



# GROUND COVER™ SUPPLEMENT

CELEBRATING 20 YEARS OF NVT



## PAGE 3 HISTORY

Confidence in comparisons expands beyond yield data

## PAGE 10 BREEDING IMPACTS

NVT the centrepiece in mastering yield complexities

## PAGE 13 NVT COMMITTEES

Growers the guiding hands to NVT success

Sean Coffey, senior manager – National Variety Trials, says that since its inception in 2005, NVT has guided grain growers and advisers with consistent, timely and accurate information on commercial varieties.

## NVT – performance test-driving our future



Photo: Israel Baldaño

**By Sean Coffey**

Senior manager – National Variety Trials

■ Access to independent and locally relevant performance data on commercially available varieties is fundamental when planning crop choices. The National Variety Trials (NVT) program provides that data. Since its inception in 2005, it has guided grain growers and advisers with consistent, timely and accurate information on commercial varieties.

While this has helped accelerate superior variety adoption, importantly,

it has also ensured that growers avoid unsuitable varieties and farming systems' profitability is optimised.

For the past two decades, the NVT program has aimed to test varieties on growers' paddocks in a way that is easily comparable and that reflects regional conditions.

This testing includes grain yields, disease and pest responses, and grain quality traits for wheat, barley, canola, chickpeas, faba beans, field peas, lentils, lupins, oats and sorghum.

Without growers across the country who generously host the trials – some

across the program's two decades – this would not be possible. The program is starting an honour roll of grower hosts to acknowledge their contribution to its success; see [nvt.grdc.com.au/honour-roll](http://nvt.grdc.com.au/honour-roll).

Not all lines or varieties are tested at each location, but entries are not restricted by state boundaries. Commercial varieties that are widely grown are used as performance comparisons.

Trial management and data collection are managed by independent service providers under strict protocols, and all trial data is processed and analysed centrally through the NVT database by expert biometricians. To read about trial service providers see pages 14 to 15.

The massive dataset collected has also helped research. For example, Grains Australia is tapping into historical data to create pulse quality frameworks. To read about how NVT data is helping in other trials, see page 22.

Other stories highlight the people behind the largest coordinated field trial network of its kind in the world, which is helping breeders to continually develop new varieties. Read these stories on pages 6 to 9.

Industry experts are engaged from each region on regional advisory committees to provide expert advice on the operations. To read about NVT Advisory Committees, see page 13.

Celebrating 20 years of a program in 24 pages is a challenge. The stories in this *GroundCover™ Supplement* are a snapshot of the people, programs and organisations that have contributed to the NVT's success. Enjoy reflecting on the past 20 years of NVT and I look forward to building the next 20 with you. □



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COVER IMAGE: GRDC National Variety Trials (NVT) service provider Peter Matthews, technical specialist with NSW DPIRD at the Blighty, NSW, NVT site.

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# Confidence in comparisons expands beyond yield data

More than two decades of trials have provided the tools needed to compare commercial varieties using independent and locally relevant performance information

By Rebecca Thyer

■ Confidence in National Variety Trials' (NVT) data has shaved two to three years from variety adoption rates while boosting the area planted to new varieties.

When the NVT was established 20 years ago, the aim was clear – to provide a trusted source of independent variety performance data and accelerate the adoption of superior varieties from breeding programs.

At the time, it took an estimated average of 10 years for a new variety to reach peak adoption rates.

As NVT celebrates its 20th anniversary, NVT systems manager Neale Sutton reflects on this aim: “Not only has variety adoption occurred earlier, but also growers are planting more area to new varieties,” Mr Sutton says.

“That could be, for example, planting 100 hectares of a new variety, compared to 20ha. It is because NVT has given the industry the tools and the confidence to adopt new varieties sooner.

“NVT produces reliable, comparable and honest data and it would be hard to find this information without it.”

The NVT's purpose has remained true to its original aim; however, the program now provides not only comparative information on yield performance but also on grain quality and disease resistance for commercially available grain varieties.

The vast variety of data collected in the NVT system also makes it a treasure trove for researchers. Being able to access that information is helping researchers explore topics from herbicide loss to climatic changes while building industry capacity in the biometric space.

## BEGINNINGS

The idea for independent, coordinated variety trials came about as more public, state-funded and state-focused breeding programs shifted to private models.

“There was a general shift from public to private breeding,” Mr Sutton recalls. “The end point royalty (EPR) system was in place and with that came a revenue stream for commercial breeders.” This also drove an increase in the number of commercial breeders operating in Australia.

Mr Sutton says the shift from single, state-funded breeding programs to competing commercial breeding

organisations created a need for independent variety evaluation. “It was important to have robust standardised data made available nationally. Different breeders presented results in different ways and NVT created a standard independent approach that growers could trust.”

## TRIAL EVOLUTION

Over time, trials have grown with new crops, areas and treatments.

Sorghum, grown in the northern region, was added to the NVT in 2018. Much further south there are now barley and wheat trials in Tasmania, which had its first NVT site in 2012.

Alternate trial treatments are needed as new technologies are released, such as imidazolinone-tolerant (IMI-tolerant) lentils.

“As the adoption of herbicide-tolerant lentils increased, the NVT program incorporated IMI-tolerant lentil trials into the program reflecting grower practice,” Mr Sutton says.

“It is the same story with canola. Some newer varieties have a stack of tolerances. These newer technologies allow for later sprays and NVT will treat them like that too.”

Photo: Paul Jones



Canola NVT plot near Young in Western NSW.

NVT management practices are guided by the NVT Advisory Committees. “We rely heavily on them,” Mr Sutton says.

Established in 2013, these committees consist of growers and advisers and help inform protocol development.

### SYSTEMS MANAGEMENT

NVT has grown to become the largest independent coordinated trial network in the world. More than 650 trials are sown at 300+ locations for 10 crop species across Australia each year and the NVT database includes more than 1.5 million plot points.

It requires a vast array of systems to store and communicate trial data, results and pathology information for cultivar disease resistance ratings. “Over the past 20 years, these systems have had to evolve and grow,” Mr Sutton says.

Today, with NVT online, growers and agronomists from across the country can access the latest information easily.

Additionally, systems for other stakeholders have been developed. “These systems are used by service providers, breeders and NVT staff to manage operations for every facet of the NVT program.”

### CREATING A SUSTAINABLE MODEL

Access to the program has evolved with the Pre-commercial Purchasing and NVT Resource Sharing models, both aimed at improving impact grains industry impact.

The Pre-commercial Purchasing model removes constraints on the number of pre-commercial entries available to breeders. It also allows

international breeders to enter the program for the first time, promoting better global access to future varieties.

Mr Sutton says that essentially, the model acts like an entry fee. “Breeders pay an upfront fee to be in the NVT when their line is pre-commercial. We refund the money when the line is commercialised. So, it means that growers (via GRDC) essentially fund testing of all varieties where growers get access to the NVT results.”

Minor crops, such as pulses, oats and durum, are supported via the Minor Crop Allocation, which allows all crops and smaller breeders to access NVT.

