



E-Newsletter

Autumn 2020

PRESIDENTS REPORT

How quickly things change! At the end of April, I was pondering which paddock I would start this season's dry sowing. Just a week later, I was waiting to see which paddock would be the first to dry out enough to get the seeder into! The opening rains will bring a different seeding experience to the ones of the last few years and also provides a great opportunity to control some weeds before the crop goes in.

Of course, this is not the only change we have seen in recent months. The COVID-19 pandemic has caused worldwide disruption and SANTFA was not immune to it. Sadly – but unavoidably – we postponed our annual conference and are still in discussion about when and how we can reschedule. One option may be to move to a webinar-type conference. You can be sure we will keep you informed with developments as soon as we can.

Coronavirus has seen many organisations and businesses embrace online technology and SANTFA is among them. It gives me great pleasure to welcome you to our new digital SANTFA newsletter. This quarterly communication update will replace *The Cutting Edge*. Adopting a digital platform allows greater flexibility in terms of interacting with farmers and we believe it will deliver greater value for your membership. Each newsletter edition will contain all the features you loved about our magazine – farmer profiles, research and development project updates and findings, as well as technical articles. By moving to digital, we also have an exciting opportunity to include video content, as well as website links and a host of other benefits.

Digital communication also brings considerable cost savings compared with producing hard copy magazines and we are pleased to pass these savings on to our members. Our annual membership fees for the coming year have halved – down to \$110 for the first member and just \$50 for subsequent members from the same business. Membership renewal notices will be sent out in July and we look forward to continuing to work with you to maximise the benefits of no-till and conservation farming.

We are thrilled to share that SANTFA has recently been successful in securing grants for a number of new projects. These projects will be rolled out over the next 12 months and information about them will be included in R&D Manager Greg Butler's updates to this newsletter. We appreciate the support we receive from various funding bodies to conduct new research, as well as their recognition of SANTFA's vital work towards improving farming systems.

I hope you enjoy the first edition of our online newsletter. As always, we welcome your feedback or any questions you may have – please use the contact details at the end of the newsletter to get in touch.

Good luck with seeding. Remember ... there is more money in mud than dust so don't panic if the seeder cannot run 24/7 like it has in recent years.

Callum March
SANTFA President

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hydrophobic or “oily” sand, the problem begins when microorganisms fail to digest waxy plant residues. During hot weather, these waxes melt and coat the surface of the sand. The wax-covered particles then repel water, leaving large patches of dry soil that inhibit seed germination and crop establishment, causing reduced crop productivity and soil erosion. This can further leave the soil at risk from wind and water erosion.

Through a process known as seed priming, seeds can be forced to germinate irrespective of soil condition. Through this controlled hydration process, seeds are soaked in liquid and then drained before planting. This enhances seed performance by improving the rate and uniformity of germination and decreases seed sensitivity to external factors.

There are three stages to seed priming:

Stage 1: Water imbibition, where seeds are soaked in liquid for a period of time to allow them to hydrate and absorb the liquid

Stage 2: Activation of nutrients, which occurs when the soaked seeds are drained and lightly dried. During this phase, enzymes are activated that encourage the seeds to sprout

Stage 3: Radicle protrusion, where the seeds start to produce future roots.

Hydro-priming is a low cost and straight forward seed priming technique, which uses water to soak the seed. However, various solutions and chemicals can be used. Other priming techniques include:

Osmo-priming, which uses osmotic solution with low water potential;

Halo-priming, which uses different inorganic salt solutions;

Solid matrix-priming, whereby seeds are mixed with a solid carrier material and water in known proportion;

Bio-priming, where a biological seed treatment is used in combination with seed hydration;

Nutri-priming, or nutrient priming, which uses a nutrient solution to soak the seeds; and

Thermo-priming, where seeds are exposed to certain temperatures before sowing.

SANTFA performed trials at Kybunga, in South Australia’s Mid North, in May last year to assess the emergence of wheat and canola in non-

wetting sand after the seed was primed. Before planting, the seeds were either hydro-primed in water or primed in a liquid solution that contained a germination stimulant. The seeds were soaked over a six or 18-hour period.

