



blwk - cawc

Datums

- 6 tot 7 Augustus – BLWK Bewaringslandbou konferensie
- 21 Augustus – SSK Wintergraandag Riversdal
- 29 Augustus – Roodebloem Overberg Agri
- 11 September – SKOG
- 20 September – Hopefield Wisselbouproef dag

MAY 2019

BLWK-nuusbrief CAWC newsletter

Inhoud / Contents

- Grazing and improving soils with cover crops ...2
- Why agriculture?
Karen Truter ...6
- Op die spoor van Dikvoet ...8
- Making investments in natural capital count ...11
- Sporelement bestuur by koring ...15
- Photos ...17

Vir die meeste is plantyd al verby en die gewasse steek al kop uit. Die reën val lekker in die Boland terwyl ek hier sit en skryf. Ons hoop is dat dit sommer wyd sal val. Ons vertrou dat julle die afgelope twee nuusbriewe geniet het, al was dit effens laat. Ons is nou weer terug op skedule. Die BLWK program is ook ingesluit om julle 'n voorsmakie te gee van hierdie jaar se lesings en praktiese demonstrasies. Die besprekings sal binnekort opmaak en dan sal ons die nodige inligting deurgee.

Redakteur

Sowing time has come and gone for the most of us in the cereal production game and the crops are starting to or have emerged. The rain is falling quite nicely here in the Boland while I am writing this piece. We hope that you have enjoyed the last two newsletters. We are back on track with the posting of the newsletters on the website. The CAWC conference week programme is also included in the May newsletter. Please have a look at the programme, which promises to be very informative. Bookings will open soon and we will send out the necessary info soon.

Editor



Grazing and improving soils with cover crops

Rens Smit^{1,2}, Dr Johann Strauss¹ and Dr P Swanepoel²

1. Directorate Plant Sciences, Research and Technology Development, Western Cape Department of Agriculture
2. Department of Agronomy, University of Stellenbosch

The implementation of cover crops can improve soil properties, crop diversity and can also lead to an increase in crop production. In addition to this cover crops can provide nutritious grazing for livestock. Although cover crops are defined as crops which are left unutilised this study indicate that cover crops can be utilised and still deliver benefits. The aim of the study was to determine the negative effect of grazing on cover crops but the results indicated that grazing may have a positive effect on cover crops.

These statements are based on results which was obtained from a study conducted on Langgewens Research Farm (Western Cape Department of Agriculture) in the Swartland. The cover crop mixture was composed to contain 70% legumes and 30% cereals in order to improve soil nitrogen for subsequent wheat cops and have high quality grazing.

Table 1: Nutritional value of a mainly leguminous cover crop mixture when the cereals in the mixture reach the flag leaf- and soft dough growth stage.

	Growth stage	
	Flag leaf	Soft dough
Ash (%)	11.6	6.1
Crude protein (%)	20.7	12.8
Crude fibre (%)	24.2	27.0
Crude fat (%)	3.5	1.8
Neutral-detergent fibre (%)	40.6	47.4
Acid-detergent fibre (%)	28.3	30.6
Acid-detergent lignin (%)	3.3	4.3
Gross energy (MJ kg ⁻¹)	17.9	18.1
Metabolisable energy (MJ kg ⁻¹)	10.4	10.8
In Vitro digestibility (%)	80.3	71.4

In Table 1 it is clear that cover crops can provide grazing with a high protein content and is highly digestible especially at a younger growth stage. These nutritional values indicate that cover crops can improve the growth of livestock especially the growth



of muscles. In this trial the cover crops were grazed by 145 SA Mutton Merino ewes of 70kg per hectare for a ten day period. After this high intensity grazing the cover crops were left to regrow in order to provide sufficient soil cover. In practice cover crops can be grazed more than once but it is crucial to manage the grazing in order to maintain sufficient soil cover. The addition of cattle can simplify the management of grazing as the cattle would be able to utilise the cover crops at a later growth stage.

