

Getting the most out of disc openers

By Mike Ashworth, WANTFA

During crop germination and emergence stages, it has been found that disc machines help provide the optimal conditions for efficient and timely growth. But it is during the establishment phase that the relationship between the seeding machine and the soil quality interacts the most.

During the establishment phase, the seedling must become independent of its seed reserves. A seedling's survival is now largely dependent on its ability to adapt to changes above and below the ground and to compete with other plants for water, nutrients and light.

The effect of prior land management has a major influence on this stage of development. For example, the effect of compacted layers below the seed zone, whether induced by tillage or traffic, can restrict root growth and moisture movement.

Soil nutrient status can be affected by soil type, fertiliser applications and previous cropping history.

SMEARING AND COMPACTION AT SEEDING

Tynes and discs apply different forces to the soil, which in turn produce different seedbed environments for establishing the plant. A tyne typically creates a bursting effect in the soil and moves a considerable quantity of fine and moister aggregates towards the surface – a common characteristic of 'soil engaging' tools that have a rake angle. This leads to water loss in the soil layers above the seed and produces a typical traffic pan from the compaction forces acting vertically at the base of the tyne.

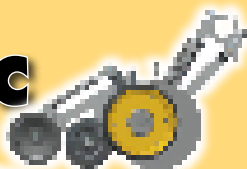
The forces experienced by the soil when seeded with a disc machine are related to the design of the module used. The module that exerts the greatest soil force is the double disc opener, which applies lateral (sideways) forces to the soil when forming the seed furrow.

These forces, in finer textured moist soils, create impermeable compaction ...4 ▷



The bolus soil texture test is handy when trying to understand the way a soil will deform at seeding. This is a good example of a silty clay that gets very sticky at seeding.

EI 853 SINGLE DISC OPENER...



New release into the Australian market with years of proven performance in South America and North America. Ideal for seeding and fertilising into heavy trash cover and clayish, sticky soils. Excellent ground penetration in tight soils. Frames to suit 9", 10", 12", 13" and 15" row spacings. Easy access to row units.

✓ Row Units @ \$1400ea + gst

Zero & Minimum Tillage STUBBLE WARRIOR PLANTERS...

SP 200
DOUBLE
DISC



CR 600



- ✓ SP 200 can be fitted with JD boxes
- ✓ Single pass seeding and fertilising
- ✓ Profitable zero tillage planting solutions
- ✓ Precise ground following ability with a true parallelogram design
- ✓ Combination of winter and summer planting machinery
- ✓ Machine adaptability to emerging agronomic advances

- ✓ A trailing, linkage or quad-lift machine configuration built to your specific requirements
- ✓ Interchangeable disc opener and tyne tooling options
- ✓ Robust low maintenance design
- ✓ Quality in design, manufacture and service



EXCEL Agriculture

Excellent product. Excellent service.

A DIVISION OF

AGRICULTURE

74 to 92 Buckland Street
Toowoomba Qld 4350

PH: 07 4636 9100, FAX: 07 4636 9140

www.excelagr.com.au

Brian Moran 0427 722 925

Brian Legg 0427 293 653 (Vic/SA)



Wheat emerging after being sown with a single disc seeder with minimal moisture loss.



Wheat being sown with Conserva-Pac tynes. Tynes can cultivate and sow deep in dry seasons.

◁3...DISC OPENERS

layers on the vertical faces of the furrow. When this compaction force is applied it forces moisture out of the soil, and as these layers subsequently dry, they are 'massive' in structure with high soil strength. The soil may also have smeared and lost structure.

Any seedling trying to grow through this will encounter a strong compaction layer with little ability for moisture to penetrate.

Research conducted by Iqbal et al (1998) trialled the effect of seed zone properties and seed furrow smearing on corn production. The soil, a fine loam, was seeded with single disc, double disc and tyne implements.

It was found the tyne implement caused dramatic soil moisture loss and a reduced soil bulk density. Germination was slow but plants showed early vigour due to the speed of root growth.