On May 1, 2019, the primed wheat and canola, as well as an unprimed control, were sown by hand into non-wetting solid. The crop was assessed regularly over 16 days to determine emergence rates, reasonable rainfall was recorded and, in normal circumstances, soil moisture was not considered a limiting factor.

“There was significantly better canola germination rates for the primed seeds, compared to the untreated seed. This suggests the easiest and most cost-effective treatment was canola primed in water for six hours.”

A week after planting, on May 8, there was significantly better canola germination rates for the primed seeds, compared to the untreated seed (see Figure 1). Interestingly, there was no statistical difference between the seeds primed with water only and the seeds primed with the solution containing a germination stimulant. There was also no statistical difference between the six-hour and 18-hour soak. This suggests the easiest and most cost-effective treatment was canola primed in water for six hours.



Figure 1: The primed canola (202 & 302) had faster emergence than the untreated seed (102).

Over the next eight days, all treatments continued to show further germination and, by May 16, all treatments – as well as the non-primed control crop – had similar percentages (see Figure 2).

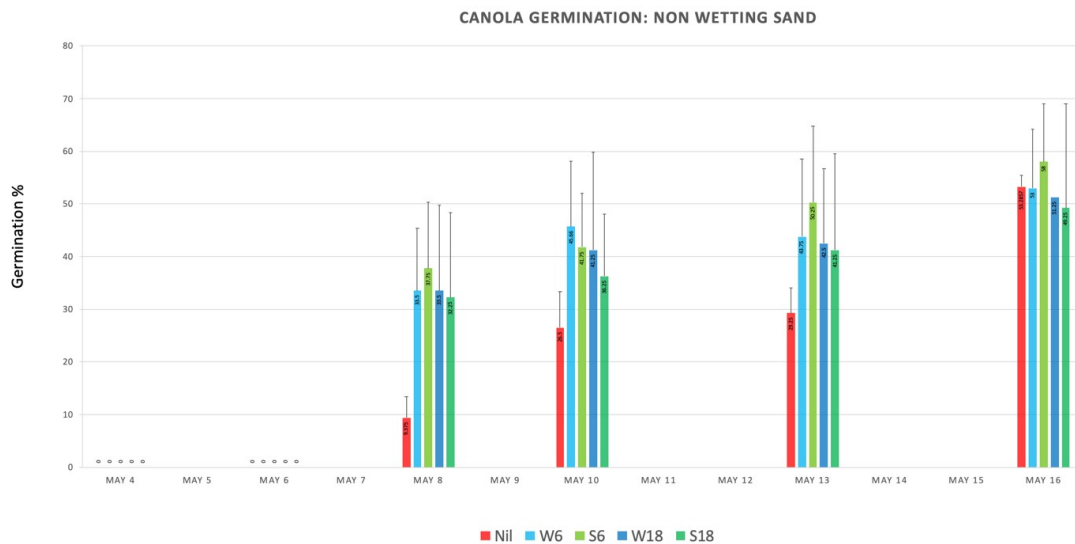


Figure 2: The primed canola seeds emerged faster and demonstrated an early advantage.

During the trial, rainfall at the site was steady with 8mm on the day of sowing (May 1), followed by 5mm over the next few days and a further

20mm on May 10. In the absence of rainfall, it is likely that the non-primed control crop would have lagged behind the primed treatments for a longer period of time.

In the wheat trials, germination was slower than the canola but still showed a similar trend, with the primed seed germination sprouting at a faster rate than the untreated seed (see Figure 3). There was also no significant difference in germination based on soaking times or the priming solution that was used (see Figure 4).

