

## MACHINERY FOR SOWING AND RENOVATION - HOW GOOD IS IT ?

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### IMPROVING THE CONVENTIONAL

Lower commodity prices and higher production costs for most cereal grains has seen a definite move by grain producers towards reducing cropping areas and increasing the development of livestock enterprises. Parallel to this is a move toward the establishment and maintenance of improved pastures, an activity that has been neglected in many areas over the past decade because of good returns from crops.

It is most important to look at pasture establishment as a long term investment and to ensure that no short cuts are taken, or bad decisions made during sowing or during the first year of establishment. Poor initial establishment will be felt as lost production for the life of the pasture (several years).

So with this and the higher costs of pasture seed in mind I will explore a few areas where the more conventional methods of pasture sowing can be improved with minimal cost.

### WHAT IS THE CONVENTIONAL

The conventional method referred to is sowing into worked soil with a standard combine fitted with a ground driven small seeds box followed by covering harrows.

A cover crop (or companion crop) may or may not be sown. However, if the prime objective is to establish a sound pasture, it is unwise to use a crop of any type, as plant competition, whether from weeds or other crops, is a major cause of poor establishment.

### DEFICIENCIES WITH CONVENTIONAL EQUIPMENT

#### High gearing

Most small seeds boxes fitted as an extra to standard combines, are geared too high so that at low seeding rates the fluted distributors are almost closed off, especially with lower rates of lucerne, causing seed damage and very erratic metering.

#### Sowing depth

Usually pasture seed simply drops from the small seeds box, about half landing on the tops (crowns) of the furrows left by the last row of tines and the remainder dropping into the bottom of the furrows. Covering harrows then flatten out the seed bed, resulting in the seed in the bottom of the furrows being buried up to 75 mm deep. Research and observation has shown that the majority of this seed will not establish, even though it may germinate. This can result in a wastage of up to 50% of the seed sown. Correct sowing depth should be around 5 - 15 mm from the finished surface.

## Seed to soil contact

In order to promote active germination the pasture seed must be in close contact with moist soil and not stranded in tiny air pockets caused by trash, humus and clods. Most conventional seeding systems do not address this problem.

### IMPROVEMENTS TO BE CONSIDERED

#### Gearing down the small seeds box

This should be considered in most cropping areas where grasses such as ryegrass and fescue, are not usually sown and especially where lucerne is sown alone at low rates, eg. 1-2 kg/ha.

The gearing can be changed by adding a lay shaft into the drive between the combine and seeds box. In most cases you can afford to halve the standard gearing. Ideally the seed distributor should be about half open for most common seeding rates.

#### Levelling bars and light harrows

It is important to level the seed bed prior to placing the seed, to prevent deep sowing. A levelling bar consisting of a length of 38 - 50 mm pipe or flat bar etc. chained fairly high up to the rear of the combine in order to prevent bulldozing effect, particularly in light soils. It rides on the surface between the rear tines and point of seed drop. Finally light harrows only should be used to cover the seed.

Heavier harrows if used should be turned on their back. Sometimes the seed tubes may have to be extended backwards to allow room for the levelling bars. A number of shorter lengths of pipe should be used with wider combines to get better contour following.

#### Bandseeding attachments with levelling bars and no harrows

To further enhance the result a bandseeding attachment may be added to accurately place the seed behind the levelling bar. A bandseeder consists of down tubes made from pipe or angle iron. They are all individually hinged and sprung so that they follow the contours at all times.

Tongues or small furrow openers are welded to the underside of the down tubes. These form a shallow groove (around 10 - 20 mm deep) in the soil. The seedbox tubes are extended so that they drop the seed gently into the small furrows, and light covering chains attached to the down tubes then gently cover the seed. Harrows should not be used.

This technique is the most efficient way to obtain an even shallow depth of sowing and gently cover the seed in one pass. These are manufactured commercially or can be made on the farm although this may be quite time consuming.

#### Rollers

As mentioned earlier good seed-to-soil contact is important to trigger germination. Rollers can be utilised to greatly improve this in most soil types. Rollers should not be used in crusting type soils or if sowing in wet conditions. I tend to favour a light rolling with rubber tyred rollers to firm down the seed bed without causing excessive compaction. Cast steel type rollers are better clod busters but I feel they are too heavy for rolling

after sowing. They are also prone to damage in rocky conditions. Theoretically, press wheels would be better job however it is very expensive and hard to engineer press wheels for the close row spacing used in pasture seeding.

#### Standard harrows and trailed pasture seeders

Some problems occur with levelling bars, particularly when pre-emergent herbicides, which need incorporation at sowing, are used. Also some makes of combines are not well suited to fitting bandseeders or levelling bars. These problems can be overcome if the small seeds box and bandseeder are built into a separate trailed unit fitted with a long draw bar to allow the standard covering harrows to be used between the combine and trailed unit. In this arrangement, the harrows level the seedbed incorporating fertiliser and herbicide (if used) and the trailed bandseeder accurately places and covers the seed. A rubber tyred roller can also be incorporated into the trailed unit.

This is probably the Rolls Royce method of broadacre pasture sowing whether on irrigation or dry land. The unit is also easily unhitched when finished, and readily stored away, avoiding the inevitable half-day clean out and freeing up of seeds boxes.

#### What about airseeders ?

Pasture seeding attachments are available to suit most makes of airseeders. However most of these are only after thoughts and usually do a very poor job of pasture sowing. Most makes, spray the seed out onto the harrows (usually the mounted type), resulting in much of the seed being sown too deeply.

