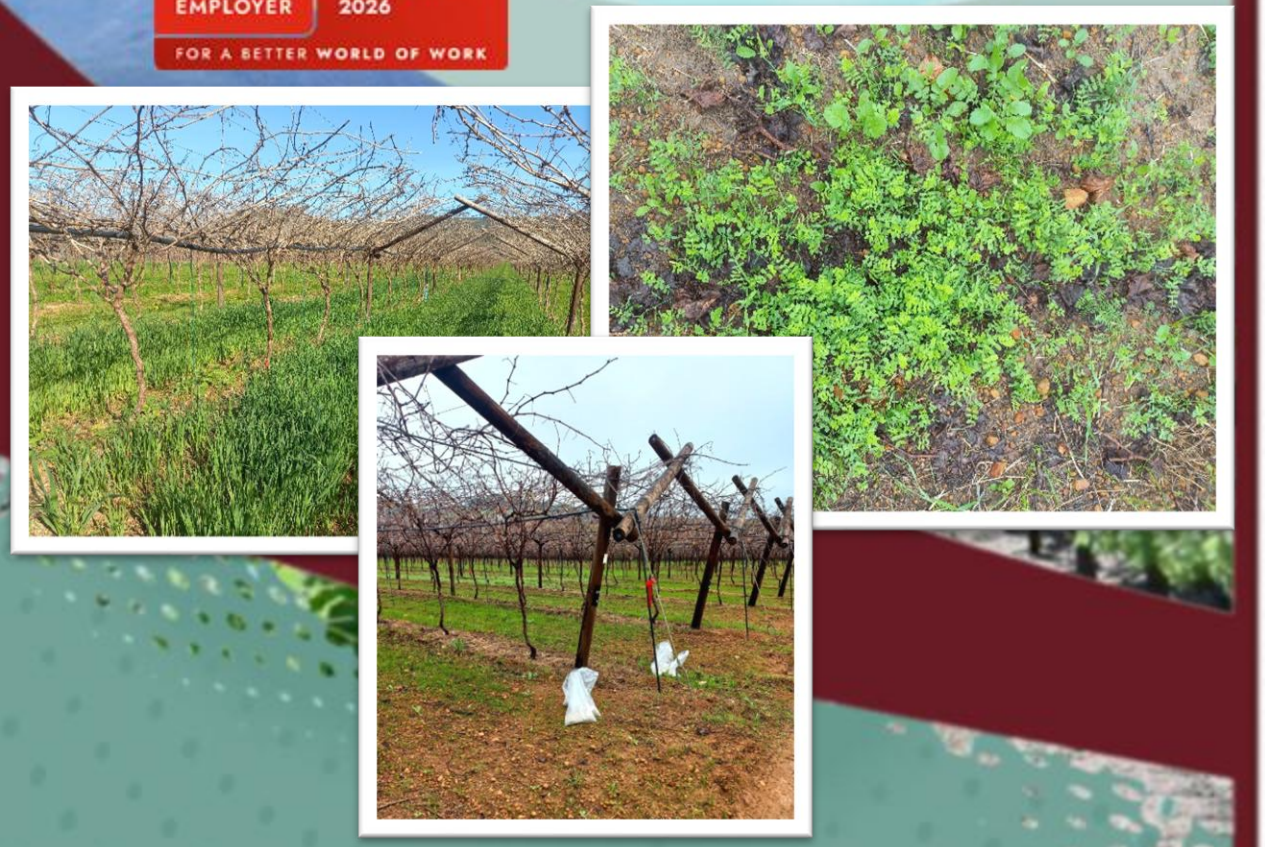
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Assessing the impact of cover crop cultivation in a Sweet Globe™ vineyard in the Berg River Region, South Africa

C. Howell, K. Freitag & R. Mulidzi
ARC Infruitec-Nietvoorbij
06/08/2026, Table Grape Conference 2026, Franschoek

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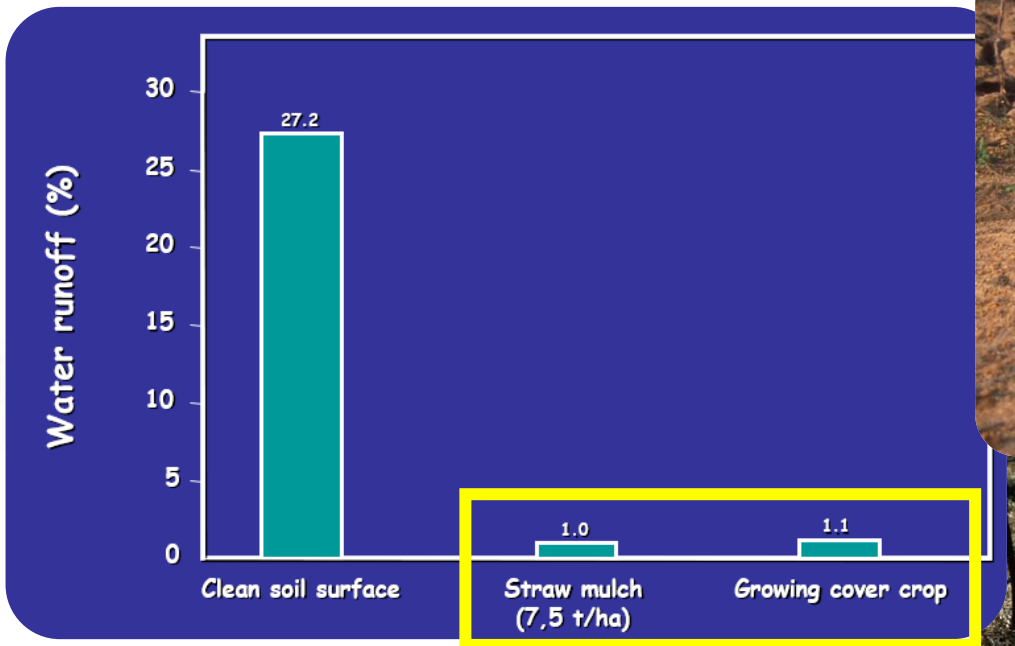
Background

- Annual cultivation of cover crops in the winter is almost standard practice in South African wine grape vineyards.
- Most of the research on cover crop cultivation in South Africa was carried out in micro-sprinkler irrigated wine grape vineyards where irrigation was applied to establish cover crops.
- The benefits of cover crops have been shown for wine grape vineyards in all regions as well as table grapes in the Northern Cape.



