover crop is sown, graze off completely by the end of July.
- Graze first year pasture in such a way as to allow adequate seed set in the establishment year.
- Spray for insects only if they are doing substantial damage to the pasture, particularly within six weeks of germination.

### Acknowledgments

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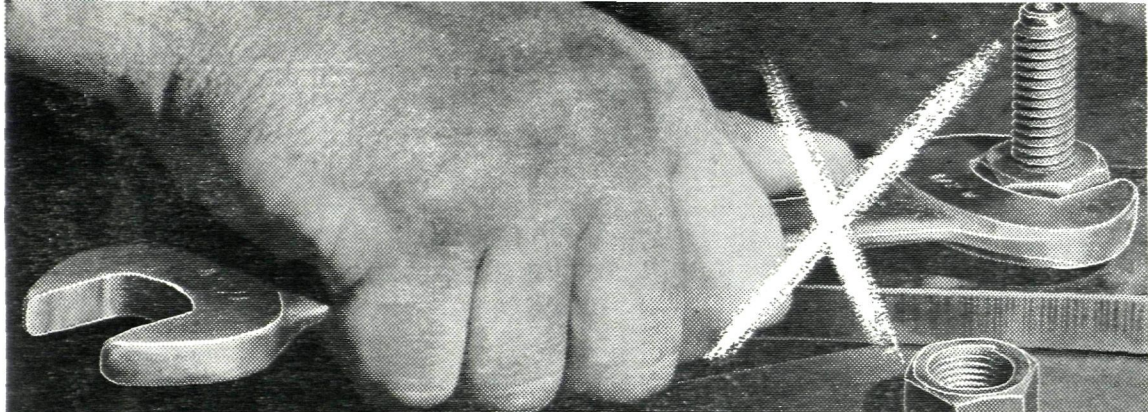
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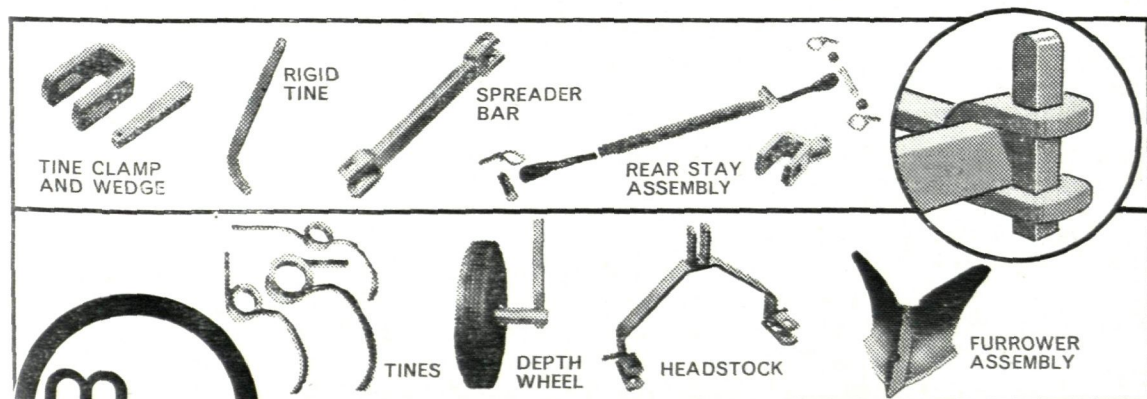


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