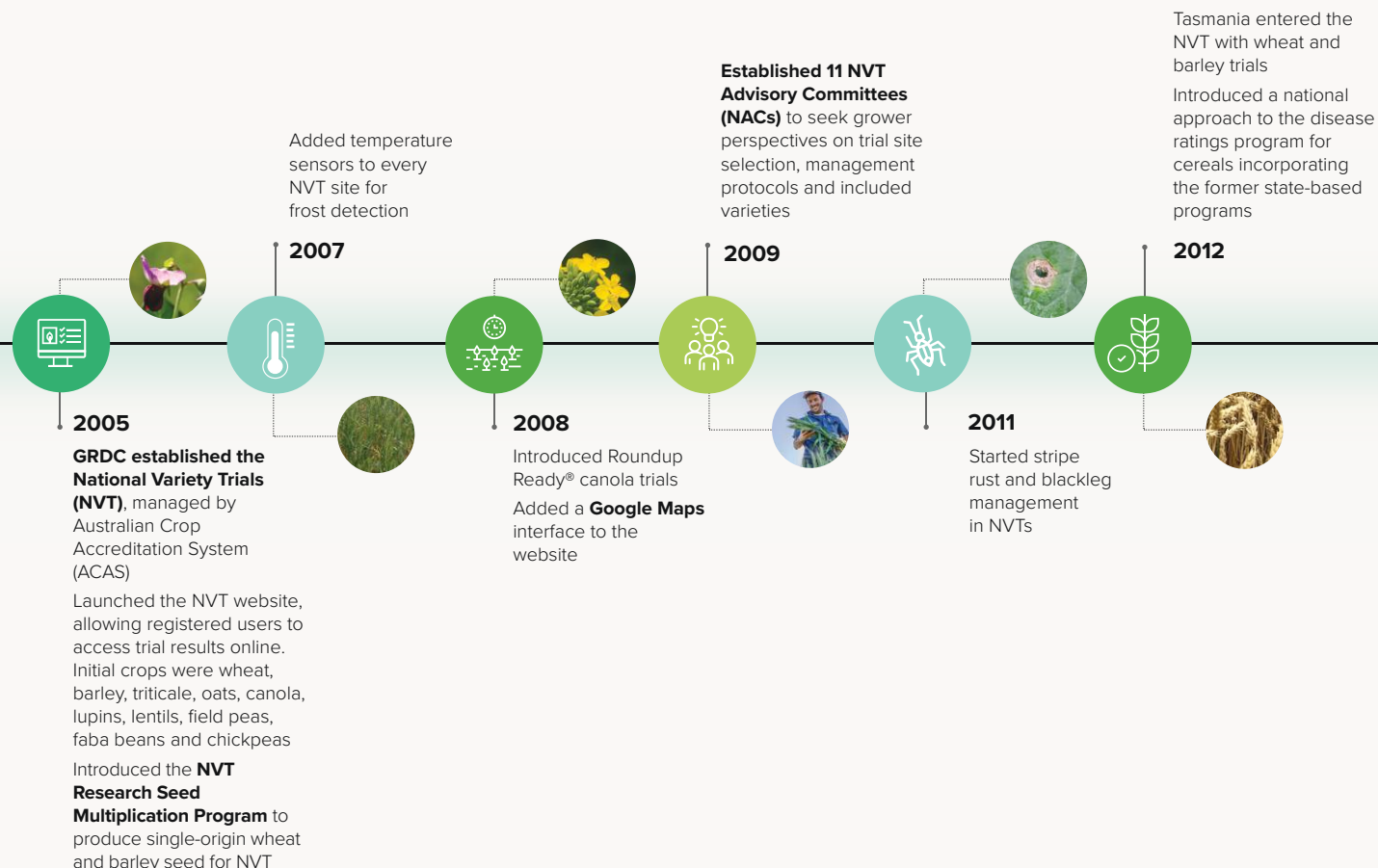
Via the NVT Resource Sharing model, grains industry researchers now have access and a licence to use the NVT to support their research.

## NVT HISTORY TIMELINE

■ GRDC established NVT in 2005. It is the largest independent coordinated trial network in the world.

■ NVT brought multiple state-focused variety trial programs together into a single entity that has evolved into a world-leading variety evaluation program.

■ Today, NVT conducts over 650 trials annually, involving 30 different breeding programs from around the world.



This has increased the program's value to the grains industry by providing other research projects with access to NVT resources, including data, trials and harvested grain. As a result, it has become an enabling platform for a wide range of research that benefits the Australian grains industry.

### READ OR 'HEAR' ALL ABOUT IT

Getting this information out to growers and agronomists is a top priority.

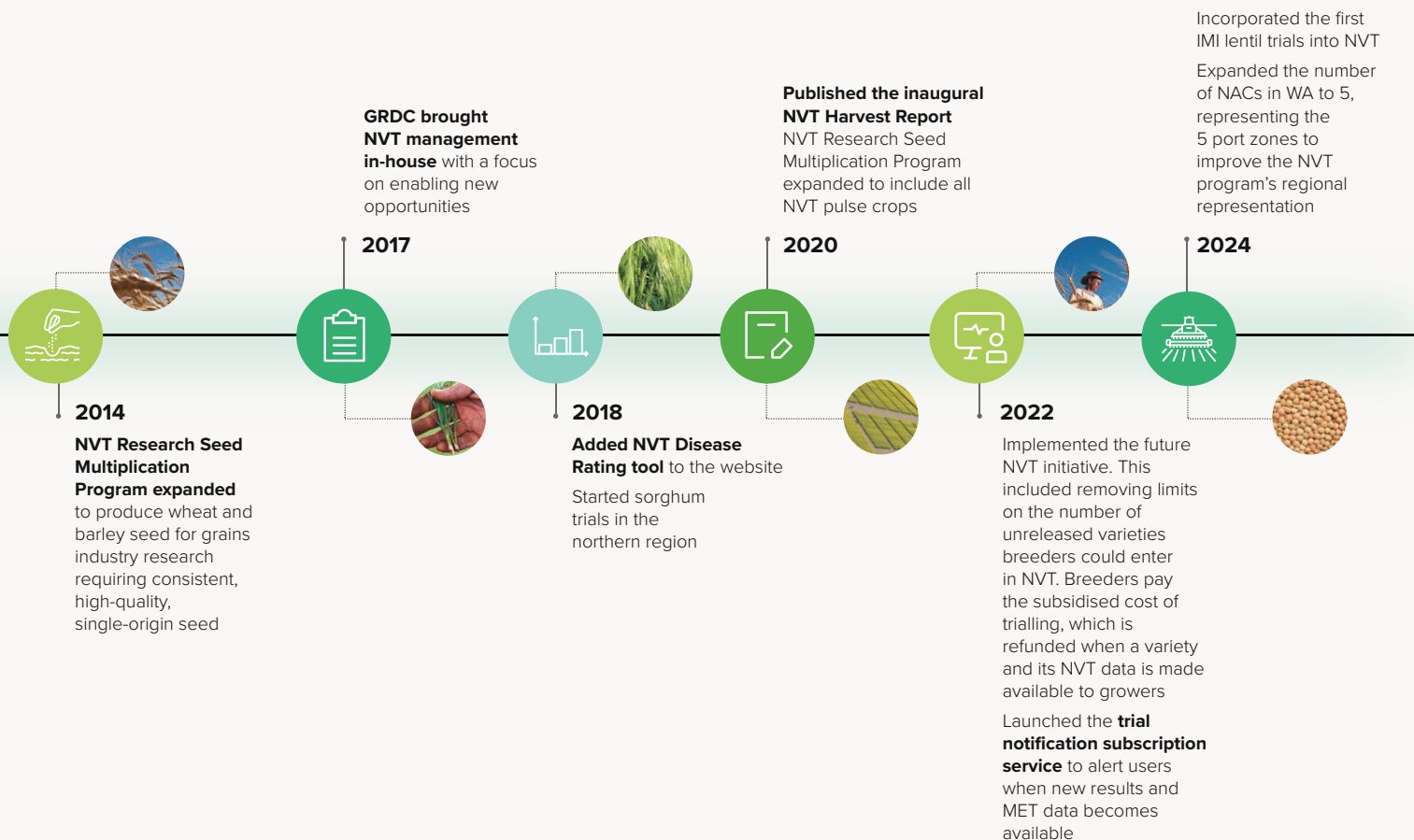
Information is made available via the website, in printed publications, and now in podcasts too.