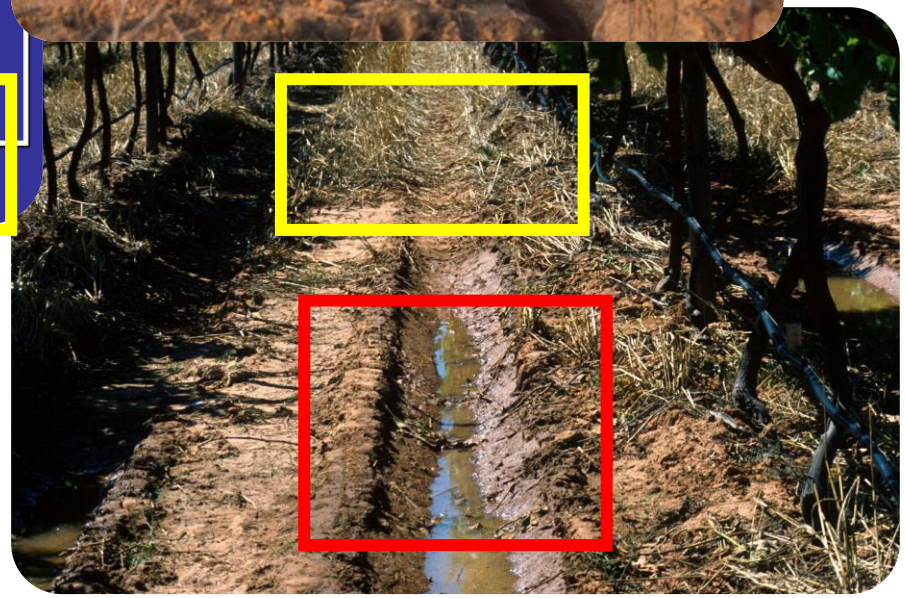
Background…

- These benefits include: Restriction of water runoff and erosion.



Louw (1991)





Background…

- These benefits include: Maintenance or improvement of organic matter content of soil.

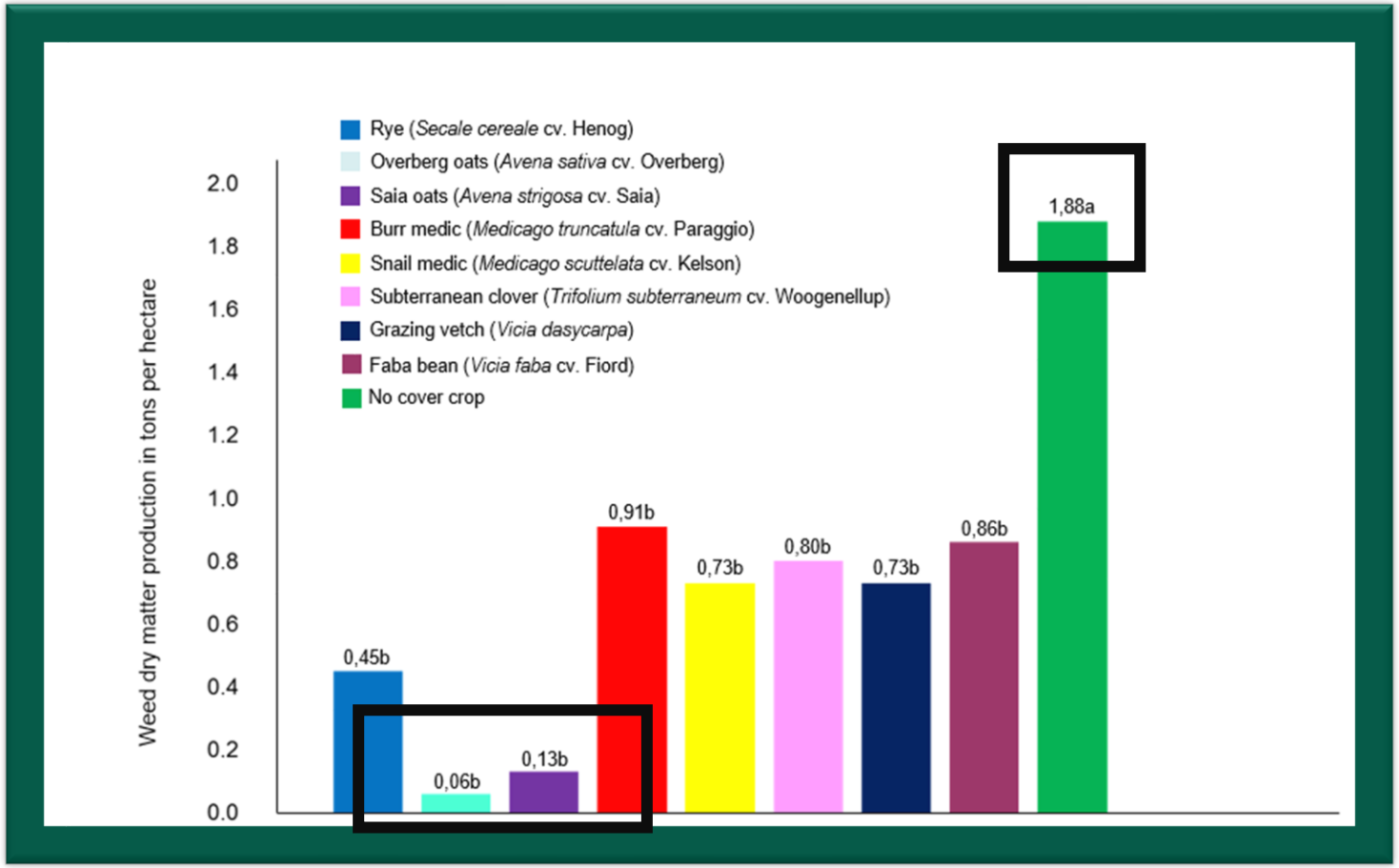
Practice	Organic C (%)				
	1993	1998	% increase	2003	% increase
Rye, chemical control	0.12	0.18	50	0.21	75
Pink Seradella, chemical control	0.11	0.17	55	0.21	91
"Paraggio" medic, chemical control	0.12	0.15	25	0.17	42
"Saia" oats, chemical control	0.10	0.13	30	0.17	70
Grazing vetch, chemical control	0.12	0.18	50	0.36	200
No cover crop, mechanical cultivation	0.10	0.11	10	0.12	20
No cover crop, chemical control	0.13	0.13	0	0.11	-15

