

Potatoes SA remains rooted in research

By Susan Marais, Plaas Media

“Roots in the ground with the future in mind.” This was Potatoes SA’s theme for this year’s research symposium held in Parys in the Free State between 18 and 20 July.

This year the annual event combined 26 research projects with panel discussions during which researchers, producers and other industry role-players shared their insights on matters pertaining to technological advancements, soil health, foliar disease, insects and consumer insights.

Dirk Uys, Potatoes SA’s research and innovation manager, said that in the long term five enablers will impact the South African potato producers positively.

- Global population growth.
- Consumers’ movement towards healthier food.
- Collaboration with input providers.
- Innovations in breeding.
- Investment in potatoes.

The red flags are rising input costs, policy and regulatory challenges, environmental pressures, competition for global resources, and the quality and shelf life of potatoes.

Mechanisation and irrigation

Dr Jacques van Zyl, a senior researcher at the Western Cape Department of Agriculture, explained that a long-term study of Sandveld potatoes by the department revealed that conservation farming practices could lead to more sustainable potato production in the region.

“During the study, we found that neither yield nor quality was negatively influenced by conservation tillage, while it did lead to a definite increase (46%) in the soil’s carbon levels,” he said. Rip tillage also produced the best results, and the department recommended that Sandveld producers utilise this method going forward. “Currently, we are not seeing any weed or disease problems, and biological activity increased with conservation tillage practices.”

Julian Conrad, CEO of Groundwater and Earth Sciences (GEOSS), and his team have been

studying soils in the same region for nearly three decades. Over the years the GEOSS research team saw that the Sandveld water table was rapidly declining. “We are seeing a decline of between 0.6 to 1 m per year, which means that we only have roughly 30 years’ water left before running into serious trouble. Water quality is also deteriorating.” Conrad based this statement on the fact that the water’s electric conductivity was increasing.

“This means we have roughly 20 years of fairly usable water left. The legal status of water usage in this area is another issue of grave concern. The Department of Water and Sanitation simply isn’t doing enough to move the process forward quickly enough. Better control of water usage is essential.”

Conrad says it is becoming more complex and more expensive for producers to obtain water licenses. “During the Covid period, a backlog started at the Department of Water Affairs in the Western Cape and has never been cleared. It is important that this issue is addressed as soon as possible. Because we have limited water available, it is important to use every drop as efficiently as possible.”

Soil health

Uys said soil ecology is currently the biggest investment area in the Potatoes SA research programme. “As highlighted during the symposium, we don’t only farm potatoes but also soil biology.” To support this view, Dr Mieke Daneel, a researcher at the Agricultural Research Council’s (ARC) division for tropical and subtropical crops, addressed the importance of cover crops and green manure in a rotation system. “Cover crops not only control nematodes; they also improve the soil’s quality, which will over time lead to better quality potatoes,” she said.



The first panel discussion focussed on mechanisation and irrigation. Gerrit Bezuidenhout (far left) facilitated the session. The panellists, from left to right, were Prof Martin Steyn of the University of Pretoria’s Department of Plant and Soil Sciences, Dr Jacques van Zyl of the Western Cape Department of Agriculture, Julian Conrad, CEO of GEOSS, and Chris Barnard, an independent fertigation consultant.



Piet Brink (left), manager of Agronomy Services at Yara and chairperson of the Sandveld working group, was one of the recipients of the *Solanum tuberosum* award for his contribution to potato research. With him is Gert Bester, chairperson of Potatoes SA.



Prof Hannelene du Plessis of the North-West University received the Plaas Media award for best research article published in CHIPS magazine between July 2022 and July 2023. Susan Marais from Plaas Media handed over the award.

Producers struggling to control nematodes should consider planting the following cover crops, as they are poor hosts for root-knot and lesion nematodes: Tolgar Rhodes grass (*Chloris gayana*), Turfsaver tall fescue (*Festuca*), marigold (*Tagetes patula*), saia oats (*Avena strigose*) and scala brown mustard (*Brassica juncea*).

Dr Estianne Retief of the ARC's Plant Health and Protection Soilborne Plant Diseases Unit, spoke about the molecular characterisation and pathogenicity of *Fusarium* species collected in the Limpopo province. She warned producers that some *Fusarium* species causing wilt were only now being observed to cause potato wilt in South African fields.

"*Fusarium* wilt is a vascular potato disease. The pathogen infects the potato via the roots and then colonises the xylem vessels of the stem. This is followed by chlorosis (yellowing) of the leaves followed by necrosis. Vascular discolouration occurs in the stem and the plant often becomes stunted. Advanced disease may result in the death of the plant," Dr Retief said.

