A GROWERS GUIDE TO DEEP PLANTING CHICKPEA

SUMMARY
Deep planting has proven to be an extremely valuable risk management tool over the last few seasons. It has allowed chickpea to be planted in situations where winter crop planting rains have either been very late or have failed to eventuate altogether.

A large proportion of the Australian chickpea crop in recent years has been planted using deep-planting techniques. Crops are commonly planted at depths of 10-20cm and this has often the difference between achieving a reasonably profitable crop or no crop at all.

There is an increasingly greater awareness that deep-planting is not only an extremely valuable tool under drought conditions, but can also offer major advantages in most years. It allows growers to plant chickpea at the optimum time for their district regardless of highly variable rainfall events. This maximises crop water use efficiency, grain yield, crop height and profitability.

Critical issues that need to be addressed include:
- Seed quality and vigour
- Planter configuration and operation
- Filling in the seed trench (furrow)
- Harvestability of the crop

SPECIAL FEATURES OF THE CHICKPEA SEEDLING
Field research and commercial experience have shown that chickpea has the ability to emerge through over 15cm of soil cover.

The chickpea seedling has clearly shown that it has a superior ability to emerge from depth than most other grain crops. DPI research on alluvial clay soils at Biloela in 2001 demonstrated that chickpea was much better suited to deep-planting situations than wheat (cv Hartog). The results of this research are presented below. There was no rainfall at the trial site over the 70-day period prior to planting.

Chickpea are different to most other pulses in that their cotyledons (seed storage organs) remain underground, with the seed sending up a narrow shoot to emerge through the soil. This hypogeal emergence allows chickpea to emerge from depths of over 15cm with little or no reduction in emergence and seed yield. Research in WA and overseas has shown that deeper plantings can actually increase yields through:
- Avoidance of residual herbicide damage
- Improved nodulation
- Better development of lateral roots near the soil surface.

The plants capacity to emerge from depth clearly provides an opportunity for growers to utilise this trait by deep-planting chickpea during their optimum sowing window. This can readily be achieved by varying planting depth from 5-20cm according to seasonal conditions at the time.
DEEP PLANTING CHECKLIST

- Plan ahead if you are considering deep-planting of chickpea. Growers can use this technique in most years to ensure that they plant at the optimum time for chickpea in their district rather than relying on highly variable rainfall events. This is preferable to using deep planting as a last resort, salvage operation after planting rains fail to eventuate and the optimum-planting window has already passed.
  
  The key to deep planting is to make the decision early and sow on time.

- Exercise caution when deep planting on hard setting or crust-prone soils.

- Decide on the best combination of sowing point, press-wheel, and operational speed for your planter and soil type. Be prepared to alter this combination depending on soil conditions at the time of planting. Speed is critical as it can have a major impact on depth control, as well as the amount of soil coverage over the seed.

- Ensure you have high quality planting seed. The deeper you plant, the greater the importance of using high quality planting seed. Check your germination percentage and seed counts (seeds/kg) and adjust seeding rates accordingly.

  Only use the highest quality seed when attempting deep planting.

  There are two additional seed tests that can be used to better determine seed quality.

  The Accelerated Ageing (AA) Test. This test is normally undertaken after harvest or well before planting and gives an indication of the seed vigour at planting time providing storage conditions are good. The value of this test is that seed showing poor vigour can be identified early and alternative actions can be taken. This test is highly recommended for seed that is likely to be deep sown. A germination test should also be done at the same time.

  If the results from the AA test are similar to the germination test then the seed has good vigour. If there is a significant difference between the two tests then advice on the interpretation of the test should be sought.

  The Vigour or Soil Germination Test. This test is recommended prior to planting and gives a guide to seed vigour in soil conditions at that time. The guidelines for interpreting the results of this test are the same as for the AA test above.

- Increased weed pressure. When deep planting under dry conditions, the first general winter rain will now fall in-crop and winter weeds will germinate on this in-crop rainfall.

  This places a lot more pressure on broadleaf and grass weed control as growers can no longer rely on a glyphosate spray at planting to tidy up winter weeds.

  Growers need to ensure that they have an appropriate weed strategy mapped out before planting.

- Use fungicide treated seed. As a precaution against the seed transmission of Ascochyta blight.

- Spray out fallow weeds prior to planting. These can be difficult to control if moisture stressed and covered in dust (because of the dry conditions). Adjust herbicide rates and water volumes accordingly.

- If you are using residual herbicides such as Balance® or simazine you will need to fill in the furrow (seed trench) prior to applying the herbicide. If you cannot fill in the trench completely, then you should at least ensure you have 8-10cm of soil coverage above the seed. Both these measures will ensure that the risk of herbicide damage after rain is minimised.