Fourie (2007)

Background…

- These benefits include: Weed control efficacy.

Winter growing weeds



Fourie (2006)

Background…

- These benefits include:
  - Water savings.
  - Improved grape yield.





Background…

- Due to these benefits, table grape producers are becoming increasingly interested in cultivating cover crops in winter.

- In addition, it is regarded as one of the basic elements of environmentally friendly production systems and improvement of soil health.

- Growers are under increasing pressure to consider the financial implications of their management practices because of high standards required by the export market and the pressure to keep input costs as low as possible.



Background…

- However, only considering the input costs of soil cultivation practices can affect growers in the short- and long term.

- In 2022, the topic of cover crops was listed as a research priority on the research call of SATI to researchers and they were encouraged to submit proposals on the topic to SATI.

- ARC obtained funding from SATI and ARC for a project entitled “The use of cover crops to ensure sustainable table grape production (P04000323).”



Objectives

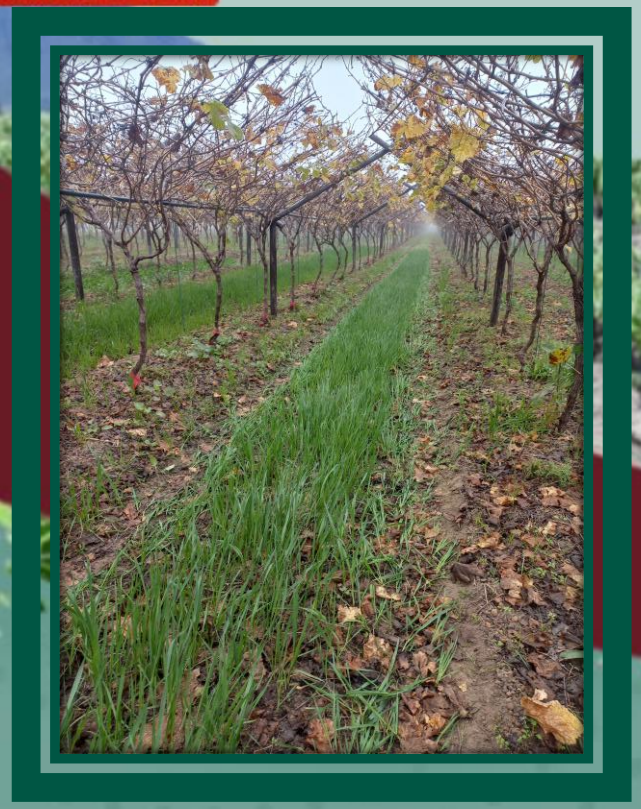
The project focuses on:

- **Effect of cover crops and placement of the plant residues on soil responses in a table grape vineyard.**

- **Effect of cover crops and placement of the plant residues on N status of soil and grapevine in a table grape vineyard.**

- **Effect of selected cover crops and placement of the plant residues on grapevine responses in a table grape vineyard.**

- **This study is seen as a first step towards a possible long-term objective, *i.e.* to develop suitable table grape cover crop systems for each growing region through continuous measuring and monitoring of the performance of different cover crops to reduce inputs and improve soil health and grapevine performance.**



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Approach





Location of the Sweet Globe™ experimental vineyard on Laborans farm where the field trial is being carried out.

Experimental design

- There are 4 different cover crop treatments plus a control. Treatments have been applied since April 2023.

- There are 2 management practices being applied to all treatments, namely
  (i) full surface, chemical control and
  (ii) slashing of the cover crops and placing the plant material on the grapevine row.

- Roundup herbicide is used for the chemical control management practice. For the slashed practice, cover crops are mechanically cut and placed on the grapevine row to create a mulch.



Treatments that are being replicated randomly in the experimental vineyard on Laborans farm where the field trial is being carried out.

Main Treatment (Factor 1)	Sub-treatment (Factor 2: Slash and spread on tree row before budbreak)
Cover crop specie(s) 1 (*e.g.* Pallinup oats) **Oats**	Yes No[1]
Cover crop specie(s) 2 (*e.g.* Yearly rotation) **Rotation of triticale and medics**	Yes No[1]
Cover crop specie(s) 3 (*e.g.* Grazing vetch **Grazing vetch**	Yes No[1]
Cover crop specie(s) 4 (*e.g.* Mixture of Triticale a lupins) **Mixture of triticale and lupins**	Yes No[1]
Control (farmer's standard practice)	Yes No[1]

[1] Chemically controlled

Sow the seeds in April/May



Weighed bags



Seeds being innoculated

Cover crop seeds being sown by hand





Fertilise cover crops with LAN at 100 kg/ha (June)







Measurements

- Cane mass at pruning
- Cover crop and weed dry matter production (DMP)
- Gravimetric soil water content (Oct, Nov, Dec, Jan/Feb)
- Soil analyses
- Leaf blade and petiole analyses
- Berry mass, size distribution and yield
- Post harvest quality

G. Nemaluma, an M.Sc student working on the project, will present a flash presentation on vigour, biochemical responses and leaf blade nutrient contents later today.