As the NVT moves ahead, its goal remains the same – to help growers optimise system profitability through appropriate variety choices based on reliable, independent data. □



- Establishing an independent service in parallel with the shift from public to private breeding was essential to maintain confidence in variety claims.

**The NVT's purpose has remained true to its original aim: provide Australian grain growers and advisers with access to independent, locally relevant performance information on commercially available varieties, to accelerate the adoption of superior varieties and help growers avoid unsuitable varieties.**



## Audits keep trial quality high

The work of service providers is audited each year to ensure the NVT program sustains high-quality outputs

By Nicole Baxter

■ Rob Wheeler has spent 45 years running crop variety trials and completing audits to ensure the highest standard of work.

Mr Wheeler was a principal scientist with the South Australian Research and Development Institute (SARDI), where he coordinated crop variety trials as an NVT service provider before joining GRDC as the southern NVT manager.

From the early 1980s, Mr Wheeler sourced varieties and advanced breeding lines from crop breeders to run trials across SA.

“Our system was widely praised by the industry and used a lot of NVT-type practices,” he says.

“In the early 2000s, a GRDC Panel member from Western Australia came to SA to see how we ran trials and recorded information in the database we were developing. He was impressed and encouraged GRDC to start the NVT program based on what we did.”

As a service provider at SARDI, Mr Wheeler helped Alan Bedggood from Agriculture Victoria (AgVic) set up the NVT and the database to manage trials and store results.

After Mr Bedggood left AgVic to lead the NVT, Mr Wheeler and his SARDI team oversaw the SA NVT and coordinated the Victorian NVT in the Mallee until the Birchip Cropping Group started managing the Mallee trials.

He says the NVT have always been an excellent training ground for regionally based early career technical and scientific staff.

After retiring from SARDI, Mr Wheeler joined GRDC as the southern NVT manager. He ensured that all SA, Victorian and Tasmanian NVT were established according to agreed-on protocols to produce sound and unbiased results.

“NVT managers travel to trials at least once a year to complete an audit,” he says. “It’s essential to ensure everything is



Photo: Anvill Media

Former southern NVT manager Rob Wheeler was the original trial service provider for NVT in SA. He says trial audits keep variety data quality high.

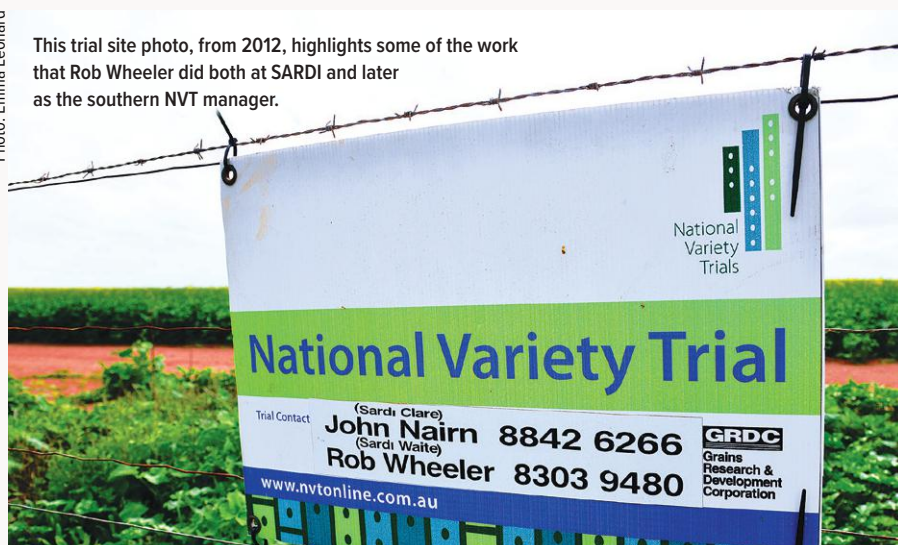


Photo: Emma Leonard

This trial site photo, from 2012, highlights some of the work that Rob Wheeler did both at SARDI and later as the southern NVT manager.

standardised so there is no bias towards one variety or breeding line. It’s one of the most important parts of the NVT.”

An audit can take up to an hour and includes putting a drone above the trial site to check the plot uniformity.

Among other aspects, a ground-based check identifies issues with trials that could affect data quality to ensure appropriate management occurs.

Examples of trial issues include:

- even establishment;
- pests;
- diseases;
- frost impact; and
- physical grain loss – for example,

shattering, lodging and head loss.

Mr Wheeler says the NVT’s emphasis was initially on wheat and barley but, today, 10 grain crops are involved, with sorghum the most recent addition.

“Changing to a higher-yielding, better-quality or more disease-resistant variety doesn’t cost much to a grower, but it can greatly improve profits and make farming systems more sustainable,” he says.

“In the past five years, the NVT has stepped up the speed and uniformity with which it disseminates results via the online database, trial notification service, harvest reports and sowing guides.” □

# Variety trials empowered as a national program

**Former NVT manager Alan Bedggood is proud to have helped set up a system to support growers in choosing new varieties for their farms**

By Nicole Baxter

■ Former barley industry development officer Alan Bedggood managed Agriculture Victoria's variety trials before being employed to set up the National Variety Trials (NVT) for GRDC.

Mr Bedggood recalls when, in 2002, state agricultural departments ceased wheat and barley breeding.

"When I ran Agriculture Victoria's variety trials program in 2003, I invited all plant breeding companies to submit elite entries," he says.

"Before the NVT started, state coordinators met yearly to share the development changes in equipment and trial protocols."

While different groups continued with trial work, there was a need for independent, comparable and quality trial data growers and advisers could trust.

## EXPERIENCED HAND

When GRDC established the NVT and sought someone to head the program in 2005, Mr Bedggood was chosen for his experience and ability to ensure continuity.

He says when the NVT program rolled out, all state agricultural departments were ready, enabling a smooth transition.

"The same trial managers ran the experiments, and later, we saw companies like Kalyx and Agrisearch Services competing to run the trials."

Coordinating the trials involved talking with plant breeding companies to source crop varieties.

"Initially, breeding companies wanted to put potential new varieties in every trial in every state," Mr Bedggood says. "However, due to constraints on budget and the number of available spots in NVT, we had to push back and ask where the varieties would be marketed."

## VARIETY PERFORMANCE

Mr Bedggood says a condition of entry for plant breeding companies was that their varieties had to be within

two years of commercial release. This allowed growers to compare yield and grain quality two years before varieties could be bought.

He says the NVT's primary benefit is that it provides trusted information that allows growers and agronomists to compare the performance of new varieties relative to others in local areas.

"For the first time, we had all the potential new varieties in the trials, and the results made available to growers and agronomists online, as well as in hardcopy booklets," he says.

By 2015, when he retired, Mr Bedggood says more than 600 variety trials had been established on more than 300 growers' farms.

"I had a national focus for all the crops, which put me in touch with all the breeders, grain-quality scientists and biometricians," he says. "I travelled to all states to meet the trial managers, complete trial audits and present the results at GRDC Updates."

