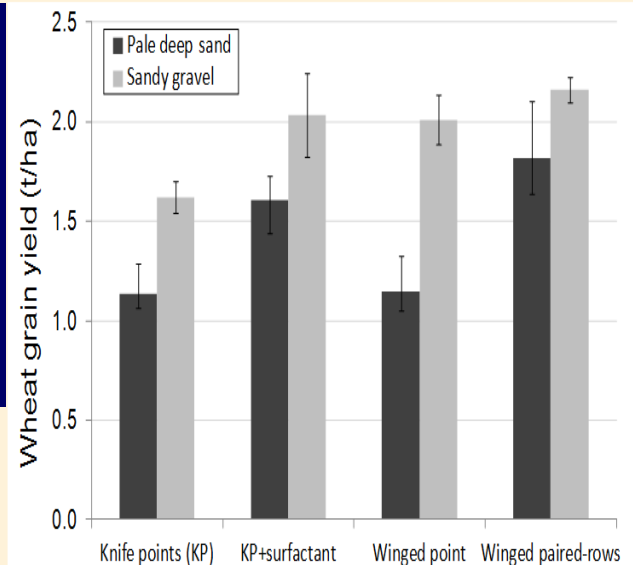


### How it works

Water repellent sandy soil lacks cohesion when dry so it tends to flow around narrow knife points at seeding and become concentrated in the sown furrow. This repellent soil concentrated in the furrow resists wetting up and hence can reduce establishment and timely germination of the crop. In these circumstances the furrow tends to remain dry while the ridges wet up. The problem would tend to be expressed more with dry or partially-dry sowing and in circumstances where the soil water repellence is more severe. Improved seeding systems aim to improve the wetting up of the seeding furrow by either reducing the flow of water repellent soil into the furrow at seeding or improving the capacity of the furrow to wet up primarily through the use of banded wetting agents.

### Key Points:

- Narrow knife point systems don't perform well in non-wetting soil.
- Winged points and paired row systems have all shown improved emergence and yield.
- Greater benefits have been seen with dry sown crops.



**Above:** Impact of seeding systems on wheat yield in water repellent pale deep sand and sandy gravel at Badgingarra, 2012.



**Above:** Example of poor germination on non-wetting soil.

### Benefits and Results

Research on how best to improve seeding arrangements is still being undertaken. Use of a winged seeding boot with twin rows improved crop establishment, soil water content and grain yield compared to standard knife points on moderate to severely water repellent soil patches in a seeder comparison in 2011 (Davies and Blackwell, 2011). Further trials conducted in 2012 showed benefits to both sowing point design and use of banded wetting agents (Davies et al. 2013; above graph ). Banded wetting agents can easily be turned on and off allowing them to be used only in situations where they are likely to give a significant return. This also allows easy in field testing of their efficacy. Use of the wetting agents as a carrier for precise placement of selected liquid nutrient applications is yet to be assessed in detail but offers an opportunity to provide further benefits and improved cost effectiveness.

# Improved Seeding Systems

## for water repellent sandplain soils

### Costs

Costs vary markedly depending on which of the improved seeding strategies is used. Costs tend to be relatively low for re-fitting existing seeder bars with winged points or seeding boots. Costs escalate if new seeders are purchased. The cost of banding kits to setup a seeder to deliver banded wetting agents can also vary depending on the approach taken and components used. For a robust, new system 'SACOA' and 'Sprayline' have estimated that it may cost approximately \$6000-9000 for a tank, filter, pump, controller and valve, then a further \$42-50 per tyne depending on the number of tynes being fitted with the system.

### Where it works

Sandplain soils with sandy repellent topsoil that when dry are prone to flowing into the furrow during seeding. Benefits are likely to be greater in soils with moderate to severe soil water repellence. Water repellence may be widespread or patchy in nature. Banded wetting agents tend to show more benefit with dry or early sowing. Soil movement in the furrow behind the press wheel during application and furrow infill can impact on efficacy.



Above: Primary Sale winged points.