For their study, Dr Retief and her team collected 230 isolates from potato plants in Limpopo. The researchers identified 25 species of *Fusarium*, four of *Neocosmospora* and one of *Bisifusarium*. *Fusarium clavus*, *F. nygamai*, *F. nirenbergiae* and

N. falciformis were the most predominant species identified.

"We have isolated *F. nirenbergiae* from potatoes before and it has been known to cause wilt. But this is the first time that *N. noneumartii* was reported in South Africa. However, *N. noneumartii* was reported to produce wilt in Israeli potatoes."

Albert de Villiers, a Western Cape potato and wheat producer, said his farm's soils started improving in 1998 when they initially planted wheat as a cover crop to prevent the wind from blowing their topsoil away. "The results were incredible. We harvested 500 kg/ha more in the first year alone."

The cover crop also directly led to improved soils and over the years De Villiers was able to decrease his fertiliser costs by R10 000/ha. "It takes years to decrease the need for agrochemicals, but after two years we started noticing an improvement in our soils' drainage," De Villiers said.

Today De Villiers will rather invest in his soils than pay for damage control, such as fumigation. "If you must fumigate, you don't have an option. But I do believe prevention is better than cure."

Foliar diseases

Dr Elsie Cruywagen, a plant pathologist at the ARC-Vegetable, Industrial and Medicinal Plants,

gave a talk on the efficacy of fungicides against *Alternaria* on potatoes.

"Early blight and brown spot are caused by four *Alternaria* species in South Africa. They are the most important foliar diseases in potatoes," Dr Cruywagen said. "Early blight is caused by *Alternaria solani* and *A. grandis*, while brown spot is caused by *A. alternata* and *A. arborescens*."

However, according to the Fungicide Resistance Action Committee (FRAC), there was a high risk of *A. alternata* developing resistance to fungicides and a medium risk of *A. solani* developing resistance. During a Potatoes SA-funded project, 1 237 *Alternaria* isolates were isolated from 54 farms located in 13 potato production regions in South Africa. "The isolates were tested *in vitro* against five classes of fungicides."

The results indicated that both small- and large-spored *Alternaria* from all areas showed a loss of sensitivity to Qol (strobilurin) fungicides, Dr Cruywagen indicated. "Those isolates with loss of sensitivity to azoxystrobin all showed a loss of sensitivity to picoxystrobin as well."

Furthermore, all potato-producing areas, except the Sandveld and Ceres, showed a high prevalence of loss of sensitivity to the SDHI (fluopyram) fungicide. "All regions also showed

a loss of sensitivity to dicarboximide (procymidone) fungicides and all areas had isolates with loss of sensitivity to tebuconazole." In respect of difenoconazole, most isolates were still sensitive to this agrochemical.

Due to a widespread loss in sensitivities, Dr Cruywagen recommended that continuous treatment with the same mode-of-action fungicide should be avoided. Furthermore, producers were urged to follow the recommended dosage rates on labels. "The timing of fungicide application is important, so avoid treating too late when the pathogen population is already high," she urged. "Producers should make use of integrated disease management practices such as crop rotation, irrigation scheduling, and minimising plant stress."

Pressure on crop protection products, in general, was of grave concern, Uys indicated. "This is complicated by a shift in sensitivity towards important modes of action such as the potato tuber moth complex and foliar diseases caused by *Alternaria* spp."

The integration of biological alternatives in a spray programme offers a potential solution to the

problem, but pest and disease biology must be understood when developing viable spray programmes. "Fortunately, genetic improvements hold the potential of improving the potential of potatoes," Uys said. "This includes the opportunity offered by innovations such as hybrid true potato seed (HTPS) which is making inroads throughout the continent."

New breeding techniques can also improve tolerance to diseases such as late blight and viruses (PVY and potato leafroll), Uys added. "New breeding improvements will provide an opportunity to better manage environmental challenges. Potatoes SA's cultivar trials offer the opportunity of gaining a better understanding of the cultivar and its environmental interaction."

Innovations in crop protection

Prof Johan Burger discussed clustered regulatory interspaced short palindromic repeats (CRISPR) or gene editing, and whether this technology would be advantageous to the South African potato industry. "When we look at conventional breeding, it is clear that we've hit a genetic glass ceiling, while the options for gene editing are still vast," Burger stated.