- Avoid deep-planting into compacted wheel-tracks as it usually results in variable depth control and poor seed coverage. Both are major contributors to patchy, uneven plant stands. Adopt the use of controlled-traffic systems wherever possible.

- Decide on a planting depth that will ensure that all seeds are planted into moisture. Thoroughly inspect seedbed moisture levels across paddocks and different soil types and ensure you plant into moisture. Experience indicates that you are better to err on the “deeper side” rather than plant “too shallow” into marginal moisture.

- Ensure that the planter can maintain uniform depth control across the full width of the machine under normal operational speeds. Poor or variable depth control will result in gappy, uneven plant stands.

- Harvestability is a major issue. Deep-planted crops can experience adverse, dry conditions where crop height and harvestability are significant problems. The following management decisions can have a significant impact on harvestability of the crop:

  ✓ Levelling of the soil surface at planting

  Harvest losses of up to 50% have been reported in paddocks that were left unlevelled at planting, with mounds of dirt and stubble left either side of the furrow.

  ✓ Choice of variety. If harvestability is a major concern then consider planting a tall, upright variety that sets its pods higher up in the bush.

  ✓ Planting time. Planting during the recommended sowing window for your district will maximise plant height and harvestability.

  ✓ Maintain plant populations of 20-25 established plants/square metre. This will encourage a more upright growth habit and more even maturity.

  ✓ Use wide-row spacings of 50-100 cm to encourage a taller, more erect plant.
“DEEP – FURROW PLANTING” or “DEEP – PLANTING”?

The technique referred to as moisture seeking has been used to a limited extent for over 20 years to plant cereals into stored fallow moisture without a planting rain. The practice usually requires the deliberate formation of a furrow or trench above the seed row because wheat and barley have relatively short coleoptiles, which limit the depth of soil they can successfully emerge through to approximately 8cm.

This practice is referred to as deep-furrow planting because the furrows are deliberately left intact at the completion of the planting operation.

Sweeps or “shovels” may need to be mounted on the sowing tyne assemblies to help shift dry soil out of the furrow.

This technique of “deep-furrow planting” is not suited to crops such as chickpea for two very good reasons:

- The short stature of the chickpea crop and the need to set the header front as close to the ground as possible
- The reliance on using pre-emergent, residual herbicides for broadleaf weed control. These herbicides can concentrate in the furrow after rain and cause considerable crop damage.

The more appropriate technique for chickpea is “deep-planting” where growers fill in the furrow and level the soil surface after planting and rely on the chickpea plants’ ability to emerge from depth to achieve crop establishment.

Levelling the soil surface considerably reduces the risk of herbicide residue damage and minimises harvest difficulties.

Minimising the risk of herbicide damage to chickpea.

Growers are reliant on the use of pre-emergent residual herbicides for broadleaf weed control in chickpea because there are no cost-effective alternatives for use in-crop. These post-plant, pre-emergent herbicides include Balance®, simazine, diuron and prometryn.

In most cases, growers will be required to use one or more of these residual herbicides at planting, and will as a consequence need to fill in the seed trench and level the soil surface prior to applying the herbicide “blanket”.

If a trench or furrow is left at planting there is a much greater risk of herbicide damage to the crop. Rainfall within 2-3 months of planting can concentrate residual herbicide in the furrow and down around the root system.

The risk of damage can be further aggravated by:

- Shallow depth of soil coverage over the seed
- Not firming the soil back over the seed (leaving an open, exposed slot above the seed)
- Light, sandy soils with less than 10% clay content

Symptoms of damage tend to show up first on the lower leaves and can extend up the plant in severe cases. Crop height and maturity can be delayed in severe cases.

Minimising the risk of harvest difficulties.

The general consensus is that “deep-planted” paddocks that had been levelled at planting are much easier to harvest than “deep-furrow” planted chickpea.

Paddocks that are levelled at planting with the furrow filled in are:

- Easier and quicker to harvest (header speed)
- Minimised dirt contamination in the sample
- Suffered less grain losses
- Minimise risk of damage to the header.

A number of growers who have conducted their own, “levelled versus furrow-planted” comparisons are totally in support of levelling chickpea paddocks when it comes to harvest operations.

Methods of soil levelling include:

- Rollers
- Rotary chain harrows (eg Phoenix)
- Conventional harrows
- Looped chain behind the planter
- “Ticklers” behind individual sowing assemblies.

ACKNOWLEDGEMENT.


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