He says it was a whole-of-industry job that he found empowering and enjoyable. □

Former NVT manager Alan Bedggood visits an NVT site near Horsham, Victoria. Mr Bedggood was chosen to head the NVT when it began in 2005.



## NVT – independent and data rich

**Prominent plant breeder and former GRDC managing director Dr Steve Jefferies reflects on the value of the NVT to breeding companies and growers**

By Nicole Baxter

■ When crop breeding was privatised, the rate of genetic gain and the rate at which new, improved crop varieties were released increased dramatically, says former Australian Grain Technologies (AGT) chief executive officer Dr Steve Jefferies.

Before the NVT, state agricultural departments compared varieties using different standards and protocols, and with declining funding, he notes.

“Being able to provide nationally coordinated and independent information to growers to make informed decisions about new varieties was why the NVT started. When I was at AGT, we submitted entries to the NVT because we saw a significant value proposition from participating.”

### NVT VALUE

Dr Jefferies says this was because the NVT provided an independent and comprehensive assessment of varieties.

“If AGT varieties performed well, we felt the NVT would demonstrate this and, in turn, speed the uptake of our varieties,” Dr Jefferies says. “We only needed to focus on making sure we produced better-performing varieties.”

Even though AGT’s variety information had a high level of integrity, he says company representatives felt that growers might not trust breeding company data. When Dr Jefferies was appointed GRDC’s managing director in 2016, he says growers told him they valued the NVT, but still had concerns:

- trials were not sown at the optimum time;
- trials were poorly managed; and
- trials were not sown in relevant parts of the rotation or on relevant soil types.

Back then, GRDC outsourced the NVT’s management to a third party.

Dr Jefferies says the NVT was GRDC’s second-largest investment then, and growers valued it. However, he knew it could be improved, so he brought it in-house.



Photo: Brad Collis

Dr Steve Jefferies with Nobel Laureate Dr Norman Borlaug during his visit to Australia in 2003. When Dr Jefferies was appointed GRDC’s managing director in 2016, he brought the NVT in-house.

“In 2017, we recruited a bunch of skilled staff, including NVT senior manager Sean Coffey, and the team has worked diligently to enhance the program ever since.”

### QUALITY IMPROVED

Since then, Dr Jefferies says the quality of the trials, the scope of traits assessed and the scale of the data gathered have improved substantially.

“The NVT gives growers ready access to independent information to make informed decisions about varieties, which has a huge impact on their businesses,” he says.

“For example, if a new wheat variety has a five per cent yield advantage, at two tonnes per hectare and a price of \$350/t, this delivers growers a \$35/ha immediate profit improvement, minus the initial cost of the seed.”

Dr Jefferies says the NVT is audited, standards are high, and the conditions imposed on contractors to run the trials are critical for high-quality results.

“Sean and his team are dedicated to ongoing improvement,” Dr Jefferies says.

“The NVT, with improvements in farming systems and summer weed control, has also played a critical role in helping to drive water use efficiency improvements through enhancing the adoption of higher-performing and more resilient varieties.”

### BEYOND VARIETY ADOPTION

Dr Jefferies says GRDC survey results show that growers value the NVT highly, and this recognition has flow-on benefits.

“GRDC and researchers can use the NVT to attract growers to paddock walks and field days, extend their messages, and discuss technology adoption other than just varieties.”

Dr Jefferies says the NVT today comprises one of the world’s most extensive variety and crop performance datasets: “This data is powerful, especially with the evolution of artificial intelligence, machine learning and data analytics.”

He says the grains industry is at the tip of the iceberg regarding opportunities to ‘mine’ NVT data to increase grower profitability in the future. □



## Experienced insider motivated by data sharing

**A background in farming and an agricultural science degree have equipped Neale Sutton for a long-term career with GRDC's National Variety Trials**

By Nicole Baxter

■ GRDC National Variety Trials (NVT) systems manager Neale Sutton says he enjoys delivering independent crop and variety performance data to growers.

Hailing from a farming background in Victoria and armed with an agricultural science degree, Mr Sutton started working with NVT in February 2007 when the Australian Crop Accreditation System managed it.

When GRDC moved the NVT in-house in 2017, Mr Sutton became a GRDC employee and has remained with the program ever since.

“Working with the NVT offers an excellent opportunity to leverage my farming background and agricultural science degree. It has kept me connected to the broadacre cropping industry across Australia,” he says.

“I’ve had various roles within the program and met some fantastic people.”

### CLEAR PURPOSE

When Mr Sutton joined the NVT, he was clear about its purpose: to connect growers with the best plant genetics for their farms. As an insider, he watched the program help transition the grains industry from state-based public plant breeding to privatised crop breeding.

“The NVT puts independent results in the hands of growers in a commercial world where it can sometimes be difficult to recognise marketing ‘spin’.”

He says the NVT has enabled growers to take advantage of significant genetic advances made by private plant breeding companies by accessing independent, transparent and trustworthy variety performance data for winter crop and sorghum varieties.

While the NVT remains committed to independence and relevance, he says it has evolved to add value. Examples include more efficient trial management procedures and protocols to keep up with technological advances and best practices.

### CURRENT ROLE

In his current role, Mr Sutton oversees the NVT database, which stores all trial results. He also manages the website to deliver crop variety performance results quickly and accurately. His other work includes managing various investments, including the NVT disease rating program.

“I love that the NVT covers all growing regions across Australia. You would be hard-pressed to find a grower that does not have an NVT trial within 100 kilometres of their farm, so we always ensure the local relevance of the results,” he says.

“It means we are engaged with growers and advisers from across Australia. I have visited most NVT locations, met with growers, advisers and trial managers, and see first-hand how different crops and varieties look.”

### REPORT CARD

Having worked for the NVT for almost 18 years, Mr Sutton is well-placed to assess its performance.

“The NVT has been successful in developing a national standard for crop variety trials, and aligning the states and participating breeder programs under this standardised approach,” he says. “This has been achieved through ongoing and active stakeholder engagement.”

Mr Sutton monitors innovative technology developments that could improve the accuracy of results and labour efficiency in the future.

For example, he says advanced imaging technologies may be practical for capturing establishment data, assessing plant population variability, and determining disease infection levels.

“Improved analytics, AI and machine learning will also simplify the interpretation of results because the NVT already has surpassed 1.6 million plots planted, and over eight million plot-specific measurements in the database.”

He says the work is exciting and challenging and he looks forward to contributing to the program’s future evolution. □

Photo: Israel Baldego

GRDC NVT systems manager Neale Sutton says the NVT team remains committed to putting independent and locally relevant crop performance data into growers’ hands. Mr Sutton has worked with NVT since 2007.



# NVT the centrepiece in mastering yield complexities

Breeders working across the major grain crops provide insights into where the National Variety Trials system sits in delivering breakthrough gains

By Dr Gio Braidotti

## MULTI-ENVIRONMENT RESILIENCE

Breeding in the past two decades has advanced significantly: researchers have developed tools that better account for gene-by-environment-by-management (GxExM) impacts on yield. In the process, multi-environment trials have become more important.

This advance translates in the paddock to yield resilience and yield stability – especially important in Australia with its sometimes extreme seasonal variability.

In the process of learning to master yield complexity, GRDC made several

investments in research infrastructure that helped to nurture these tools. This included infrastructure that allowed for systemic multi-environment trials. But the centrepiece in this strategy is the NVT system.