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Key findings

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Oats





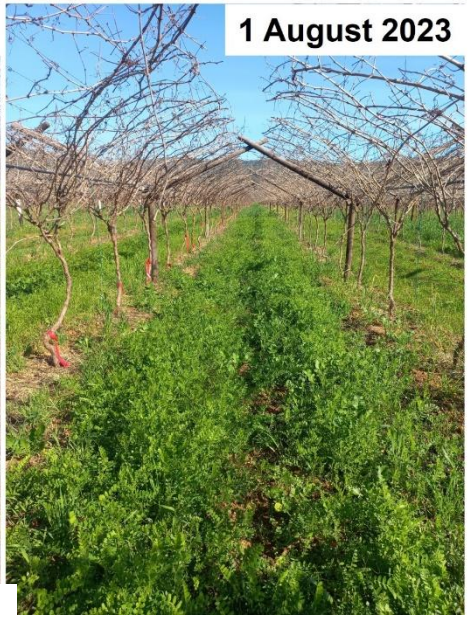






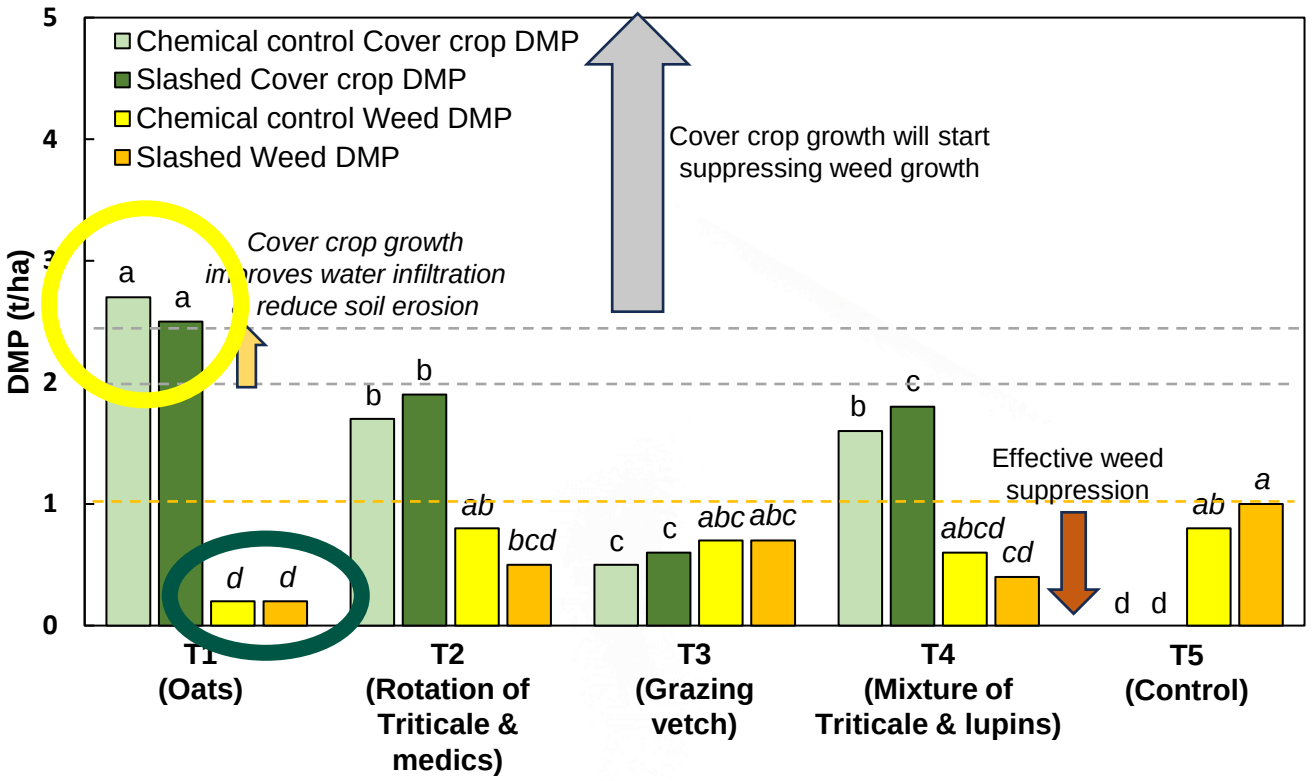






Grazing vetch

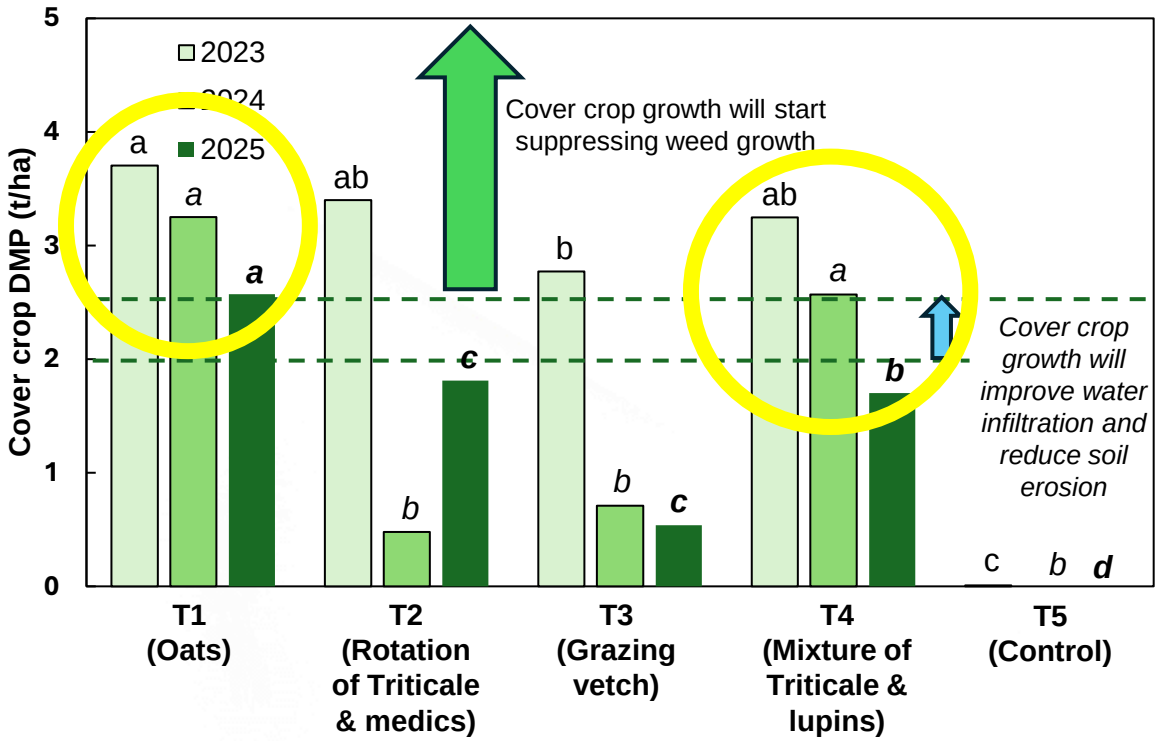
Dry matter production (DMP)