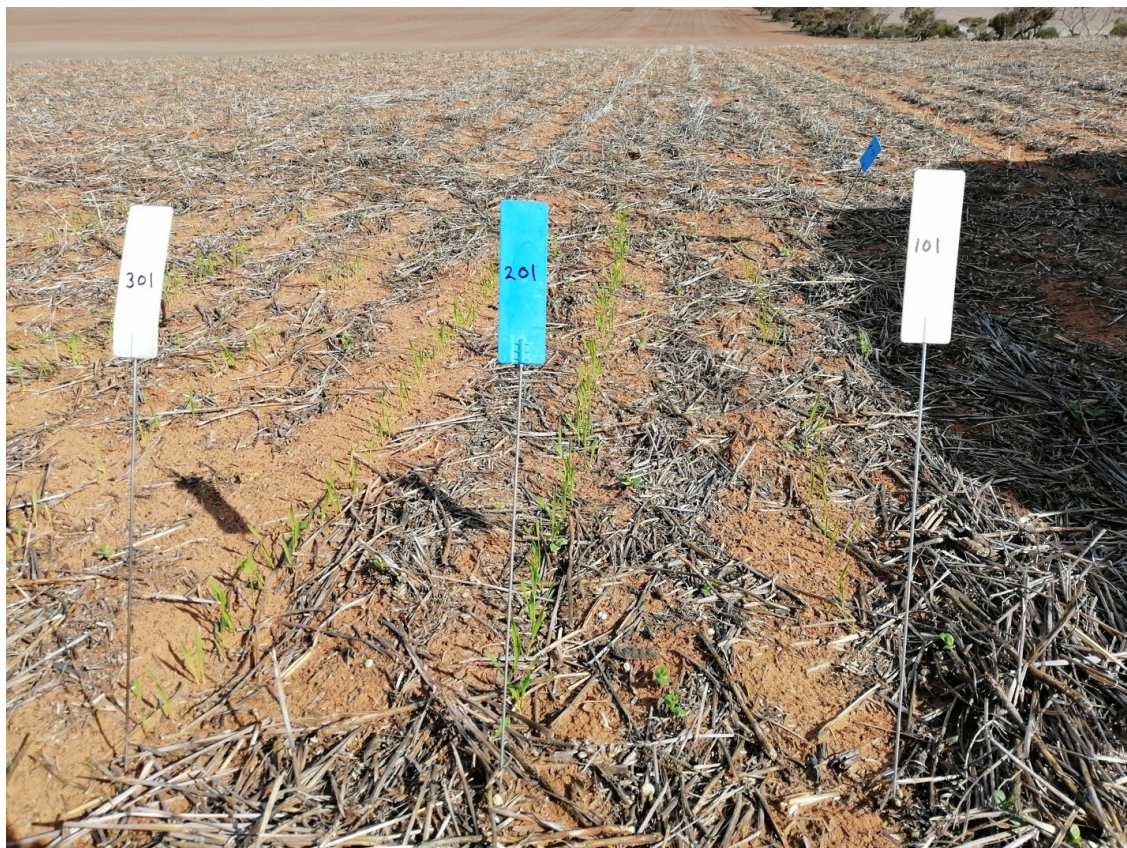


Figure 3: The primed wheat (201 & 301) had faster emergence than the untreated seed (101).

