

Using chickens, pigs and sheep to save your soil

By Glenneis Kriel | 1 February 2022 | 1:41 pm

JP de Villiers has not used any herbicides on his farm for the past three seasons. He spoke to Glenneis Kriel about his use of sheep, pigs and chickens to overcome soil health problems in his orchards and vineyards.



Mature chickens are allowed to graze in the orchards and vineyards to help with pest management.

Photo: Glenneis Kriel

Four years ago, JP de Villiers, who farms on Goedemoed in the Keisie Valley near Paarl, realised he could not continue farming as usual. He was applying more and more herbicides and fertilisers, and double doses of insecticides, with poorer and poorer results.

“I was struggling with weeds and [red spider mite](#), and of the 83ha I have under fruit and wine grape production and 25ha under apricots and plums, the yield was less than 10t/ha,” he says.

“I was barely breaking even despite following production advice to the letter.”

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Then Hardie Brink of Real IPM introduced De Villiers to Fritz Breytenbach in the Robertson Valley and Ted Stanford in Wolseley. Both farmers had achieved good results with farming practices that embraced nature, instead of trying to subdue it with chemicals.

Breytenbach used weeds as cover crops in his orchards and vineyards, and produced almost double the regional wine grape average.

De Villiers realised that soil health was at the root of his problem. He started researching alternative production methods on the Internet and visited 22 farmers to see what they were doing to improve their soil.

“Many of these farmers still use conventional farming practices, but each of them did at least one thing that resonated with the *regenerative farming* philosophy, be it the use cover crops or mulch to keep the soil covered, minimum- to no-tillage to disturb the soil as little as possible, maintaining living roots in the ground year round, or the integration of livestock into their production systems,” says De Villiers.

Revelations

One of his first realisations was that there is no such thing as a weed. “A weed is simply a plant that grows where it’s unwanted,” explains De Villiers. All plants have benefits, ranging from medicinal to nutritional, or “they fulfil a specific eco function, ranging from binding certain nutrients to the creation of a habitat for specific types of organisms.”

READ *[How weeds are able to survive](#)*

Most of the ‘weeds’ on his farm are pioneer plants, and De Villiers realised he was preventing the ecosystem from restoring itself by continually destroying them.

Another revelation centred on the buffering impact of soil cover on soil temperatures, and how this influences the water-use efficiency of plants. De Villiers measured soil temperatures on the barren planting ridge, on the shaded and sunny sides of the ridge, as well as the grass-covered area between the planting rows of one of his orchards.

On the day the measurements were taken, the outside temperature was 32°C, but measured 34°C in the grass-covered area, 24°C on the shaded side of the ridge, 29°C on the sunny side and 52°C on the ridge.

Research De Villiers was reading at the time held that soil temperatures averaging around

21°C were ideal, resulting in 100% moisture extraction for plant growth. Above 38°C, however, about 85% of the moisture was lost to evaporation, increasing to 100% at

temperatures above 55°C. Above 60°C, the heat had a damaging effect on soil micro-organisms.

Weed management

“In the past, I thought it best to have clean soils with no plants competing with the vines and fruit trees for water and nutrients,” says De Villiers.

“Now I understand the importance of keeping the soil covered to keep soil temperatures cool, which in turn helps to reduce evaporation, protect soil micro-organisms and improve soil health.”

Initially, De Villiers downscaled herbicide use by only doing spot treatments, but finally stopped using herbicides altogether three years ago.

“Regenerative farming guru Gabe Brown says you have to break down the compaction layer in your mind and let go of your ego when embracing regenerative farming principles,” says De Villiers. “It was difficult to stop using herbicides, as it went against everything I have ever learnt since I was a child.”

To boost the diversity of plants in his orchards, he collected damaged and leftover seed from grain farmers in the Swartland and Overberg. In September, with the help of soil health expert Stoney Steenkamp, he broadcast this seed into every fifth orchard and vineyard row. The plants included clover, serradella, vetch, black oats, lupines and fava beans.

De Villiers probably won't sow cover crops into the rows again; this one application should be enough to introduce a good diversity of plant material.

“I don't understand why people buy cover crops when wild counterparts of these plants are growing naturally in the orchards. For instance, instead of canola, there is wild mustard, and instead of medics, wild clover,” he says.

The use of cover crops and living roots is making a marked difference to soil health. It's also helping to create a habitat for insects and other organisms.

“By removing plant material between plant rows, you actually leave organisms that are considered problems without a habitat. They then only have the trees left in which to hide. The creation of bigger biodiversity, for instance, has helped us solve our red spider mite problem,” says De Villiers.

He's also started rehabilitating and planting refuge areas between orchards to create safe places for animals, birds and other organisms outside of the orchards.

Using Sheep

Using mechanical methods to keep weeds in check is not only expensive, because of the associated fuel costs, but these also pose a compaction threat. De Villiers therefore started experimenting with what he calls 'weed-eaters', which include sheep, chicken and pigs.

He started out with 20 Dorper sheep towards the end of October last year. The sheep were put in 3m x 6m cages made from scaffolding, and moved every 20 minutes during the day up the area between the planting rows.

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"The grazing time can probably be stretched to three hours once the soil and plant growth have recovered, but for now it has to be short to prevent overgrazing," says De Villiers.

Only every second row was grazed to compare the impact of grazing with rows that were not grazed. The sheep were also left to sleep in the cages at night, as it would have been too laborious to move them somewhere else.

Two shepherds were appointed to move the cages, look after the sheep and ensure they have enough water to drink.