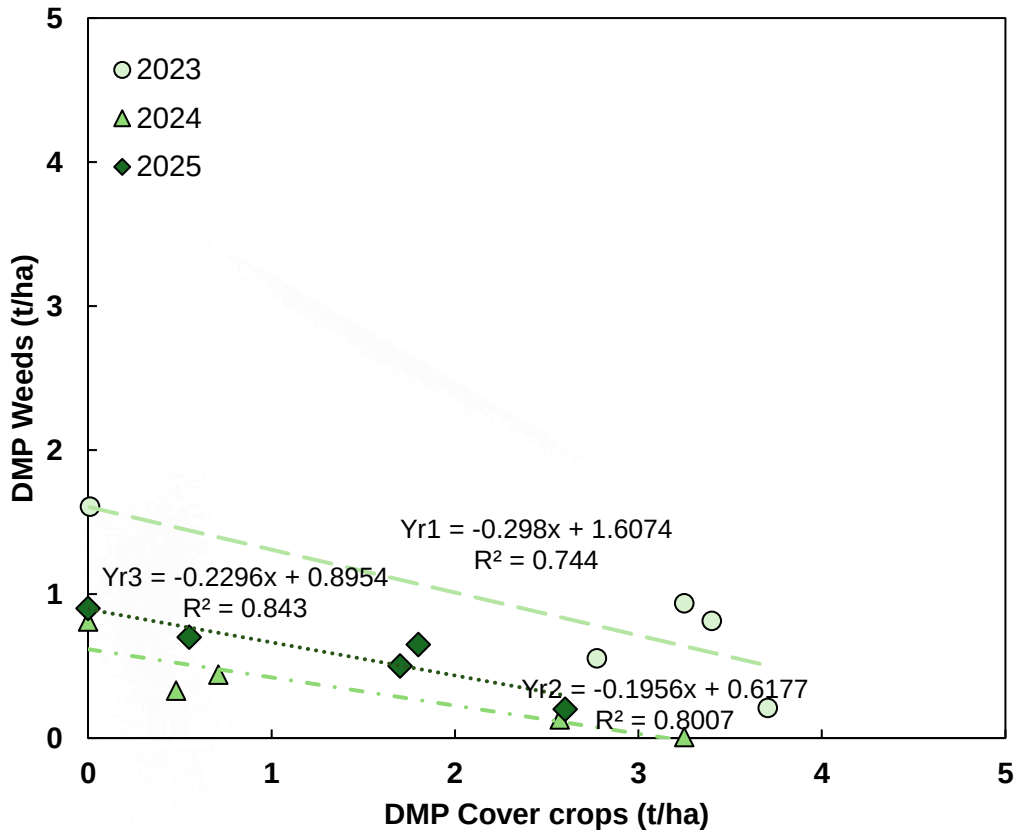
The dry matter production (DMP) of the different cover crops and weeds measured in September 2025. Values designated by the same letter for the cover crops and weeds do not differ significantly ($p \leq 0.05$).

Dry matter production (DMP)…



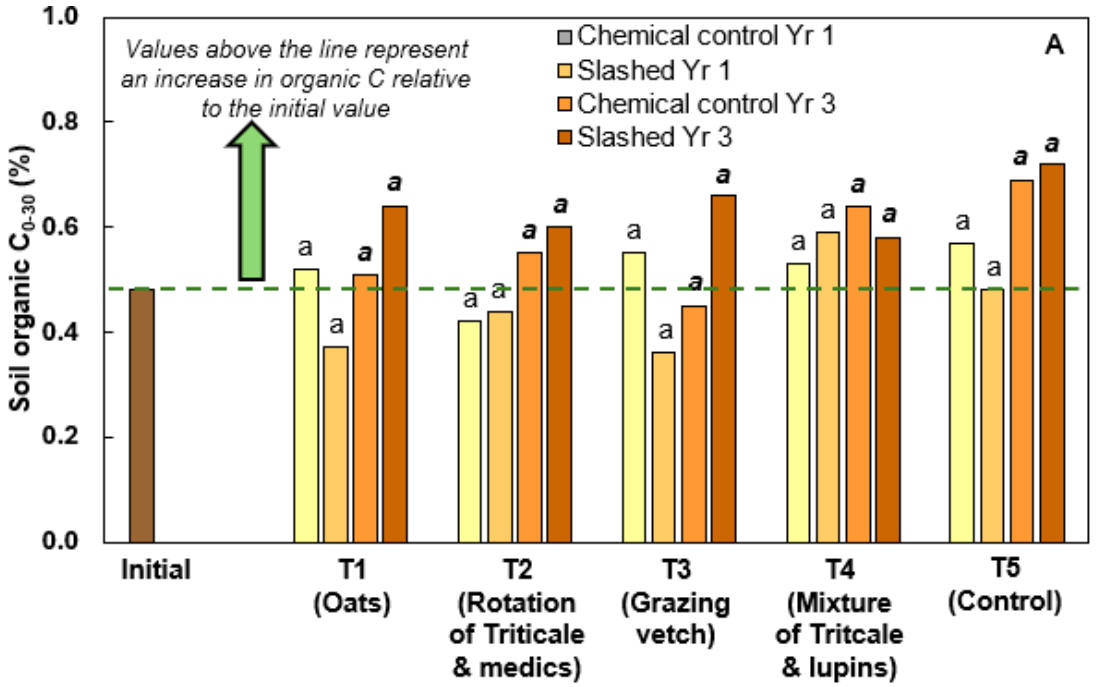
The dry matter production (DMP) of the different cover crops, regardless of termination method, measured in September 2023, 2024 and 2025. Values designated by the same letter for each data set do not differ significantly ($p \leq 0.05$).