## INFORMED BREEDING DECISIONS

Canola breeder Dr Kate Light, from Nutrien Ag Solutions, explains why: “The NVTs allow breeders to check whether yield is stable in different environments. That data informs which varieties we decide to release and where these varieties are best suited.”

Dr Babu Pandey, a field pea breeder at the Agriculture Victoria Horsham

SmartFarm, agrees. “The NVTs are an essential mechanism that allow us to compare and contrast breeding material across environments, which is especially important when it comes to deciding which breeding lines to release,” he says.

However, Dr Pandey goes further. Just as important to his breeding program are opportunities provided by NVT to receive feedback from growers.

“That feedback informs the direction we take with our breeding efforts,” he says. “In that sense, the NVTs create a bridge between breeders and growers that ensure we are on the same page.”

The benefits do not stop there.

Canola NVT plot in Western NSW. Multi-environment trials are important for yield resistance and stability.

### BENCHMARKING AND MARKETING

All the breeders spoken to were clear that the NVT exist primarily for growers. The side-by-side comparisons provided by these annual trials are viewed as producing independent, multi-environment performance data that assist growers in identifying the cultivars that best meet their needs.

However, this still transfers through to breeding companies.

For example, Dr Haydn Kuchel at Australian Grain Technologies notes that while the NVT data assists growers with variety selection, the same side-by-side trials provide breeders with a benchmarking benefit.

“The rigour used to run the trials is exceptional,” Dr Kuchel says. “Being independent, NVT data helps us to benchmark our varieties against competitors and helps us to demonstrate the improvements we are making for farmers.”

That sentiment is shared by Dr Light, who says that Nutrien Ag’s canola breeding programs prefer to use only NVT data – not company data – when it comes to promoting a new variety.

“When it comes to marketing, what makes NVT data compelling is that it is produced – and can be verified – independently,” she says.

So too at LongReach Plant Breeders, where Dr Bertus Jacobs says that NVT yield data contributes significant power as a marketing and extension tool.

He adds that, while conservative, the disease ratings provided are credible, reliable and standardised for all industry participants to use.







### PULSE EXPANSION TRAITS

Benchmarking variation in different environments has been especially significant for pulse breeders.

At Agriculture Victoria’s SmartFarm, lentil breeder Dr Arun Shunmugam says lentils are now recognised as a crop that delivers a significant economic impact to the southern regions, alongside its rotational and agronomic benefits.

Those benefits, however, do not translate to other cropping zones. He says the challenge now is to breed for traits that help expand lentil cultivation into additional agroclimatic zones.

**Table 1: The milestone traits that made a big productivity difference.**

CROP	MILESTONE BREEDING MOMENTS
 <p><b>WHEAT</b></p>	<ul style="list-style-type: none"> <li>■ Increased yield and yield stability to counter the impacts of seasonal variability</li> <li>■ Higher grain quality parameters for increased market access and higher prices</li> <li>■ Lowering the cost of weeds, pest and disease control via improved disease, pest and weed resistance traits</li> </ul>
 <p><b>FIELD PEAS</b></p>	<ul style="list-style-type: none"> <li>■ Developed machine-harvestable plant architecture that is less prone to lodging</li> <li>■ Greater resistance to disease and subsoil constraints</li> </ul>
 <p><b>CANOLA</b></p>	<ul style="list-style-type: none"> <li>■ Increased yield and shifted from open-pollinated to hybrid varieties in the early 2000s</li> <li>■ Delivered herbicide tolerance traits</li> <li>■ Increased rotational benefits from stacking multiple herbicide tolerances into individual varieties</li> <li>■ Increased disease resistance, especially to blackleg</li> </ul>
 <p><b>LENTILS</b></p>	<ul style="list-style-type: none"> <li>■ Improved yield and grain quality</li> <li>■ Identified heat and acid soil tolerance traits to enable crop expansion into warmer regions and locations with acid soils</li> <li>■ Improved disease resistance</li> <li>■ Improved herbicide tolerance for more effective weed control</li> </ul>
 <p><b>CHICKPEAS</b></p>	<ul style="list-style-type: none"> <li>■ Improved yield stability and grain quality</li> <li>■ Improved disease resistance, especially to Ascochyta blight and Phytophthora root rot</li> <li>■ Improved herbicide tolerance</li> <li>■ Delivered harvestability traits such as height of lowest pod and lodging resistance</li> </ul>
 <p><b>SORGHUM</b></p>	<ul style="list-style-type: none"> <li>■ Sustained adaptation to Australian growing conditions</li> <li>■ Improved lodging resistance</li> <li>■ Developed greater drought tolerance</li> <li>■ Developed midge resistance and the ‘Midge Tested Scheme’ to provide an independent rating for a hybrid’s resistance</li> <li>■ Improved early maturity traits that proved a better fit for environments with dry early conditions</li> </ul>



NVT of pulses in South Australia, 2021. Adding pulses to the NVT disease rating system has provided industry with independent disease ratings.

Photo: Trevor Garnett

“When it comes to breeding lentils for the expansion zone, the NVT helped us a lot. For example, we could benchmark the performance of milestone varieties in different environments and better understand the breeding challenges.”

Agriculture Victoria now has several pre-breeding programs that are targeting traits needed to expand lentil cultivation.

Among the critical traits are tolerance to heat and acid soils, with advanced breeding technology being used to make rapid progress on both fronts.

### DISEASE RESISTANCE

However, a third critical category is disease resistance. For lentils, a key target is *Botrytis grey mould*.

At Chickpea Breeding Australia, Dr Kristy Hobson finds benefits from the NVT when it comes to efforts directed at disease resistance.

“The inclusion of pulses into the NVT disease rating system with standardised definitions (rather than relative ratings based on the performance of a previous variety) has provided industry with independent disease ratings,” Dr Hobson says.

“However, it requires fundamental work to understand how a score in a controlled

environment test translates to yield in the paddock. It’s essential that the disease ratings are meaningful to growers and provide a measure of disease risk and the associated disease management required.”

### ADAPTATION CHALLENGES

Sorghum is the northern region’s number one summer crop and produces a highly exportable grain that can be cultivated mostly using the same machinery as winter crops.

However, its introduction to Australia presented unique adaptation challenges for breeders after the arrival of high-yielding, hybrid germplasm from overseas in the 1960s.

At Pioneer® Seeds Australia, Ivan Calvert notes breeding efforts have primarily focused on using various sources of parental germplasm and adapting it to Australian environments.

“That includes being mindful of the way sorghum is grown so that we also focus on genes that better suit specific agronomic practices.

“Ensuring we produce hybrids that are a good fit means running a very big multi-environment trial program. While NVTs are fantastic

for cross-environment comparisons, sorghum was only included from July 2017.

“That inclusion has been good for farmers and breeders, providing both with independent, side-by-side comparisons. That allows us to benchmark our internal breeding strategies and goals while accelerating gains through enhanced competition.”

### HEALTHY COMPETITION

Finally, breeders noted that trials being side-by-side encourages the creation of varieties that stand out from competitors. As Dr Light points out, this tends to accelerate rates of gain by encouraging both competition and mutually beneficial cooperation. □

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■ NVT Harvest Reports, [nvt.grdc.com.au](http://nvt.grdc.com.au)

# Growers the guiding hands of NVT success

For more than a decade, growers and agronomists have helped guide the NVT as part of the program's advisory committees

By Rebecca Thyer

## KEY POINTS

- The NVT Advisory Committees (NACs) comprise growers and advisers from each NVT region
- The NACs provide advice on NVT operational management
- They were implemented in 2009

Growers and industry representatives at an NVT trial site north of Tincurrin.

