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Lucerne establishment in dryland conditions: effects of crop residues and wheat as a nurse crop

by Prof. Pieter A Swanepoel and Stephan le Roux, Department of Agronomy, Stellenbosch University

Lucerne is used as a pasture crop in longrotation systems in the southern Cape region,
where it is rotated with wheat, barley, canola,
and other crops. The unpredictability of rainfall
and the delicate nature of lucerne seedlings
create hurdles for successful establishment of
lucerne in dryland regions. Prof. Pieter Swanepoel
and Stephan le Roux from the Department of
Agronomy, Stellenbosch University have explored
potential solutions. Their recent study tested
the effects of wheat as a nurse crop and crop
residue on lucerne establishment.

What is a nurse crop? By planting an annual companion crop alongside lucerne in its initial growth phase, support and protection to the young seedlings can be provided. Wheat, canola, and oats are among the popular choices for nurse crops, offering benefits such as efficient space utilisation, weed suppression, and

protection from environmental stressors like wind and excessive sunlight.

In the southern Cape region, where conservation agriculture practices prevail, retaining crop residues as soil cover is a common strategy. While crop residues offer advantages such as soil water conservation and weed suppression, their high loads can pose challenges with small-seeded crops like lucerne. Finding the balance between reaping the benefits of residue cover and avoiding its hindrance to lucerne germination is a key aspect of sustainable farming practices.

The experiment took place near Swellendam, South Africa. Different treatments were tested to see how they affect lucerne establishment. A crop residue of 4 t/ha covered half of the site, while the other half had no crop residue.



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This was to test for the effects of crop residue, common in conservation agriculture systems, on lucerne establishment. To test the nurse crop effect, wheat was planted without lucerne; lucerne without wheat; and a wheat–lucerne mixture. The wheat cultivar SST 0166 was planted at a seeding rate of 80 kg/ha (±200 seeds per square metre). The lucerne cultivar Aurora was planted at a seeding rate of 10 kg/ha (±450 seeds per square metre).

The research on effects of crop residues and wheat as a nurse crop for establishment of lucerne was published in the *African Journal of Range and Forage Science*. Here is a summary of the results:

- Lucerne plants thrived better without crop residue, with over 60 plants/m² compared to only 23 to 37 plants/m² when residue was present. Having an adequate plant population is crucial to lucerne productivity and longevity.
- Crop residues helped increase biomass production of wheat and lucerne were intercropped. This could be due to the water conservation benefits associated with residue presence.
- Wheat yield remained unchanged regardless
 of the treatments, but protein content varied.
 Wheat grown alone with no residue had the
 highest protein content, whereas wheat grown
 with lucerne and residue had the lowest. The
 thousand kernel mass of wheat was highest
 when planted with a nurse crop and without

- residue. However, all treatments resulted in satisfactory wheat quality.
- Intercropping wheat and lucerne did not significantly differ in productivity compared to planting them individually.

To summarise: when wheat and lucerne are planted together, the crops compete, and this affects various growth parameters. Wheat thrives better in pure stands, showing higher grain quality, whereas lucerne shows superior performance when grown without wheat. Furthermore, high levels of crop residue reduced lucerne germination, which emphasise the importance of residue management during establishment.



Although the nurse cropping concept holds promise, the research suggests caution, especially in the Mediterranean climate region of South Africa. It is, therefore, advisable to avoid the use of wheat as a nurse crop in such conditions, in order to optimise the successful establishment of lucerne and to ensure sustainable crop growth.

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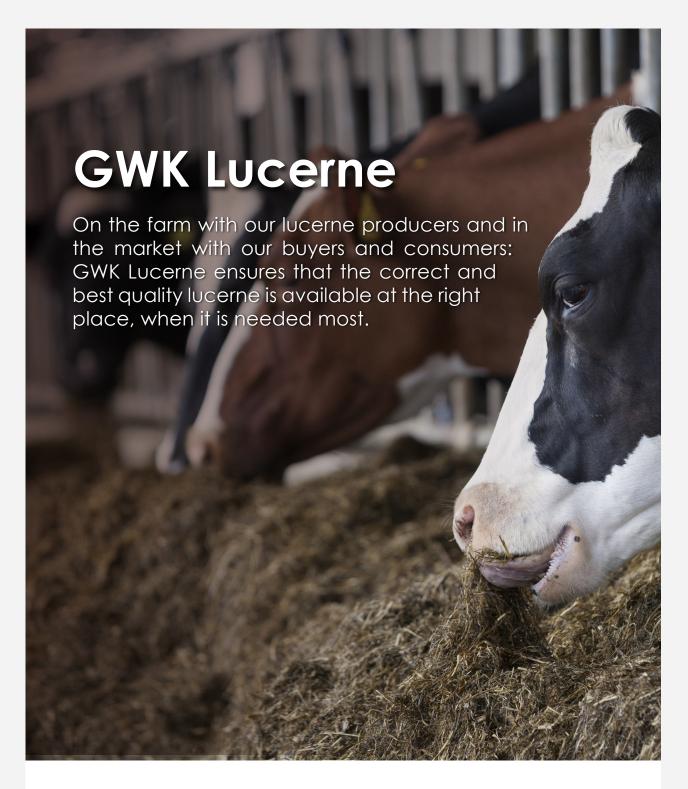


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