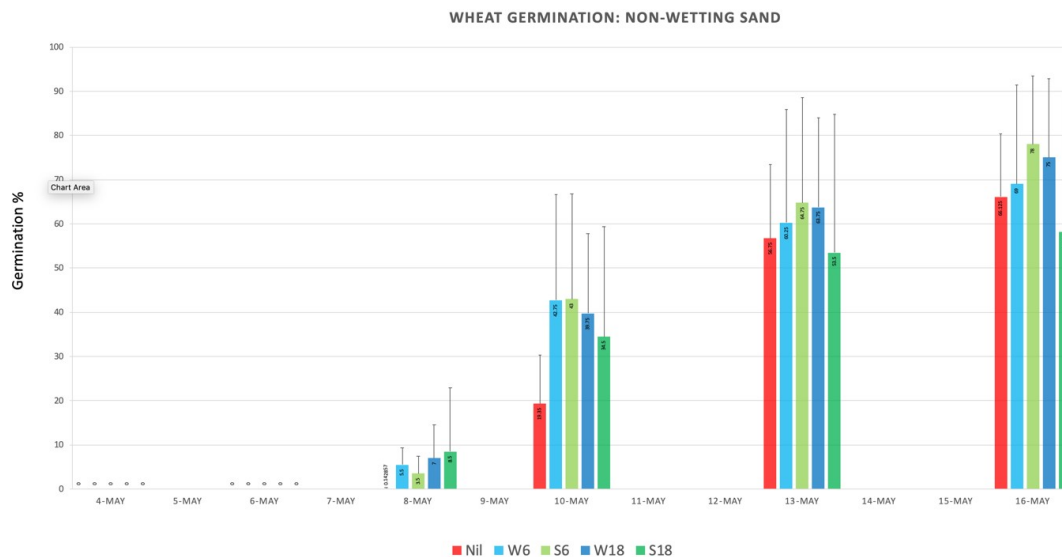


Figure 4: Priming the seeds did increase the speed of germination however, the duration of priming (6hrs or 18hrs) or the choice of priming solution (water only or water with germination stimulant) did not greatly influence the outcome.

“The rate of germination in canola and wheat can be increased by seed priming before sowing and water appears to be the most-cost effective method.”

These trials showed the rate of germination in canola and wheat can be increased by seed priming before sowing. Water appears to be the most cost-effective method for seed priming, given there was no statistical difference observed when compared with seeds treated with the germination stimulant. There was also no statistical difference observed by increasing the soaking time from six hours to 18 hours.

However, handling wet and swollen seed was difficult. Even though primed seed can be broadcast, the next step of this trial is to determine the feasibility of sowing primed seed through conventional seeding equipment.

SANTFA gratefully acknowledges the support of the South Australian Grains Industry Trust (SAGIT) throughout this trial and also the support of Kenton Angel who supplied the land and seed for the trial.



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Improving Soil Fertility Leads to Better Livestock Health

by Sarah Johnson

The Hammat family of Baderloo Poll Merino Stud in SA's Mid North are investing in their property's soil health to build a more profitable and sustainable livestock enterprise.

For Daniel Hammat, livestock health starts with the soil. As the owner of Baderloo Poll Merino Stud at Washpool, in the state's Mid North, Daniel believes soil fertility is the key to achieving pasture improvement, better sheep health and ultimately a more financially and environmentally sustainable enterprise.

Since taking over management of Baderloo about five years ago, Daniel has been sowing mixed species pastures and applying biological fertiliser to boost plant growth and microbial activity in the soil. His efforts have paid off and made him the envy of others.

"People drive on to our farm and say, 'Wow, you've got a lot of feed'. And my gut feeling is that what we're doing is working for us. The health of the soil, and the subsequent feed, is starting to build, " said Daniel.

"I've certainly noticed on our hills country that we're finding those enormous earthworms – they're about 10mm thick and 30cm long. We're also starting to see more mushrooms in the paddock than I've seen since I was a young child.

"We're using natural fertilisers to improve soil health and as we improve the soil, we're actually growing a healthier plant that provides more nutrients to our sheep to help them grow and do better."

Daniel, along with his wife Demelza (Mel), are committed to the long-term sustainability of their 1200ha property, which is located between Jamestown and Spalding. While they plan to increase the size of their enterprise, their focus is on boosting production to get the most out of what they already have.

"We're trying to buy more land, but just missed out on a property that came up," said Daniel. "My theory in the interim is to make what we have more profitable and also more sustainable in the long term. We're probably at the stage, with some of the dry springs we've had, that we're almost decreasing our stocking rate. We need to start putting some inputs in so we can try to increase it. We're trying to increase production all over the farm if we can."



Daniel in his canola and vetch mixed forage

Baderloo was established by Daniel's parents, Phillip and Ann, in 2000. Phillip had previously managed a ram breeding stud, taking a progressive approach with the adoption of Soft Rolling Skin (SRS) breeding principles. He carried this science through to Baderloo, where the enterprise's livestock now has thin, loose and supple skin that is resistant to fly strike. Baderloo hasn't mulesed since 2004.

While Daniel grew up on the farm, he is relatively new to agriculture after spending six years in civil construction before returning to Washpool with Mel in 2014 to put down roots and raise a family. They worked alongside Phillip and Ann at the sheep stud but sadly it was a short apprenticeship, with Phillip passing away within 18 months.