■ When it is time for the National Variety Trials (NVT) to decide on varieties, paddock selection or germination times, the experiences of local growers, advisers and agronomists help guide these operational decisions.

This is a large part of why the NVT relies on its advisory committees. Dotted across the country, these NVT Advisory Committees (NACs) comprise growers, advisers and agronomists from each NVT region.

Each year, NACs also review trial outcomes, advise on management issues, provide counsel on changes to NVT protocols, review germination windows, and give feedback on varieties or included crop types and trial locations.

NACs were introduced following a 2008 review that recommended a more formalised advisory and consultative mechanism for grower involvement.

Today, there are 15 NACs across Australia. A recent change in Western Australia led to five regional meetings rather than a single centralised meeting in Perth.

Sean Coffey, NVT senior manager, says this change allows for a greater ability to get a handle on regional issues – a key benefit of the NACs.

That said, the NAC model remains very similar to its original form, providing stability that has helped guide NVT management decisions.

“The NACs were developed to provide advice on the program's operational management,” Mr Coffey says.

“They are an advisory and consultative mechanism established as a ‘grower's voice’ to provide local or regional operational advice to NVT management.

“The NACs are specifically aimed at getting input from growers, or those representing grower interests, to ensure trial management reflects district practice.

“This is important when we have to make late changes to trial sites. They have helped identify suitable paddocks and work with our trial service providers (TSPs). TSPs will be in contact with NAC members for support and advice throughout the year,” Mr Coffey says.

This has included decisions from increasing the dry sowing of crops to transitioning certain trial series into or out of the program.

“NACs have also provided the NVT team with valuable advice on any new changes to the program.”

The NVT team is always open to new NAC members. Contact an NVT regional manager or email [nvt@grdc.com.au](mailto:nvt@grdc.com.au). □

# NVT reflect a ‘team Australia’ approach

For two decades, trial service providers have created the region-specific data on crop performance needed to power the NVT, allowing growers to make informed decisions about variety selection

Audrey Gripper in a plot of wheat at the Southern Farming Systems Inverleigh trial site.



By Sandra Godwin

## KEY POINTS

- Trial service providers are essential for GRDC’s National Variety Trials (NVT)
- There are 13 trial service providers across Australia engaged in the NVT
- They select sites, as well as plant, maintain, assess and harvest trial crops across the country, feeding all the data into the NVT portal for analysis by statisticians

■ For the past 20 years a nationwide network of trial service providers has allowed GRDC’s National Variety Trials (NVT) to function year after year.

The network includes private companies such as Kalyx Australia, grower groups such as Southern Farming Systems (SFS), and state departments such as the Department of Primary Industries and Regions (PIRSA) through the South Australian Research and Development Institute (SARDI). There are trial service providers across Australia engaged in the NVT.

Kalyx has been an NVT partner since 2005 and now has a team of up to 100 permanent staff, plus seasonal staff, who select sites as well as plant, maintain, assess and harvest trial crops across the country, feeding all the data into the NVT portal for analysis by statisticians.

In south-west Victoria, SFS manages dozens of trials across sites at Hamilton, Inverleigh and Streatham, testing a wide range of crops including wheat, barley, oats, canola and faba beans.

SFS senior research and extension officer Audrey Gripper says the five-year contracts provide the stability to hire and train staff and ensure continuity.

“The NVT complement the other trials and project work we do,” she says. “We can use newer, high-performing varieties in fungicide or plant density trials to look more in-depth at what management works best for our area.”

SARDI manages more than 100 trials in South Australia. Agronomy program leader Associate Professor Rhiannon Schilling says the diversity of environments ensures the trials capture a wide range of data to reflect variability across the state’s main cropping regions.

### INDEPENDENT DATA SOURCE

For two decades, the NVT have provided Australian grain growers with independent, region-specific data on crop performance, helping them make informed decisions about variety selection.

Its roots stretch back as far as the 1960s to programs such as the WA Department of Agriculture Crop Variety Testing (CVT) and other evaluation programs such as those run in SA in the 1980s by Rob Wheeler.

By 1994, when Plant Breeder’s Rights were legislated, commercial operators were beginning to take over from mostly government and institution-based plant breeding programs.

Companies such as Kalyx played a crucial role in those early stages. Kalyx managing director Ashley Bacon recalls their involvement during the NVT’s infancy.

“We were providing trial variety evaluation services to GRDC from the mid to late 1990s, under the CVT program, and it was out of that the NVT evolved,” he says.

Now covering all the major cropping regions, the goal is clear: to provide independent, unbiased data on the performance of new varieties of cereal, pulse and oilseed crops.

### CHALLENGES AND OPPORTUNITIES

Running such a large-scale national program is not without challenges. From weather conditions to logistical hurdles, trial service providers must navigate a complex set of variables each year.

SARDI senior agricultural officer John Nairn says each year brings different seasonal conditions, just like on growers’ properties, including late breaks, drought and frost.

Mr Bacon says one of the unique challenges in managing NVT is their spread across all production areas to represent the needs of all growers. This is typically not the case for privately funded trial programs.

“Growers understandably want to see the trials that they have helped fund conducted close to their own farms,” he says.

“At times, this can be a challenge, but it is no different to what farmers face and our national footprint helps us manage the cost and risk associated with this.”

Photo: supplied by Kalyx



Kalyx research agronomist Nell Bate. Companies like Kalyx played a crucial role in NVT’s early stages and still do today.

COVID-19 imposed additional novel problems, with restrictions affecting travel and access to sites. However, service providers adapted, working closely with GRDC to maintain their essential services status and implement safety protocols so the trials could continue.

Ms Gripper joined SFS in March 2020, just as the pandemic struck. “When I started, we couldn’t run any field days and I pretty much went a year without meeting anyone, so it’s been great to get out and talk to people the last two years,” she says.

### INDUSTRY-WIDE IMPACT

The independent data generated by the NVT is invaluable to growers, offering insights into how different varieties perform in local environments. One of the key strengths of the program is its region-specific focus, allowing growers to see how varieties fare in conditions similar to their own.

“The trials are a great drawcard for growers because they are so region-specific,” Ms Gripper says. “Growers are always interested in seeing the top-performing varieties.”

Field days, crop walks and other outreach activities help bridge the gap between trial data and practical on-farm decision-making about which varieties to invest in.

The sheer volume of data generated over the years provides a robust resource that does not just benefit growers. Plant breeders and consultants across the country rely on NVT results to guide their recommendations.

“Breeding companies refer back to NVT data when showcasing their varieties,” SARDI’s Mr Nairn says. “It’s trusted in the industry because it’s independent.”

### LOOKING TO THE FUTURE

As the NVT moves into its third decade, the partnerships between GRDC, service providers and growers remain critical.

“It’s the highest profile trial program in Australia, and potentially the world,” Kalyx’s Mr Bacon says.

“NVT deserves a massive congratulations on getting to 20 years, and we really look forward to continuing to partner with GRDC on this.” □

# Grower hosts keen to see new varieties in action

Hosting trials on-farm gives National Variety Trials (NVT) grower hosts line-of-sight awareness of new varieties coming through the pipeline

Photo: Evan Collis



GRDC Western Panel chair Gary Lang values hosting NVT, saying every variety he's adopted has been via the trials. Mr Lang has hosted trials since the NVT began.

By Sandra Godwin

■ Longtime National Variety Trials (NVT) host Gary Lang has been hosting the NVT on his farm near Wickpin, in south-west Western Australia, since the program began.