When De Villiers realised the sheep were not thriving on the 'weeds', he added maize to their diets. They did not receive any medicine, vaccines or antiparasitics while on the farm, but diatomaceous earth was added to the top of the shade cloth covering the roof of the grazing pens to keep midges away from the sheep.

The initial experiment was a complete flop. "Dorper sheep are the worst breed to try this with, because they are not natural flock animals," says De Villiers.

"They kept escaping from the cage, did not graze together and were extremely destructive, causing damage to the trees even after we hooked nets on the supporting wires of the trellis systems for protection."

He had better success with *[Dohne Merinos](#)*, which are lighter grazers and have a better flock instinct. However, he did not take into account the fact that the breed would have to be sheared, which is something he had no experience with and would further drive up production costs.

In his final configuration, a total of 290 lambs were used, averaging 25 lambs per grazing pen.

De Villiers admits there is still much room for refining the system, but the results overall seem good.

“At first, I thought the animal impact might have aggravated compaction problems and negatively affected plant growth but, later, as the plants recovered, it was evident that the grazed areas were greener, less compacted and contained up to 30% more plant material than the areas where no grazing took place.”

De Villiers lost R50 000 in the whole sheep transaction, but thinks this is okay in comparison to the R100 000-plus he would have spent on herbicides.

“I bought the sheep for R1 400 and sold them for R1 600 in July, and we had the added costs of maize, diatomaceous earth and labour,” he says.

“For now I’m wondering if I should venture into sheep production to lower the cost of sheep supplies. In July, I just sold the sheep back to the vendor, but I might have made more money if I had sold them to the organic market.”

He would also rather use Meatmasters, as he believes this breed will be better suited to the work he wants them to do.

“*Meatmasters are hardy*, good flock animals and able to thrive on very little food,” he says.

Pigs and chicken

De Villiers introduced pigs to the system in an effort to help him manage bindweed (*Convolvulus arvensis*). He started out with two pigs in a grazing pen, which he has since increased to 15 kept in two pens.

“The pigs move like a tractor through the soil and are able to pull out the bindweed with their strong snouts. They love eating it,” he says.

READ *Care and caution keep poultry disease-free*

The pigs also receive fruit scraps to ensure they have enough to eat. “They sometimes escape from the pens and roam free, but return to the cages, because they are social animals and get organic whey in the evenings.”

A variety of chicken breeds, including Bosvelders and Koekoeks, are used to help with pest management. At the moment, De Villiers has 350 chickens, which he wants to increase to 1 500.

“My dream is to provide each of the 50 workers on the farm with a constant supply of organic eggs,” he says.

The chicks are hatched in a neighbour’s incubator and are kept in mobile trailers, which are moved through orchard rows until the chicks are old enough to graze with the older chickens. This happens at around 12 weeks of age. The chickens are taken inside each evening to protect them from the cold.

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“The chickens fly out as soon as we open the doors in the mornings, and they come back home in the evening, because they know its safe and we give them some maize,” says De Villiers.

However, he has lost a lot of chickens to predators.

“I saw that the farm did not have enough safe spaces for the chickens to roost and escape danger. I therefore started planting more trees and set up some poles for roosting to accommodate the birds until the trees are large enough to keep them safe,” he explains.

The introduction of perching poles has also helped restore birdlife on the farm.

While De Villiers says he could have got manure from a feedlot and worked it into the soil instead of using the animals for this purpose, he was worried about the effect the manure’s chemicals could have on microbial life.

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It also would not have had the same effect as the animals’ movement, grazing, manure and urine on the soil. The management costs of the pigs and chickens are also relatively low, as they don’t require any of the traditional pest and disease management associated with intensive production systems.

“Firstly, the animals are less stressed and therefore less susceptible to diseases. Secondly, they never cover the same area in an eight-month period, giving enough time for parasites to die before they return to an area,” explains De Villiers.

Other interventions

De Villiers has started using activated oxygen, which is pumped into irrigation water, to soften the water and improve its quality by destroying pathogens, reducing salt and oxidising metal pollutants. He aims to build his soil carbon levels to 3,5%, foreseeing that the soil will be so healthy and resilient at these levels that the use of oxygenated water won’t really make a difference.

He has also started using the Johnson-Su bioreactor system to produce compost.

“The composter is easy to build and the design allows the compost to be aerated without needing to be turned. It does not smell or attract flies,” says De Villiers.

The compost takes 12 to 18 months to decompose, after which it has a clay-like consistency and can be applied as an extract, a soil amendment or used to coat seed. “Less than 2kg/ha promises to produce a huge improvement in your soil-life population,” says De Villiers.

The compost contains one-third manure, consisting of dung from various animals and chicken litter; one-third wood chips from blue gum trees; and one-third brown material, consisting of lucerne bales.

The future

De Villiers admits that he still has more questions than answers and still has a long way to go. Regenerative farming, however, has made him realise that there are no quick fixes.

“We are working with a living, interconnected system. Solutions should therefore be holistic and adapted continually to accommodate changes to the system,” he says.

His advice to other farmers is to think carefully before using chemical methods to solve problems. “Think about why you are using this solution, whether it will address your problem or drag it out over a longer time. Also, what effect will it have on the soil, plant and soil population over the long term?”

“Start looking for a solution that will bring life back to your soil. Watch [the film] *Kiss the Ground* and read up on farming philosophies taught by people like Alan Savory, Gabe Brown and Ray Archuleta,” he adds.

*Email JP de Villiers at jp@goedemoed.co.za. Watch *Kiss the Ground*, a documentary on regenerative farming, at kisstheground.com*