Since then, Ann has retired, leaving Daniel and Mel, who have four children aged between two and seven years, to develop creative strategies focussed on soil health and pasture improvement.

From the beginning, Daniel could see that one of the farm's biggest challenges was filling feed gaps, with their vetch break crops not providing feed until spring and then only sustaining the sheep for six weeks. "My parents were planting a straight vetch as a break crop, which would sit there all year. They'd take the grasses out of it, wean the lambs in mid to late September and after six weeks of grazing, it sort of disappeared," said Daniel. "They'd graze it back and run out of feed. My way of looking at that was, we've got a paddock tied up for the whole year and we're getting a very small benefit out of it."

The solution was to increase diversity in the crop by sowing forage brassica on alternate rows, providing a highly digestible, high protein plant that continues to grow, particularly if it receives a moisture boost. "It grows early and just keeps on growing," said Daniel. "The sheep will chew it right down to the ground and if we get three inches of rain, it reshoots and grows again."

The forage brassica provides weed competition to alleviate grass pressure in the Hammat's cropping program. It has also allowed for increased returns on meat sales due to improving the livestock's weight and condition. Sheep sold for meat now return more than double what they did previously.

"We're carrying for a bit longer and utilising that feed and are getting a lot more condition on the sheep. They're averaging about 34 to 35 kilos dress

weight and we got \$290 for the first lot last year and \$270 for the second lot," said Daniel.

"It's made a massive difference and that's really just from planting forage brassica with the vetch and filling that early feed gap."

While Daniel started experimenting with crop diversity using an old combine, he soon realised mixed species planting would require investing in a disc seeder. In March 2018, he purchased a second-hand Fusion air seeder bar with John Deere disc units. The 6.3m-wide machine with 32 rows was re-engineered by the previous owner, who removed the wings and made modifications to allow alternate row sowing at two depths.

"There are 16 units spread across the original part of the machine and then off the back is another solid bar with the other 16 units," said Daniel.

"It means it's very versatile for doing different types of pastures to suit our program. For example, if we have a really good clover pasture that we want to sow into, we can fold up the back bar and throw the seed into the other row, so then we're just sowing on 15-inch spacing."

Taking a budget-conscious approach, an old 7500-litre Simplicity box was also purchased. While Daniel's estimated budget was \$30,000, he ended up spending \$60,000 on the entire set-up, including \$45,000 on the disc seeder and \$15,000 on the seeder box.

Still a relatively small investment, the machinery purchases have delivered several benefits to the farm, including the ability to better conserve moisture, to sow dry into established pastures and improve seed placement accuracy

"Disc seeders are great for sowing dry. They don't bring up clods of soil and you get very good seed placement, so when you do get the rain, everything is up and away quickly," said Daniel. "To go even further is to help with that soil health without breaking the ground open all the time and conserving moisture."

It also allows the Hammats to sow into medic pastures that have already germinated without causing damage. "If I've got a really good, established medic pasture, then I'm able to sow over that, even after it's germinated without upsetting it," said Daniel. "If I went in with a tine machine, I'd

probably kill most of the pasture by covering it up."

The disc seeder set-up achieves a suitable seed depth for both the vetch and forage brassica, at about 25mm and 12.5mm respectively, and provides scope to increase seed mix even further. Daniel experimented with his first multi-species pasture last year, planting Kitty Hawk wheat and vetch in one row and Bouncer hybrid forage brassica and Mammoth Purple Top turnip (*Brassica rapa*) in the other. Although more rainfall would have helped growth, Daniel said photos taken 40 days apart show very clear results.



"The property looked like a moon landscape when I took the first photo. It was like a desert from the dry but, only 40 days later, the pasture was all up and in rows and looking green," he said. "It was quite a contrast."



The vetch and forage brassica mix play an important role in filling the gap before the season break. Baderloo has a mix of hills and arable land, with the Hammats cropping just 200 ha on a three-year rotation of wheat, barley and vetch. They also have access to a further 1200 ha of neighbouring cropping land for grazing summer stubbles.