Gary, who took over as chair of the GRDC Western Panel last September, was a grain producer for 42 years, hosting research trials, including the NVT, for 20 years.

After retiring last year, he and his wife Sue leased out the farm, 'Wyoming', that has been in the family since 1923, except for a 10-hectare portion that they allocated to the Facey Group for trials.

A past president and life member of the grower group, Gary says they were keen to see Facey Group continue the NVT and other research trials at the farm.

During Gary and Sue's time at 'Wyoming', the NVT included wheat, barley and canola lines, which provided a valuable guide to potential varieties for the future.

"I always tried to have the latest varieties, and that's always seemed like a bit of a free kick to have the

highest-yielding variety you could," he says. "So I was keen from the business level. And other than that, my motivation was because it was such a big part of the Facey Group."

Gary says it is important for growers to have access to local, independent data that does not "cherry pick" from only the best results. "Every variety we've adopted, we've identified it through the NVT," he says.

Among the standouts has been HyTTec® Trident, a triazine-tolerant canola that was outyielding ATR Bonito<sup>®</sup> in trials by 25 to 30 per cent.

"That was a huge motivation to replace ATR Bonito<sup>®</sup> and we got a huge kick in yield out of that," he says.

"We got all of the 25 per cent increase in yield. You multiply that over – I think we did 600 hectares the first year we did it – and that's a lot of money."

## IMMENSE ADVANTAGE

Despite experiencing their worst season ever in 2024 due to extreme dry weather and a run of severe frost events, South Australian grower Robert Pockock says

the NVT barley plots at his farm in the Mallee performed exceptionally.

Sown dry into faba bean stubble in mid-May, the crop had less than 90 millimetres of growing season rainfall. Despite this, in the lead-up to harvest Robert was anticipating "exceptional" yields: "I'd have been happy if my barley looked like the NVT crop in 2024."

The family began hosting trials at Lampata more than 50 years ago, when Robert's grandfather Bob was at the helm. As well as barley, they have also occasionally hosted lupin trials.

Robert says hosting trials does not complicate on-farm operations yet the advantages are immense.

"We always liked seeing what's happening with new varieties that are getting tested," he says. "I generally will only look at changing a variety if it's gone through the NVT."

"If they're on your own patch, there's nothing better than that to have a look ... and you get good access to the people who are at the forefront, on the ground, and they're usually quite happy to share what's happening."



Photo: supplied



Canola in flower at 'Myee', near Grenfell, NSW, in September.



Photo: Nicole Baxter

Paul Tognetti has hosted the NVT for more than a decade. The site also serves as a focal point for Delta Ag's annual field day, bringing growers and agronomists together.

Robert says one of the major benefits has come from pitting varieties against each other in similar circumstances.

"It's all in the notes, but seeing it is better, because quite often we have groups of farmers come out to have a look and it's always good to hear what they think."

### KNOWLEDGE BANK

With a rotation based on wheat and canola for the past 25 years, New South Wales grower Paul Tognetti is particular about the traits he wants to see in new canola varieties: increased yield, better blackleg resistance and stalk strength.

Paul has been hosting the NVT for more than a decade at 'Myee', the dryland property he manages near Grenfell, in central NSW.

"I was asked to go in, and thought it would be great for our district, and our business, to have that chance to see what different canola varieties do," he says. "The other good thing is we have a field day each year with Delta Ag.

"It brings our grower group together, socially and agronomically, to look at it. Our local agronomists also get



While growers benefit from seeing new varieties in the pipeline, the program has also benefited from their generosity.

**"THE SUCCESS OF THE NVT PROGRAM HAS BEEN MADE POSSIBLE THROUGH THE SUPPORT OF LOCAL GROWERS WHO PROVIDE LAND TO HOST THE 650 TRIALS RUN EACH YEAR."**

– Sean Coffey, NVT senior manager



Photo: supplied

Wheat at 'Myee', near Grenfell, NSW, in August.

involved and often the reps from Nuseed and Pioneer attend, so it's a good get together ... we learn a bit and have a look at the different varieties."

Further west, Jeff Muirhead has had an NVT site assessing barley, bread and durum wheat, and oat varieties on his property near

Merriwagga for the past seven years.

Jeff trusts the independent data and chooses which varieties to grow based on how they perform locally over a period of three or four years. While yield is important, other factors such as demonstrated resistance to disease are also highly valued, he says. □

# NVT: a test for pathogen resistance

GRDC invests in plant pathologists and pre-breeders who use the National Variety Trials to screen and select varieties for resistance to disease

By Nicole Baxter

■ Plant pathologists carry out disease screening services as part of the National Variety Trials (NVT) to provide growers with independent disease ratings on new varieties. Through a network of plant pathologists supported by the NVT, soon-to-be-released varieties are screened for a range of diseases in different environments. The results of this critical work are passed on to growers via the NVT website and publications, enabling crop varieties to be selected based on their resistance to disease.

## Steve Marcroft

Marcroft Grains Pathology

### 1. Where are you located?

Horsham, Victoria.

### 2. What crop do you research?

Canola.

### 3. What is the most pressing disease?

Blackleg.

### 4. How does the NVT help?

We develop blackleg ratings for canola using eight disease nurseries across Australia. All the seed companies provide commercial varieties and cultivars two years before release. We screen these for

disease resistance. Based on our findings, we produce a blackleg management guide twice yearly.

With the NVT yield trials, we use 32 sites across Australia's canola-growing regions to monitor evolving blackleg populations to enable regional-specific advice.

### 5. What's the benefit of it?

An independent service to test canola for blackleg is critical, enabling growers to choose cultivars with major blackleg resistance genes.

### 6. What would growers do if this information did not exist?

Canola cannot be grown without blackleg

Marcroft Grains Pathology's Dr Steve Marcroft produces a blackleg management guide twice a year and uses NVT data to monitor evolving blackleg populations to enable regional-specific advice.



resistance, and the industry is unlikely to have developed without blackleg ratings. The blackleg pathogen evolves quickly, so cultivars lose resistance, which is why some can only be used for three years. Without the NVT, growers could not access regional advice about canola's resistance to blackleg.

## Grant Hollaway

Astute Ag

### 1. Where are you located?

Horsham, Victoria.

### 2. What crop diseases do you research?

Cereal diseases.

### 3. What is the most pressing disease?

Rust.

### 4. How does the NVT help?

The NVT is essential when communicating with growers about disease management. It gives growers the confidence not to apply fungicide if the variety they select has adequate genetic resistance.

### 5. What's the benefit of it?

The NVT disease ratings are critical for helping growers select varieties resistant to various diseases and determine the required in-crop or fungicide management level.

### 6. What would growers do if this information did not exist?

Without the NVT, disease management would be more challenging. Growers would not know the resistance of various varieties to disease, and fungicides would likely be applied equally to resistant and non-resistant varieties.

Astute Ag senior consultant Dr Grant Hollaway worked on the NVT for many years in his former role at Agriculture Victoria.

Photo: supplied by Grant Hollaway



Photo: Brad Collins

Dr Hari Dadu manages Agriculture Victoria's cereal disease program.



Photo: Agriculture Victoria

## Hari Dadu

Agriculture Victoria

### 1. Where are you located?

Agriculture Victoria's Horsham SmartFarm.

### 2. What crop diseases do you research?

Cereal (wheat, barley and oat) diseases.

### 3. What is the most pressing disease?

Stripe rust. It can cause severe grain yield losses if left uncontrolled.