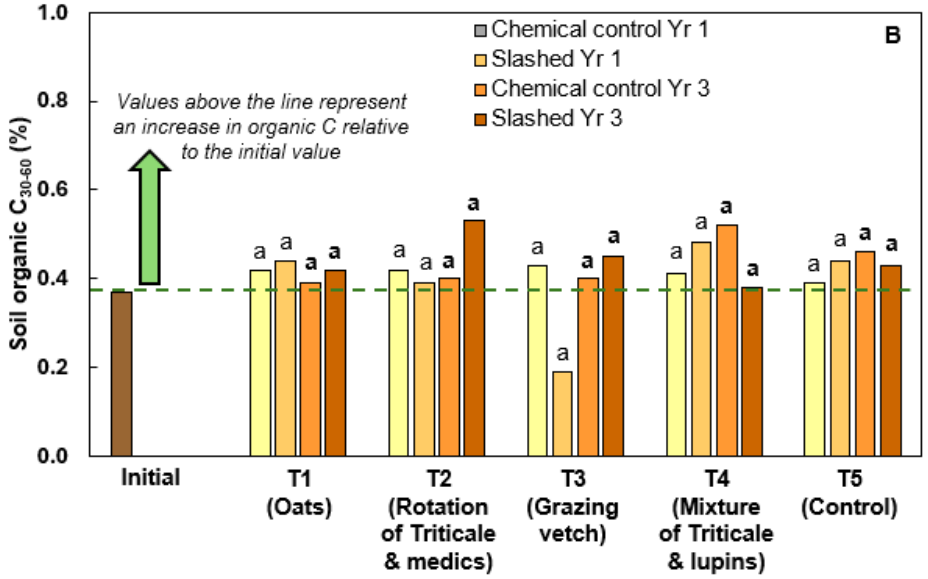
Dry matter production (DMP)…



The correlation between the cover crop dry matter production (DMP) and weed DMP determined in 2023, 2024 and 2025.