It becomes very cumbersome to try to fit conventional seeds boxes, (they are not suited to folding wing units as seed runs to one end when folded) and band seeding attachments to most cultivators. However, it can be done.

After discussion with many operators of airseeders I have come to the conclusion that possibly the best method of establishing pasture when bigger plant is used is to make a second pass using a trailed seedsbox and bandseeder unit of a lesser, more manageable width, say 24 run.

Most operators agree that by the time they messed about attaching and detaching pasture gear to their cultivators, they could have had most of their sowing done with a second pass using a small tractor or a 4WD vehicle and a trailed pasture seeding unit. This also would leave the larger plant free to keep sowing cereals. Normally if you buy a new cultivator the pasture gear has to be changed to suit, not so with a trailed unit, it's always ready to go.

#### A note about furrow sowing

Trial work has shown that furrow sowing can result in very good pasture establishment (especially in lower rainfall areas) and may improve lucerne persistence under grazing, due to a lower set crown.

Furrow sowing is when neither levelling bars nor harrows are used and the seed is placed into the furrows left behind the last row of tines, leaving the pasture seed in the bottom of the formed furrows affording it protection and maximum moisture. One disadvantage is that the paddock is left very rough for harvesting and driving over later.

The lucerne establishes in the bottom of the furrows and eventually the furrows flatten out, especially in sandy soils. As a result, the crown of the

lucerne plant being set below the surface and is protected from overgrazing.

#### Bandseeders and furrow sowing

Bandseeders can be utilized to further improve furrow sowing. The bandseeder tubes are spaced at intervals to suit the last row of tines, usually 340 mm apart, and set up to line up with the bottom of the furrows.

#### What about trash combines ?

Many newer trash clearance combines have six rows of tines rather than the usual four rows. This results in the last row of tines being up to 540 mm apart which in most cases would be considered too wide a spacing for good pasture establishment thus these machines are not well suited to furrow sowing.

#### SUMMARY OF IMPORTANT POINTS FOR CONVENTIONAL ESTABLISHMENT

- Shallow depth of sowing and reduced weed competition are most important - next to good moisture.
- Bandseeders and levelling bars help maintain an even, shallow depth of sowing.
- Better pasture equipment can realise seeding rate reductions of up to 50%.
- Furrow sowing may help with persistence of lucerne - trash combines not well suited to this task.
- Rollers and presswheels help obtain better seed-to-soil contact.
- Good initial establishment pays dividends for many years - don't take short cuts.
- Lucerne contains around 450,000 seeds and has potential to realise a stand density of 45 plants/m<sup>2</sup> at 1 kg/ha. Don't waste seed.
- Ideal plant densities (i) Dryland - 10 - 15 plants/m<sup>2</sup>.  
for lucerne (ii) Irrigation - 25 - 40 plants/m<sup>2</sup>.
- Sow 1 kg/ha instead of 3 kg/ha of lucerne at \$7/kg.
- Save \$1,400 every 100 ha - put this toward improving your equipment.

#### DIRECT DRILLING AND RENOVATION MACHINERY

Many factors should be considered when selecting this type of machinery. These include: soil type, amount of rock present, type of terrain, size of area to be improved, versatility required (i.e. amount of cropping in rotation to pasture area), type of stock management, rainfall, and paddock history.

#### TYPES OF MACHINES

##### Conventional Combines

- Spring release tine types are best suited as penetration is better.
- Newer trash clearance types allow easy removal of working tines reducing soil disturbance and increasing trash flow.
- Narrow points (lucerne type) reduce soil disturbance.
- very versatile in a mixed farming situation.
- Addition of coulters (preferably swivel type) increase trash handling ability.
- Suits most types of country.

##### Chisel type seeders

- Best suited to "roughing - in" of pasture in new country or more difficult hill country.

- Generally wider spacings.
- Good penetration.
- Finished surface left rough.
- Cannot expect results comparable to specialised machines.

#### Deep tillage - seeding combinations

- Capable of breaking up hard pans and improving moisture infiltration.
- Coulters can be added to minimise soil disturbance.
- Deep tillage and pasture seeding are generally **not** compatible as it is difficult to obtain shallow sowing depth.
- Slow to operate with a high horsepower requirement.
- Point wear can be excessive.

#### Specialised tine seeders

- These include the Baker boot type and heavy spring tine type (vibrating action to shatter soil and clear trash).
- Originated in Europe and New Zealand. Early models were too fragile for most of our conditions.
- Newer machines, many locally made, are significantly improved.
- Boot and point wear can be excessive and expensive (especially on coarse granite soils).
- Not well suited to rocky country.
- Penetration usually fairly good.

#### Disc seeders

- Older single disc types usually have poor penetration (especially in thick swards).
- They tend to lift ribbons of soil out leaving poor seed to soil contact reducing seedling emergence.

#### Triple disc types

- Reasonable trash handling ability (depending on disc coulter size).
- Minimal soil disturbance leading to reduced moisture loss and lower erosion risk.
- Smearing can inhibit root development.
- Penetration good if discs are in good condition.
- Very susceptible to damage by rock, dramatically reducing penetration.
- Usually expensive.
- Well suited to drilling into established pasture e.g. phalaris.

#### Modified rotary hoes

- Blades are modified so that only portion of the overall width is worked leaving strips that are then seeded into.
- More suited to coastal areas especially for sowing into kikuyu and paspalum.
- High horsepower requirement.
- Not suited to rocky areas.

A machine should be selected to fit into your overall operation if possible allowing a quicker return on the capital expended. However, this can be overdone: care should be taken to avoid ending up with a machine that can do almost anything but very little properly.