He listed the following advantages of gene editing:

- One can precisely introduce targeted mutations.
- There is a possibility of multi-allelic and multigene mutagenesis.
- The introduced mutations' inheritance is much more stable than that of conventionally bred plants.
- Effective trait improvement is possible.
- Optimised CRISPR/Cas delivery methods to both protoplasts and explants become possible.
- There is a possibility of obtaining transgene-free genome-edited plants.

Murray Thompson, Potatoes SA's Farmer of the Year 2022, mentioned that it was important that the potato industry used new varieties that were less susceptible to pests and viruses. "We are losing chemicals at a rapid rate while pests are increasing and changing. While this is not currently a crisis, it is on the horizon and we must prepare for it." Thompson's farming business, Athorn Farming, trials around eight different cultivars per annum to determine which varieties would be best suited to their current farming conditions.

Cultivar trials

During the feedback session, Enrike Verster, a researcher at Potatoes SA, said the University of the Free State's (UFS) Department for Sustainable Food Systems and Development conducted a very interesting sensory test on the back of these cultivar trials. Ten cultivars were selected for the UFS taste analysis. These were P1 (Pepsico), Lanorma, Sababa, Allisson, Connect, Mondial, Sifra, Noya, Panamera and Sound.

A total of 72 people from various demographic backgrounds participated in the test. They were all between 18 and 65 years old and included women and men. Each tester had to rate each potato's appearance, taste, texture and aroma on a nine-point scale.

"While all cultivar samples were rated as 'tasty', the cultivars that the



The recipients of Potatoes SA bursaries who attended the symposium were (front, left to right) Lerika Potgieter, Danae Bezuidenhout and Nosipho Phungula. At the back (left to right) are Mandla Sibiyi, Tyla Swanepoel, Angeliqwe de Wet, Samukelisiwe Vilakazi, Gcinokuhle Buthelezi and Caroline Mhlaba.



Limpopo producer, Mossie Jongbloed (right), received the *Solanum tuberosum* award for his contribution to trials in the Limpopo area. Dr Ben Pieterse, chairperson of the Potato Industry Development Trust, handed over the certificate.



Prof Martin Steyn (left) was honoured with the *Solanum tuberosum* award for his contribution to the South African potato community's agronomy activities. The certificate was handed over by Willie Jacobs, CEO of Potatoes SA.

testers preferred overall were P1 and Lanorma," Verster indicated.

Innovative technologies

Louis de Kock, a Northern Cape potato producer, said a lot of positive technology is heading towards South Africa's agricultural sector. "When you look back on history, even during Roman times, the global leader has always been the country at the forefront of technology. That is why technology is important."

De Kock, a major producer and agricultural engineer, told how he bought his farm's first computer in the early eighties, shortly after moving to his Barkly West-based farm. "I initially bought the computer because I wanted something else to do on the farm besides farming. However, we were soon using it for wages. Ultimately, the fact that we incorporated this technology on our farm early on proved very beneficial to our farming operation."

Take home message

Uys indicated that going forward, Potatoes SA would continue its innovation focussed approach by researching the following areas:

- Soil and water health.
- The use of data to support

decision-making and mitigate grower risk.

- The importance of improved potato quality to enable growth in new markets.
- A programme to minimise waste from low-grade potatoes by developing new uses, which is funded by the Department of Science and Technology's Technology and Innovation Agency (TIA) programme. "These new uses will include breakfast and energy meals, as well as producing proteins for the animal feed industry," Uys said, adding that the outcome would hopefully find value-added uses for low-grade potatoes of which more than 35% were currently wasted.

Top scientists honoured

During the symposium gala dinner, Prof Hannelene du Plessis of the North-West University received the Plaas Media award for the best

research article published in *CHIPS* magazine during the period from July 2022 to July 2023. The article titled "Susceptibility of potato tuber moth to insecticides in South Africa" was published in the January 2023 issue of *CHIPS*.

Syngenta, one of the regular advertisers in *CHIPS*, was honoured as the *CHIPS* Advertiser of the Year. They received the award for their Miravis and Actara advertisements which used sport comparisons to convey their technical messages.

Potatoes SA also recognised three agronomists with the *Solanum tuberosum* awards for their contribution to potato research. They are Piet Brink, manager of Agronomy Services at Yara and chairperson of the Sandveld working group, Mossie Jongbloed, a Limpopo producer for his contribution to trials in the Limpopo area, and Prof Martin Steyn from the University of Pretoria for his contribution in respect of agronomy practices and irrigation. ©

Download a free copy of the Research Symposium's trial cultivar booklet by following this link digimags.agriorbit.com/books/rigz/ or scanning the QR code.

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