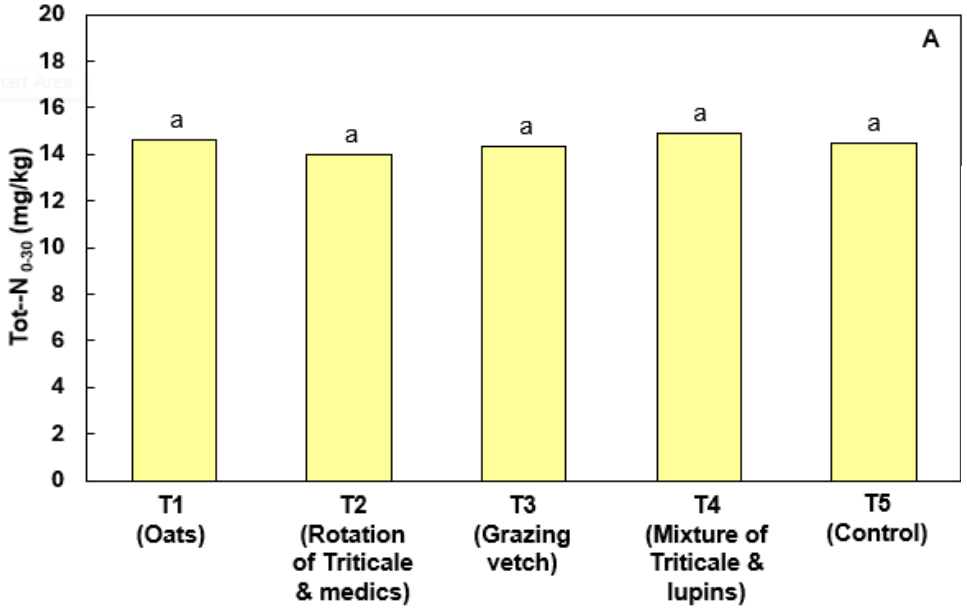
Soil

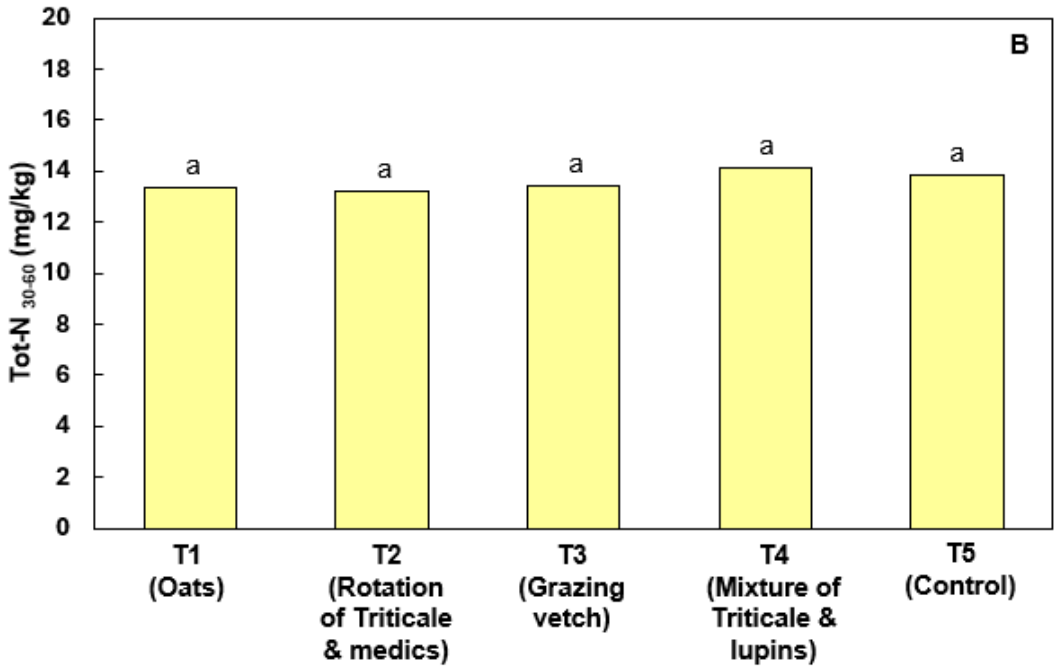




Effect of the different cover crops and termination methods on organic C in the (A) 0-30 and (B) 30-60 cm soil layers measured in November 2023 and 2025. Values designated by the same letter for the year do not differ significantly ($p \leq 0.05$).

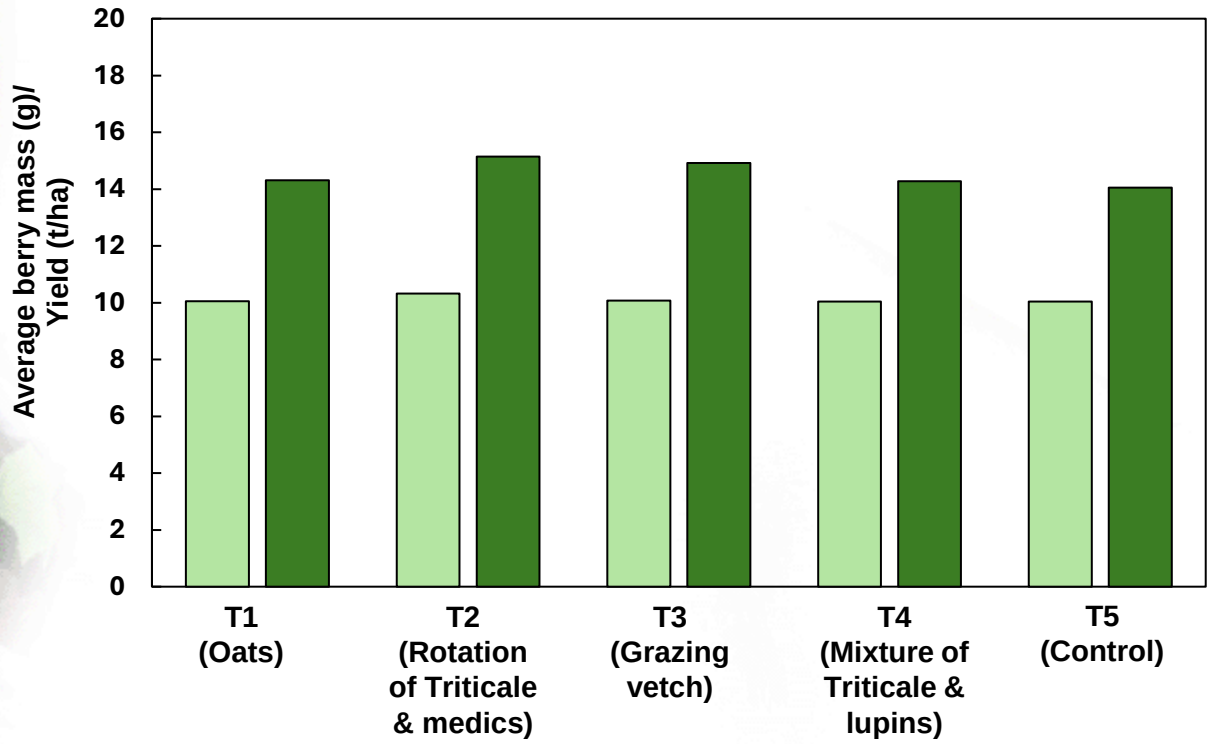
Soil …





Effect of the different cover crops, regardless of termination method, on inorganic nitrogen in the (A) 0-30 and (B) 30-60 cm soil layers measured in November 2025. Values designated by the same letter do not differ significantly ($p \leq 0.05$).

Yield





Average berry mass and yield measured from the 2023/24 to 2025/26 seasons.

Practical implications



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Practical implications

- **The study is the first one investigating the use of cover crops in a table grape production region in the Western Cape.**
- **Some of the cover crops grew very well under the prevailing conditions. In particular, the oats and mixture of triticale and lupin showed potential to produce high DMP.**
- **Oats showed strong weed control efficacy compared to some of the other treatments.**
- **Results highlight the benefit of cover crops in suppressing weed growth.**
- **In the mid-term, *i.e.* after three years, there were no substantial differences between cover crop treatments in their soil organic C and inorganic N.**
- **Cover crops are being cultivated for 2 more seasons to ascertain the longer-term effects of cultivating cover crops in table grape vineyards on their DMP and weed DMP as well as selected soil and grapevine responses.**

Take-home message



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Take-home message

- **Cover crops showed potential to produce high DMP in table grape vineyards in the Western Cape.**
- **The higher the DMP of the cover crops, the more weeds were suppressed.**
- **Soil responses are more longer-term responses to cover crop cultivation.**



Acknowledge-ments



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SAFJ, June/July 2026

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Cover-crop trials in Paarl

The first two seasons already offer promising results for weed suppression in table-grape vineyards.

By Anna Mouton

"The benefits of cover crops have been shown for wine-grape vineyards in all regions – the cultivation of annual cover crops in the winter-rainfall areas is almost a standard practice in wine-grape vineyards," says Dr Carolyn Howell, Senior Researcher at the ARC Infruitec-Nietvoorbij.