Both single and double disc configurations provided an improved soil bulk density that increased germination rates but also produced a level of lateral soil compaction. The double disc configuration was shown to also create some soil smearing on the vertical faces of the furrow.

This was ameliorated in some treatments by the fitting of a leading coulter, which reduced the smearing, but also reduced the soil's bulk density, thereby slowing germination.

In 1977, WA researcher Ron Jarvis and others, conducted a series of continuous cropping trials at Avondale, Esperance, Merredin, Mount Barker and Wongan Hills. The trials tested four tillage systems including:

- A triple disc drill;
- Combine seeding with scarifier points;

- One shallow cultivation then triple disc seeding; and,
- Conventional district practice including disc ploughing.

Ron found in the first few years of the trial, conventional cultivation was as good as, or better than, reduced tillage treatments. In successive years, reduced tillage treatments gave better yields due to improved soil structure and reduced water loss through evaporation.

During the trial, direct drilled (triple disc) treatments were found to produce reduced vigour in the seedling, which has potential implications for cropping areas where moisture stress dominates the latter part of the growing season. In these zones, sub-seed tillage could be advantageous in order to increase plant vigour and crop growth early, due to the short season.

At the wetter trial sites (Mount Barker and Esperance), rhizoctonia root rot and take-all increased in reduced tillage treatments, which must be managed prior to removing cultivation effects from the system.

Research conducted by David Tennant in 1986 on the Ron Jarvis trial sites showed reduced tillage techniques resulted in higher concentration of nitrogen in the soil. In that year, Dr Bill Bowden tissue-tested wheat on the site and found the uptake of nitrogen was lower on reduced tillage treatments even though a higher source of nitrogen was available. It was noted the confined wheat root growth limited the plants' ability to take up resources, thereby reducing vigour.

Is reduced vigour a problem?

Reduced crop vigour can be either positive or negative. Nitrogen and phosphorus uptake are vitally important at the early

growth stage as it affects tillering. If vigour is reduced dramatically, tillering may be affected which will limit final yield potential.

On the other hand, reduced vigour can be a positive. It can reduce moisture use early in the crop's development, in turn increasing the crop's post-anthesis water use, which can improve grain fill. But if the root system cannot explore the soil for moisture, then water stress will result anyway.

SUMMARY OF TILLAGE STRATEGIES

Fine textured soils (such as grey clay)

- Surface structure declines rapidly under cultivation leading to slaking and crusting.
- Reduce cultivation and retain residue. Apply gypsum regularly to improve structure.

Loams

- Not responsive to cultivation.
- Can be planted with little disturbance with residue retained for moisture.

Yellow earths of the central WA wheatbelt (perhaps with acid subsoils)

- Can form hard setting surface crusts.
- Can be no-tilled but tillage increases yields on conventional sites.
- Can be no-tilled with little cultivation if stubble is retained and traffic is reduced.

White sands

- These do not form crusts and are susceptible to wind erosion.
- Rhizoctonia is a problem therefore cultivation under the seed is responsive.
- Reduced cultivation and stubble retention is important to reduce the potential of erosion.



Tynes cause a high level of soil disturbance that can dry the seed zone increasing the emergence time. But this disturbance decreases the soil strength allowing for faster root growth.

Coarse soil types tend to be responsive to cultivation. With long-term no-till, such a requirement could be reduced due to the creation of softer soils with controlled traffic and stubble retention.

For this reason, the requirement to prepare the soil with low disturbance tynes to improve structure gradually is an important stepping stone.

The issue of sub-seed cultivation is not

black and white. No single system is likely to be ideal for all soils and situations. It has been found that no-till crops sown with reduced disturbance (discs) have faster germination due to better seedbeds and accurate placement but have slower early growth.

While crops can catch up later in their development, care must be taken not to limit the formation of the early yield com-

ponents such as tillering. An increased plant density due to better germination percentage often compensates this.

In the northern agricultural region of WA for example, reduced vigour may be a real issue due to the short length of the growing season and the need to get to maximum biomass early to sustain yield.

When making decisions regarding the ...6▷



John Deere disc seeder in action. These seeders provide little disturbance but this system relies on soft soils through long term no-till management for fast crop growth after establishment.