The barley is a dual-purpose crop that provides early green feed, followed by stubble grazing. Rams for the previous year feed on the crop until the family's ram sale in August, when the paddock is closed up and allowed to fully ripen. Lambs dropped in June are weaned in late August or early September and go onto the vetch and forage brassica pasture until it's depleted and then the ram portion of the lambs are transferred to the standing barley crop throughout summer.

"If we can get three paddocks of barley in and we get an average yield around three tonnes, that gives me 200 to 250 tonne of barley to run the ram lambs on during the summer time," said Daniel. "That means they're

on a pretty good ration right through that five-month period over summer and hopefully gets them through to the break of the season in the next year."

Daniel plans to conduct further multi-species pasture trials, including forage peas with vetch and possibly tillage radish with forage brassica and clover. He said there's little science behind mixing the seed into their two-bin air seeder, which includes a small seed box and four airlines. The process simply requires two people each pouring a bag of seed into the box at the same time.

The pastures have been enhanced by the use of biological fertiliser which the Hammats have applied during the past two seasons.

"I don't like synthetic fertilisers," said Daniel. "I think they create lots of troubles and you spend the rest of your time fixing them.

"This is about getting off the big fertiliser merry-go-round and starting to promote soil health and natural processes. We're hoping that, in time, we can reduce our costs by making the soil more fertile and working better for us."

Daniel discovered guano fertiliser, a biological combination of seabird droppings, decomposed seabirds and other remnants of marine life through Brenton Byerlee from Soil Management Systems at Orroroo. In the second year of use, Brenton conducted soil testing at Baderloo and found the Hammat's soils were largely free of the acidity problems seen on some other farms in the district. Daniel puts the results down to the lack of synthetic fertiliser.

"Because our pastures had no fertiliser history, we were actually further ahead" he said. "We didn't have big pH imbalances or issues. We found that our soils were in reasonably good health and it's just a matter of kick starting them and getting them going.

"The guano doesn't leach - it's not water soluble - so when you put it there it stays there, you get an accumulation and it works on building your soil biology. The biology starts to draw on the guano and take it into the soil and around the root systems, so it gets the whole system working.

"Brenton says your first year using guano should be as good as using a

synthetic fertiliser, it's the second, third and subsequent years, as you get a build up of guano, that you start to get your soil health working and then it just gets better every year."

Daniel has experimented with the fertiliser mix, starting with straight guano in the first year. In the second year, he created a 60/40 blend of guano and sulphate of ammonia (SOA), applying 120 kilograms in total, including 80kg/ha of guano and 60kg/ha of SOA. Next year, he's considering swapping the SOA for a bio-humate soil conditioner after receiving advice from a business based in Bacchus Marsh, Victoria. "They say it's like switching the ignition on in your car," said Daniel. "Once it hits the soil, it helps to open up the platelets and helps water to penetrate the soil. You harvest more rainfall and, because it's a living product, it washes into the soil and really gets everything going.

"I'm keen to try that and see how it goes. A lot of what I do is trial and error. I have a go at something; if it works – and I see the results – I keep going with it."

Daniel expects to pay about \$30/ha for the spray-on product, which is equivalent to the amount he paid last year for SOA, while the cost of guano is comparable to using DAP and MAP.

The investment appears to be paying off for the Hammats, with clear improvements in the amount of feed available. Last year, a 35mm rainfall event gave a 65ha paddock planted with vetch and forage brassica the boost it needed. "I looked at it one week and thought we were still weeks away from having feed, so bought an extra 12 tonne of barley just to get us through, at about \$400/t," said Daniel. "Then we got 35mm of rain that week and the next week I was able to put more than 400 livestock there. The rain just kick started it and away it went.

"From June until early September we ran between 450 and 600 head of sheep and goats there and then quit all of them and took half of our hoggets from one of our hills properties, because they were suffering from the dry, and put them on the better feed. We looked after them and fed all of our rams up and sold them and returned the hoggets back and then weaned this year's lambs straight back onto it. We got a massive feed benefit out of it."