Although cover crops could likewise be advantageous to table-grape vineyards, less research supports their use. Hence, SATI is funding a five-year project led by Howell to investigate the effects of different cover-crop systems in table-grape vineyards.

The experimental layout

Howell's trial site is a young commercial IFG Ten vineyard on a medium-textured soil in Paarl. The first cover crops were sown in 2023, with annual sowing planned until autumn 2027. Cover crops are limited to the work row.

The four cover-crop treatments are Pallinup oats, grazing vetch, a yearly rotation of triticale and medicks, and a mixture of triticale and lupins. The control is the farm's standard management practice: planting fescue. Cover-crop establishment follows the guidelines in *Cover Crops in South African Vineyards* (available from SATI).

In addition to the different cover crops, Howell and her team are assessing two management practices. Cover crops are either slashed and spread in the vine row before bud break, or chemically terminated but left in the work row.

"We're focusing on the effect of cover crops and the placement of the plant residues on the soil responses, the nitrogen status of the soil and grapevines, and the grapevine responses," explains Howell.

Her team, under the expert guidance of Technical Team Leader Karen Freitag collects samples for gravimetric determination of soil water content (the soil is weighed before and after drying to calculate its water content); soil, leaf blade and petiole analysis; berry mass, size distribution, and yield; and postharvest fruit quality.

They also measure cane mass at pruning and the dry matter production of cover crops and weeds for each treatment.



COURTESY OF CAROLYN HOWELL

The mixture of triticale and lupins on 1 August 2023

The results so far

"Cover-crop cultivation is a long-term process," says Howell. "All the research has shown this." Nonetheless, her data from the first two seasons (2023 and 2024) already display some promising trends.

In 2023, cover crops and weeds produced ample dry matter, despite late sowing. "Due to logistical problems following COVID, we could only sow in May 2023," says Freitag. "We would ideally sow in early April."

All four cover crops achieved more than 2.5 tonnes per hectare of dry mass. Two tonnes per hectare is considered sufficient to improve water infiltration and reduce soil erosion, and 2.5 tonnes per hectare is the level at which cover crops begin to suppress weeds. In contrast, the fescue control produced almost no dry matter.

All four cover crops achieved more than 2.5 tonnes per hectare of dry mass.

Weed dry matter production was less than 1 tonne per hectare for all cover crops, but about 1.5 tonnes per hectare for the fescue control.

In 2024, both cover crops and weeds suffered a setback due to heavy rains in July and August. "It was too wet," recalls Freitag. "Even the white clover on the farm was struggling."

Nonetheless, the oats and the triticale-lupin mixture still produced more dry matter than the threshold required to suppress weeds and improve water infiltration.

"If I were a farmer, I would adopt cover crops just for the weed suppression," comments Howell.

Other potential benefits

With half the data collection still to go, conclusions about the cover crops' effects on the soil and the grapevines would be premature.

However, extensive work in vineyards (mostly wine grapes) by several researchers, notably the late Dr Johan Fourie, a respected researcher at the ARC Infruitec-Nietvoorbij and author of *Cover Crops in South African Vineyards*, showed that cover crops can:

1. Boost organic matter

In long-term cover-crop trials, Fourie demonstrated significant increases in soil organic carbon with several cover crops. For example, a rye cover crop more than doubled soil carbon (from 0.55% to 1.24%) on a sandy loam soil near Stellenbosch over 10 years.

2. Reduce fertilisation

Cover crops can augment the nitrogen available to vines, allowing growers to cut back on synthetic fertilisers. Nitrogen fixers, such as legumes, increase soil nitrogen directly, and other cover crops increase nitrogen indirectly by adding soil organic matter.

Of course, excess nitrogen, especially when poorly timed, can be detrimental to fruit quality and storability (this was discussed in a December 2025 *SAFJ* article).

3. Improve water infiltration

Water droplets impacting bare soil can cause crusting of the uppermost few millimetres of soil. "Even though that crust is thin, it acts as a seal, preventing water from going into the soil," says Howell.

By protecting the soil surface, living cover crops and the mulch they create after termination prevent crusting and reduce run-off and erosion.



COURTESY OF CAROLYN HOWELL

Karen Freitag fertilises the cover crops

Howell points to research by Kobus Louw, in which he showed that a living cover crop or a straw mulch decreased rain run-off by more than 25%, as measured over 34 rainfall events, and water run-off by more than 37%, as measured during a 46 mm irrigation event (applied at 12 mm per hour).

4. Save water and energy

When mechanically or chemically terminated before bud break, cover crops form a mulch that reduces evaporative losses. Reduced irrigation demand saves water, as well as electricity for pumping it.

Howell cites results generated by Dr Philip Myburgh on the effect of mulch on evaporation from the soil surface after irrigation. He reported approximately 8 mm of evaporation from bare soil for the first day after irrigation, compared with about 5 mm from mulched soil. After three days post-irrigation, daily evaporation from the bare and mulched soil was the same.

5. Protect fruit quality

While conducting a field trial in a table-grape vineyard near Keimoes, Fourie observed a heat wave's effects during véraison.

Bunch damage was significantly less in the treatments with a mulch derived from a vetch or oats cover crop (terminated before bud break) than in treatments without a cover crop or with dwarf fescue.

"I see cover crops as positive in terms of all these benefits, and for sustainability," says Howell. "Consumers want to see these types of practices."

Cover Crops in South African Vineyards can be ordered on the SATI website

Dr Pieter Raath discusses sustainable soil management and how to think about soil organic carbon

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Thank you

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for funding the research project P04000323.

- **JDK Pty Ltd for permission to work in their vineyard, as well as their interest and technical assistance.**
- **The ARC for research resources and infrastructure.**
- **Colleagues in the Soil and Water Science division at ARC Infruitec-Nietvoorbij for technical support. PHAT division for the storage of the grapes and quality assessments.**