### Ways of changing seeding system

- Winged points or seeding boots can generate some lift in the sidewalls of the furrow helping increase the flow of dry repellent soil away from the furrow.
- Faster sowing speeds and a less vertical rake angle on the seeding point can be beneficial.
- Wetting agents can be banded on the top of the furrows behind the presswheels to assist in more even and timely wetting up of the furrow and improve crop establishment.
- Fuzzy rows, twin rows or paired and ribbon sowing may also offer some advantages by spreading seed through more soil, increasing the likelihood that some seed may end up in or near wet soil.



Above: Banded surfactant behind presswheels of a Germinator single disc bar with depth control wheels.

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# Improved Seeding Systems

for water repellent sandplain soils

## How - Set up and Equipment

Seeder modification should be approached carefully and incrementally. It is possible to test alternative seeding tynes, boots and closer plate designs on part of the seeder with relatively low risk of complete establishment failure if the modifications don't work well. For banding of wetting agents, low cost, reliable, effective and robust systems are the aim! Having stable furrows when wetting agents are being applied is an important factor and using V-shaped or rounded presswheels helps assist in this. 'V' or rounded profile presswheels tend to form more stable furrows; whereas rectangular profile presswheels can rip-up the sidewalls of the furrow during seeding, resulting in a plume of soil behind the presswheel that can interfere with placement of the banded wetting agent.



**Above:** This V press wheel throws less soil than the rectangular presswheel below and is therefore more suited to use with banded wetting agents.



**Above:** 'Rooster tail' of soil thrown by the rectangular presswheel, it tends to bury banded wetting agents.



**Above:** Stilletto boot fitted behind Primary Sales knife point.

## Lessons from other farmers

- Banded wetters seem to have a particular advantage with dry or early sowing.
- Use higher rates of banded wetter early and decrease the rate as seeding progresses or stop using it when seeding wet as benefits are less.
- Seed right alongside the previous years crop row for better establishment.
- Winged paired row seeding systems seem to offer advantages in non-wetting soil, especially for cereals, less so for lupins.
- The system needs to be reliable or down time can be costly in time of sowing.

## Need to know more

Davies S, Blackwell P (2011) Improving the efficacy of furrow sowing on water repellent soils. Northern Agricultural Region AgMemo, September 2011. [www.agric.wa.gov.au](http://www.agric.wa.gov.au)

Blackwell P (2012) Successful setups for banded wetting agent at seeding. Northern Agricultural Region AgMemo, March 2012. [www.agric.wa.gov.au](http://www.agric.wa.gov.au)

# Improved Seeding Systems

for water repellent sandplain soils

## Risks

- Reduced pre-emergent herbicide efficacy with winged points and seeding boots.
- Yield benefits depend on the season and soil type - could be worse off.
- Benefit may be less if soil is highly repellent.
- The extra top soil disturbance by winged points and winged boots may increase the probability of paddocks which are loose and with poor cover. Maintaining knife points, but with the addition of banded surfactants may be a safer option as there is less soil disturbance.

## Have I done it right?

The aim of these approaches is improved and more timely crop emergence, however, this may be influenced by seasonal conditions particularly soil moisture conditions at seeding and the amount and frequency of early season rainfall events. It may be necessary to assess benefits over a number of seasons however benefits should be more obvious in early sown crops on moderate to strongly repellent soil.

## Conclusion

- It is possible to improve crop establishment on water repellent soils using modified furrow sowing techniques.
- Banded wetting agents are helpful with early dry sowing before opening rains but show less benefit later in the sowing program when there has already been rain and the soil has started to wet up more.
- Simple approaches like sowing next to or at a shallow angle across the previous year's crop row and broadcast spreading a portion of the seed ahead of the bar are relatively simple approaches that can provide establishment benefits.
- Winged points and winged-paired row systems perform better than knife points under certain soil conditions but the benefits are variable and in some sowing conditions provide no benefit. Further research is required.

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Above: DBS unit sowing on 500mm rows at 5kph, note less soil throw to cover inter-row.



Above: DBS unit sowing on 500mm rows at 10kph, note soil throw to cover inter-row.