A WHOLE NEW High for Horsepower

INTRODUCING 34, 36, 38 AND 40 HP KOHLER COMMAND PRO OHV PETROL ENGINES.

A whole new high for horsepower and a whole new standard for performance. Engines with the power, the features, the rugged reliability to cut even the biggest jobs down to size.

The Kohler difference:

- Large-capacity air filter
- Integrated oil cooler
- High performance spark plugs
- Two barrel carburetor
- Full-pressure lubrication with full-flow filter



**KOHLER
ENGINES**

Relentless Power. Legendary Performance.

Kohler Engines are backed by a 2 year warranty. For further information contact EPG Engines on 1800 150 402.

EPG ENGINES

epg
engines

<5...DISC OPENERS

movement from tynes to discs, it is important to know the site, as previous paddock history and soil type have a huge effect of the tillage requirement of the site. With the reduction in tillage, soil disease such as rhizoctonia and take-all can increase – another trade-off that has to be taken into account and managed.

When moving from a tyne to a disc system, it is important to remember the most important factor is water harvesting or rainfall's ability to infiltrate the paddock.

The development of good water-collecting furrows will improve rainfall collection which should then be more effectively stored in higher bulk density soil. The incorporation of lime and trace elements

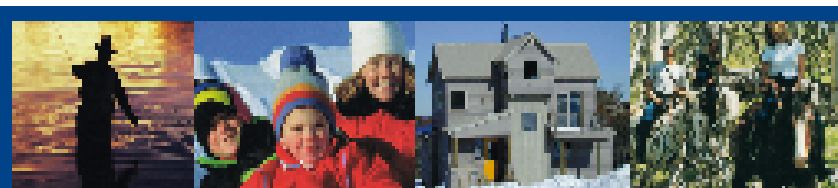
also needs to be planned and managed when reducing your tillage further.

WANTFA would like to thank NLP (National Landcare Project) for the funding to conduct this research and extension on disc seeding systems.

For more information, contact Mike Ashworth, WANTFA, P: 08 9622 7557, E: mike.ashworth@wantfa.com.au

All photos taken by Mike Ashworth, WANTFA. ■

The emergence of wheat sown with a tyne seeder next to last year's crop row. This is a good risk management tool as you use last year's moisture, but this benefit can be counter balanced by higher disease risk.



At Dinner Plain the pace is easy going.

Dinner Plain is the place where the family can be together by the fire or miles apart exploring the cross-country trail network.

Where you stroll the snow-lined streets simply for the sight or to meet friends for a restaurant dinner or drinks at the bar.

The village itself helps set the community atmosphere, natural building materials and early trees blur the line between man made and alpine environment. With over 200 lodges and estates all the conveniences of a modern resort.

Dinner Plain is the place for your holiday.

For more information explore our website at

www.dinnerplain.com

or call our toll free number

1800 - 670019



Dinner Plain
CENTRAL RESERVATIONS

**Walk it, Ride it,
Bike it, Ski it...**

**Dinner Plain...
Enjoy it!**



wantfa 2008
spring field day
presented by CSBP



9.30 am Tuesday 9 September

WANTFA Technology Demonstration Site
Meckering (135km east of Perth
on the Great Eastern Highway)

20 no-till system trials including:

- Herbicide options in disc systems
- Beneficial effects of cover crops
- Barley, canola and mustard trials
- Canola omission trial

Topical tents on:

- GM technology to combat herbicide resistance in no-till farming systems.
- 'Does cover cropping pay?'

Financial member:	NO CHARGE
Associated family members:	\$25
Bona fide students:	\$15
Non-members:	\$45
Trial Results booklet:	\$35
Non-Members special Spring Field Day membership (including Trial Results):	\$105

Pay on the day or avoid the queues.
Download your registration form from www.wantfa.com.au
and fax to WANTFA on (08) 6488 7466.

Registration enquiries to WANTFA Admin on (08) 6488 7465.

For further details please contact Kaye Phillips-Webb at
WANTFA on 0427 223395 or email: kaye@wantfa.com.au