The nutritional value of the cover crops changes over time and this must be taken into account when cover crops are utilised. As the cover crops mature and the amount of fodder increase, protein content of the fodder decreases and fibre content of the fodder increases. The timing of utilisation can enable farmers to manipulate the nutritional value of cover crops.

The question however is what negative effect would this utilisation of cover crops have on the functional role of cover crops? In this study the only negative effect of grazing cover crops was a slight reduction in the quantity of soil cover. This makes sense as the sheep utilised a portion of the material. On the other hand, soil nitrogen was improved as a result of grazing compared to cover crops which was left unutilised. Despite the reduction in the amount of soil cover the quantity of minerals in the soil was not influenced by grazing cover crops. Indicating that the grazing of cover crops leads to an increase in the mineral content of cover crops following grazing, while the cover crop regrows.

Crop and livestock production should be taken into account when the pros and cons of grazing cover crops are compared to leaving cover crops unutilised. When this comparison is made, the benefits of grazing cover crops out weight the disadvantages. Cover crops can thus play an important role in



integrated livestock into cropping systems, with the potential to improve livestock and crop production. The combination of various plants in a cover crop mixture improve diversity in a cropping system and have the ability to provide a balanced feed for livestock. Cover crops are multifunctional and have the ability to improve farm production with the correct management.

Links of the month

Click on the button to visit the website.

Please note you will need an Internet connection



How we ensure our Dohne Merinos have good nutrition – ALL year



New Source of Global Nitrogen Discovered



Lesingsdag – 6 Augustus 2019 / Lecture Day – 6 August 2019
Nooitgedacht-wynlandgoed, Stellenbosch / Nooitgedacht-Wine Estate, Stellenbosch

- 07h45 - 08h15: Registrasie en koffie met aankoms
Registration and Coffee on arrival
- 08h20 - 08h30: Opening – Chris Burgess, redakteur van Landbouweekblad
Opening – Chris Burgess, editor Landbouweekblad

Eerste sessie / First Session

- 08h30 - 08h35: Skriflesing – Hopkins Uys, voorsitter van BLWK
Scripture – Hopkins Uys, chairman CAWC
- 08h40 - 09h20: Beatrice Conradie – landbou-ekonoom Lupiene en plaasproduktiwiteit
(40min) **Beatrice Conradie – agriculture economist Lupines and farm productivity**
- 09h25 - 09h55: Johan Reyneke – Reyneke Wines, Stellenbosch. Hoe het ek my koolstof gebou
(30min) **Johan Reyneke – Reyneke Wines, Stellenbosch. How did I build my soil carbon levels**
- 10h00 - 10h30: Johniby Rabie – Oorkant Boerdery, De Wet Bewaringslandbou beginsels in
(30min) Wingerdbou
Johniby Rabie – Oorkant Boerdery, De Wet. Conservation Agriculture principles in viticulture
- 10h30 - 11h50: Koffie/tee en verversings
Coffee/tea and snacks
- 11h05 - 11h45: Egon Zunckel – bewaringsboer van KwaZulu-Natal. My bewaringslandboupad
(40min) **Egon Zunckel – conservation farmer from KwaZulu-Natal. My conservation agriculture journey**
- 11h50 - 12h50: Chris Gazey – navorsingswetenskaplike. Grondversuring bestuur en strategiese
(60min) bewerking
Chris Gazey – research scientist. Soil acidity management and strategic tillage
- 16h30: Middagete / **Lunch**

Tweede sessie / Second session

- 14h10 - 14h40: Casper Brink – Bestuurder Sporatec Wisselboustelsel se effek op Mikrobies
(30min) **Casper Brink – manager Sporatec. Crop rotation systems' effect on microbes**
- 14h45 – 15h15: Rens Smit – MSc student. Dekgewasbenutting
(30min) **Rens Smit – MSc student. Cover crop utilisation**
- 15h20 - 16h20: Groepbespreking oor Dekgewasse. Werklike ervaring
(60min) **Group discussion on cover crops. Real experience**
- 16h30: Afsluiting / **Closing**



