

Diameter, weight critical for disc efficiency

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Disc diameter has a critical impact on the ability of a disc seeder to cut through residue, Paul Jasa told growers at the recent SANTFA conference.

Disc sharpness, machine weight, to ensure consistent soil engagement, and cutting depth are also critical factors, he said.

Changing to larger or smaller discs changes the angle at which the cutting edge of the disc meets the soil surface, with larger discs tending to decrease the cutting angle and improve the ability of the machine to cut through surface residue.

Disc wear reduces the diameter and changes the cutting angle.

Working depth is also a factor, with the cutting angle – and the ability to cut cleanly through residue – changing with the depth the disc goes into the soil.

A disc set too shallow will ‘hairpin’ residue and push it into the soil surface. Increasing the depth of cut will increase the angle of the cutting edge with the soil surface and improve the machine’s cutting ability, unless the disc is set to cut too deep. Cutting too deep increases the angle between the cutting edge and the soil surface so much that the disc begins to ‘bulldoze’ residue instead of cutting through it.

Arriving at the right set up is a compromise, but disc sharpness is non-negotiable. Sharp discs, and adequate down pressure, are needed to cut residue cleanly.

Soil penetration can be an issue, he said,



ROW SPACING AND MACHINE WEIGHT BOTH INFLUENCE THE ABILITY TO PENETRATE AND KEEP DISCS IN THE SOIL.



DISC DIAMETER, SHARPNESS AND OPERATING DEPTH ALL INFLUENCE THE PERFORMANCE OF DISC SEEDERS AND GETTING THE BEST RESULTS REQUIRES CLOSE ATTENTION TO DETAIL.

and many US growers add weight to their seeders to improve soil penetration and prevent the discs riding up out of hard soil.

He favours less soil engagement – less things in the soil – because the more discs in the soil the more weight is needed to maintain seeding depth, he said.

“You need weight to penetrate and keep the discs in the soil.”

Row width also influences soil penetration, Dr Jasa said. Reducing row width increases the number of coulters and openers in the soil, which significantly increases the likelihood of the machine riding up out of hard soil. It also reduces trash clearance.

Where extra weight is needed to ensure good penetration and seeding depth control it should be positioned so the rear of the machine is heavier than the front because this helps maintain the correct cutting angle of the leading edges of the discs.

Having the front of the machine lower than the back increases the cutting angle, and the risk of the discs ‘bulldozing’ and bunching up residue instead of cutting through it.

Dr Jasa, an Extension Engineer at the University of Nebraska-Lincoln, advocates that growers wrestling with disc set up ‘think of the system and think of the

steps’, which he identified as cut, open, place and close.

Getting the best results requires close attention to detail at every step, he said.

For example, if using paired, angled ‘seed pack’ wheels, an arrangement found on many corn precision planters, to close the seeding slot it is important to set the angle of the closing wheels so they exert the closing pressure at the right depth.

“If wheat is sown with the seed pack wheels set for corn, which is sown deeper than cereals, they will compact the soil below the seed, making it difficult for the seedling roots to penetrate.”

Of the closing mechanisms available he favours the use of ‘crumblers’ that pull loose soil into the slot over the other options available.

And while many Australian farmers remove or destroy much of their crop residue out of concern about ‘trash clearance’, Dr Jasa aims to maximise the amount of cover and the time it remains intact on the soil surface.

“Stubble breaks down more rapidly as no-till systems mature and soil organisms build up. We don’t use straw choppers on the header because we want the residue to last longer and continue to protect the soil”.