### 4. How does the NVT help?

It enables growers to see how released and yet-to-be-released varieties hold up regarding resistance. We identify the most disease-resistant varieties according to region.

### 5. What's the benefit from it?

Growers can select disease-resistant varieties based on resistance ratings. Growers can better develop a management strategy for disease based on the disease rating.

### 6. What would growers do if this information did not exist?

Fungicides may be overused, leading to resistance, reducing the tools available to growers and lowering yields.

## Joshua Fanning

Agriculture Victoria

### 1. Where are you located?

Agriculture Victoria's Horsham SmartFarm and AgriBio Centre for AgriBiosciences in Bundoora.

### 2. What crops and diseases do you research?

I work on soil-borne diseases in lentils, faba beans, chickpeas, vetch, field peas, lupins and cereals.

### 3. What are the most pressing diseases?

Botrytis grey mould and chocolate spot in

Photo: Luise Fanning



Agriculture Victoria senior research scientist Dr Joshua Fanning says standardised varietal disease ratings are important. "Varietal resistance is one of the main building blocks for a robust integrated disease management plan."

lentils, faba beans and vetch, as there are only a few resistant varieties.

#### 4. How does the NVT help?

The NVT provides standardised varietal disease ratings. Varietal resistance is one of the main building blocks for a robust integrated disease management plan.

#### 5. What's the benefit of it?

The NVT offers a standard rating process and definition across the disease by crop combinations. With correct ratings, it provides a standard communications approach for disease management.

It identifies the risk that a variety will succumb to disease, which allows a disease management plan to be developed.

#### 6. What would growers do if this information did not exist?

Our disease management plans would be a guess. We would have to treat all varieties as susceptible and apply more fungicides than necessary, likely leading to more fungicide resistance.

## Manisha Shanker

Western Australian Department of Primary Industries and Regional Development

#### 1. Where are you located?

South Perth, Western Australia.

#### 2. What crops and diseases do you research?

I work as a plant pathologist and pre-breeder on wheat and oats. The diseases I research are yellow spot, Septoria nodorum blotch and powdery mildew.

#### 3. What is the most pressing disease?

Yellow spot.

#### 4. How does the NVT help?

The NVT accurately estimates resistance to various diseases and pathotypes in commercial and breeding material regionally and nationally.

#### 5. What's the benefit from it?

The NVT plays a crucial role in monitoring the effectiveness of resistance genes in varieties. This information is essential for breeders, pre-breeders and growers when

selecting disease-resistant varieties.

#### 6. What would you do if this information did not exist?

If we did not have access to disease resistance information through the NVT, we would have to develop a research program to know what varieties to choose for developing populations for pre-breeding and monitoring various pathogens. □

**GRDC Codes MGP2404-004SAX, DEE2403-003SAX, DJP1905-002SAX, WAA1905-001SAX**

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Photo: WA DPIRD



Dr Manisha Shanker is a senior plant pathologist at the Western Australian Department of Primary Industries and Regional Development. She says the NVT plays a crucial role in monitoring the effectiveness of resistance genes in varieties.

# Impact of NVT extends beyond variety selection

**For 20 years the National Variety Trials data and resources have been exploited for a range of innovative purposes, including the development of classification frameworks that provide growers with a marketing edge**

Jen Lillecrapp is Grains Australia's classification and technical officer – pulses.



Photo: Grains Australia

By Dr Gio Braidotti

■ Jen Lillecrapp is tapping into historic National Variety Trials (NVT) data for a truly innovative purpose.

She is interrogating NVT data related to pulse quality traits to develop frameworks to classify Australian pulse varieties based on the quality requirements of markets and end-uses.

This work, a GRDC initiative, is being undertaken at Grains Australia. In addition to classification, functions include trade and market access, market insights and market education. Ms Lillecrapp is the initiative’s classification and technical officer – pulses.

“The classification systems we are developing already exist for wheat and barley,” Ms Lillecrapp says. “These systems classify varieties in terms of genetic quality traits for specific end-uses, such as malting or pasta-making. We are now working on similar systems for pulses and Grains Australia has recently implemented a system for oats.”

The NVT dataset is unique in its ability to support this kind of research and development work for a number of reasons.

Firstly, the data is independent and generated across numerous environments and seasons using robust and consistent methods. Secondly, the trials provide a side-by-side comparison of varieties and lines from breeding programs and companies.

“This enables us to assess if there is a strong and consistent genetic effect or if there is genotype by environment interaction that influences the expression of specific grain quality characteristics,” Ms Lillecrapp says.

“That’s important because a classification system needs to be based on a variety’s genetic propensity to produce a particular quality trait, such as seed size, which is important for many end-uses and markets for pulses.”

Varietal classification provides major industry benefits, such as:

- ensuring growers, traders and customers understand the genetic qualities of varieties;
- allowing for differentiation based on genetic qualities of varieties; and
- conveying market signals to breeders.

### RESOURCE SHARING

To access the historical NVT data, Grains Australia entered into a ‘sharing agreement’ with GRDC. The data was then extracted, sorted and provided to Grains Australia.

“This resource sharing means we can use the data to build pulse classification systems based on quality characteristics that will deliver value for growers, the wider grains industry supply chain and our customers,” Ms Lillecrapp says.

The Resource Sharing Program has supported more than 100 research projects since its inception in 2022.

### RESEARCH SEED MULTIPLICATION

Alongside the normal variety trials, the NVT system also runs a seed bulk-up program. The Research Seed Multiplication (RSM) program grows all the commercial varieties at a single point of origin to reduce variability. This seed is then made available to all GRDC researchers who need access to consistent seed of varieties within their trials.

It produces about 22 tonnes of seed for over 240 commercial winter crop varieties.

This system eliminates variability in research work by ensuring consistent, high-quality seed while creating larger economies of scale and reducing duplication of resources.

Every November, the head of the RSM program sends out an expression of interest to all GRDC researchers and provides a list of the varieties in the bulk-up program. Researchers can then request a certain amount of seed for their trials. □

### RESOURCES FOR RESEARCH

NVT resource sharing has been used in many GRDC investments.

This includes for example the ‘Analysis of herbicide loss on grain cropping in Australia using the NVT yield data to inform assumptions of yield potential’ project.

CSIRO’s Dr Rick Llewellyn is making use of a bespoke dataset from NVT seasons 2014–22 for all regions.

Another example is found in Dr Dean Diepeveen’s work at DPIRD. He has been using wheat, barley and canola mean yield and trial location data in a project called ‘Review of WA agzones as climate and farming practices have changed, which alter the boundaries of the zones’.

**“THIS ENABLES US TO ASSESS IF THERE IS A STRONG AND CONSISTENT GENETIC EFFECT OR IF THERE IS GENOTYPE BY ENVIRONMENT INTERACTION THAT INFLUENCES THE EXPRESSION OF SPECIFIC GRAIN QUALITY CHARACTERISTICS.”**

– Jen Lillecrapp

#### Resources

- National Variety Trials, [nvt.grdc.com.au](http://nvt.grdc.com.au)
- Grains Australia, [grainsaustralia.com.au](http://grainsaustralia.com.au)

Photo: Paul Jones



Classification systems help group varieties that have genetic quality traits for specific enduses, such as malting or pasta-making. Work on pulses is underway.

# VISIT [grdc.com.au](http://grdc.com.au) TO FIND OUR RANGE OF GROWER RESOURCES

Including NVT Harvest Reports  
and Crop Sowing Guides,  
fact sheets, podcasts,  
events and more.