Praktiese dag – 7 Augustus 2019 / Practical Day – 7 August 2019

Langgewens-navorsingsplaas, Moorreesburg / Langgewens Research farm, Moorreesburg

08h00 - 08h45:	Registrasie en koffie met aankoms Registration and Coffee on arrival	
08h50 - 09h00:	Opening – Johann Strauss, Elsenburg Opening – Johann Strauss, Elsenburg	
09h00 - 10h00:	Plantergesprek – plaaslike maatskappye - Wat wag vir ons in die toekoms Seeder discussion – local manufacturers - What can we expect from the future?	
10h00 - 10h30:	Beweeg na proewe; water word uitgedeel Move to trial sites, water to handed out	
10h30 - 13h00:	Besigtiging van proewe	Trial viewing and discussion
	<ul style="list-style-type: none"> • Stikstof bemesting in bewaringslandbou • Wei van dekgewasse met skape • Dekgewas saaidigthede • Bemesting met 'n skyfplanter tydens plant • Met of sonder – topbemesting in 'n koring medic stelsel • Effek van kunsmistipe op Canola produksie • Profielgate met volledige chemise en biologiese ontledings • "Intercropping" - voorbeelde 	<ul style="list-style-type: none"> • Nitrogen fertilisation in conservation agriculture • High pressure grazing of cover crops with sheep • Cover crop sowing density • Fertilisation with a disc seeder at plant • With or without – topdressing in a wheat/medic system • Effect of fertiliser type on canola production • Soil profile pits with full chemical and biological analysis • "Intercropping" - examples
13h15:	Middagete / Lunch	

Hoekom landbou?

Why agriculture?

Karen Truter

In die ses jaar wat ek op Stellenbosch studeer, was hierdie seker die vraag wat ek die meeste gehoor het. Al wat ek eintelik kan dink is – hoekom nie? Tot dusvêr is ek baie dankbaar vir die paar jare wat ek in die Departement van Landbou deurgebring het. Hierdie jare het my geleer dat die lewe oor meer as net onself gaan. Dit het my leer rond kyk en vrae vra oor dit wat rondom ons aangaan. Dit het my geleer om niks in die lewe vanselfsprekend te aanvaar nie en alles te waardeer.

Landbou is 'n baie groot woord. 'n Woord propvol betekenis. Die woord beteken seker vir elkeen iets anders, maar vir my is dit 'n teken van hoop en liefde. Oor die paar jaar het baie respek gekry vir boere. Hy plant sy saadjies in droeë grond en vertrou dat hulle op die regte tyd sal opkom, dat die reën een-of-ander tyd sal kom. Hy het sy diere amper so lief soos sy kinders, enige plan sal hy maak om seker te maak daar is altyd genoeg voer en water. Hy glimlag oor sy nuwe lammetjies. Hy het harde hande en 'n sagte hart. Sy werk hou nooit op nie. Sy werkers is hardwerkend en gewillig want hulle word met respek hanteer. Al is sy damme leeg en sy grond droog, bly hy vol vertroue. Hy geniet die reuk van nat grond en hy gee nie om vir vuil hande nie. Hy bly nederig al het hy 'n baie belangrike taak om te verrig.

Dit is opwindend want dieselfde seisoen word nooit herhaal nie. Daar is baie geleenthede vir verbetering en vooruitgang.



Oor die paar jaar het my studies vir my baie meer as net 'n "toekomstige beroep" geword. Dit is 'n liefde vir die omgewing en die mense wat daarmee saam gaan. Vir my is landbou fassinerend en 'n strewe om elke dag beter te leef. Dit is omgee vir ander mense en ons plaasdiere. Ek sien dit as 'n uitdaging. Dit is opwindend want dieselfde seisoen word nooit herhaal nie. Daar is baie geleenthede vir verbetering en vooruitgang. Verandering vat tyd, maar dit is besig om te gebeur. Die woord is kleurvol, opbouend en vol hoop. Soos George Washington gesê het - "Agriculture is the most healthful, most useful and most noble employment of man." My grootste droom is dat meer mense dit sal besef en werklik daarin sal belê.

Landbou is ons toekoms.

People asked me this question a lot over the six years that I have been studying. I kept on thinking - why not? Thus far, I have been grateful for the few years that I have spent in the Department of Agriculture at the Stellenbosch University. During these years, I learnt that there are more to life than just you and me. I learnt to look around and ask questions about things that are going on around me. Above all, I learnt that nothing in life must be taken for granted and that everything must be appreciated.

It is exciting because not one season will be the same. There are a lot of opportunity for improvement, development and progress.

Agriculture is a very large word. A word filled with meaning. This word might mean something else to each one using it, but for me it is a sign of hope and love. Over the last six years, I learnt to respect our local farmers. He plants his seeds in dry soil and truly believes that it will emerge at the right time. No

matter what, the rain will come. He loves his animals almost as much as he loves his own children, and he will do anything possible to make sure that they always have fresh water and enough food. His face light up when he sees a new lamb for the first time. His hands are hard but his heart is soft. His work never ends. His workers and hardworking and always willing to help, because they are treated with respect. Even if his dam is empty, his heart remains full of faith. He enjoys the smell of wet soil and he does not mind getting his hands dirty. He remains humble even though he has a very important job to do.

Over the last few years, my studies resulted in something more than just a "future career". It became a love for the environment and the people that goes along with it. For me agriculture is fascinating. It is my encouragement to live each day better than the previous one. It is caring for the people of our country and our farm animals. I truly see it as a challenge. It is exciting because not one season will be the same. There are a lot of opportunity for improvement, development and progress. Change take time, but it is busy happening. For me, agriculture is a word full of colour, encouragement and hope. As George Washington once said - "Agriculture is the most healthful, most useful and most noble employment of man." My biggest dream is that more people will realise this and that people will truly start to believe in the power of agriculture.

We must invest in agriculture. This is our future.



OP DIE SPOOR VAN DIKVOET

L Nowers en PJA Lombard
Lizetten@elsenburg.com

Gewoonlik word die tegniek van spoorsny aangewend met die hoofdoel om 'n spesifieke teiken te vind. In hierdie inligtingstuk, word die leser egter aangemoedig tot 'n spoorsny-jagtog met 'n ander doel : naamlik om hopelik NOOIT die teiken teë te kom nie! Dikvoet is 'n vreesaanjaende siekte vir enige Brassica-producent, maar dis juis daarom dat moed aan die dag gelê moet word om op sy spoor te bly. Sodoende sal veral die canola-bedryf nie onkant gevang word indien hierdie siekte op 'n dag in canola in die Wes-Kaap geïdentifiseer word nie. Dê siekte is ook reeds jare gelede in die Kaapse Vlakte aangemeld en daar is tans reeds bekende besmette areas in die George-omgewing.

Om die oorhand te hê oor hierdie grond-, wind- en plantgedraagde siekte, is dit belangrik om te weet hoe dit lyk, waar dit skuil, hoe dit beweeg en baie belangrik : hoe om dit te beveg!

Dikvoet word veroorsaak deur 'n mikro-organismes genaamd Plasmodiophora brassicae. Dit is nie swam of 'n bakterie, soos baie ander plantpatogene nie, maar dit is wel 'n eensellige organisme met eienskappe soortgelyk aan swamme. Die simptome is opgeswelde wortels, soos duidelik sigbaar in Figuur 1. Blare toon tydelike verwelk gedurende sonnige dae, maar soos die plant verswak, verander dit in permanente verwelk.



Figuur 1 : Dikvoet simptome

Eenvoudig gestel, kom Plasmodiophora in 'n siklus van 2 fases voor :

Die primêre fase behels baie klein rustende spore wat in die grond voorkom. Hierdie spore kan tot 20 jaar in die grond oorleef, sonder enige gasheerplante. Wanneer toestande gunstig is, ontkiem hierdie spoor en vorm 'n zoöspoor wat in die grondwater swem tot by gasheerplante se haarwortels. Dit penetreer die haarwortels, gaan oor na 'n geslagtelike fase en hier begin die sekondêre fase. Dit is tydens hierdie fase wat die organisme vermeerder binne-in die ondergrondse dele van die plant en die galle vorm. Met genoegsame ontwikkeling, vorm die organisme weer rustende spore (primêre fase). Hierdie rustende spore word vrygestel wanneer die geïnfecteerde wortels van nature begin afbreek in die grond.

Ideale omstandighede vir infeksie is :

- hoë grondtemperatuur (20 – 24 °C)
- baie grondvog
- pH <5.5 (KCl)

Daar is verskeie aksies wat gebruik kan word om a) te verhoed dat dikvoet skade begin aanrig, of om b) die spoorlading in die grond te verminder. (Indien spoorlading onder 1000 spore per 1g grond is, sal gewasproduksie nie beïnvloed word nie, maar soos dit vermeerder, vermeerder die moontlikheid van oesverliese.)

Hierdie verskillende aksies moet egter as 'n pakket uitgeoefen word om suksesvolle beheer te kry. Alles moet gedoen word om die Plasmodiophora-spore uit produksie-areas te hou en terselfdertyd moet produksieland hanteer word asof daar reeds spore in die grond is. Hierdie aksies behels die volgende :

• Toets

In Kanada word aanbeveel dat grond in 'n laboratorium getoets word vir Plasmodiophora-spore. Na konsultasie met plaaslike laboratoriums

deur die DLWK, het SPORATEC, 'n spesialis laboratorium te Stellenbosch, na vore getree om hierdie toets as diens beskikbaar te stel aan plaaslike produsente. Die ontwikkeling van hierdie toets is tans onderweg en derhalwe sal dit hopelik binnekort vir produsente moontlik wees om grondmonsters in te handig vir die toets van Plasmodiophora-spore. Die toets van 'n land of blok se grond is egter slegs 'n aanduiding en behoort nie as 'n 100 % finale toets aanvaar te word nie. Grondtoetse moet deur die volgende stappe vergesel word.

- **Blote oog observasie**

Wees op die uitkyk vir simptome. Dit behels gereelde besoeke aan alle dele van 'n land, maar veral nat kolle en naby ingangshekke waar implemente besmette grond kon indra. Trek verdagte plante uit om te kyk vir enige verdikkings ondergronds. Die beste tyd vir so 'n visuele ondersoek is tydens blomtyd, maar na platsby of oes is dit makliker om deur die aanplanting te stap. Enige Dikvoet-galle sal steeds aan die wortels vassit, selfs ná oes.



Figuur 2. Hibridisasie nodules op canolawortels



Figuur 3 : Simptome van hormoon onkruidodderskade op canola

- **Verwyder**

Enkele plante wat verlep tydens warm dae kan op die siekte dui, en indien sulke plante wel dikvoet het, moet dit verwyder en vernietig word. Onthou dat verskeie onkruid gasheer kan speel vir hierdie organisme. Opslag-canola, mosterd, wildemosterd, ramnas, herderstassie, peperbossie en stinkkruid moet verwyder word van canola aanplantings, maar onthou om ook hierdie plante se ondergrondse dele te ondersoek vir tekens van galle!

- **Gooi die net wyd**

Ou groentelande en –tuine, sowel as areas waarin voertuie of implemente van ander gebiede beweeg het, kan 'n verskuilde bron van inokulum wees. Die feit dat die rustende spore vir tot 20 jaar kan oorleef, maak dit baie belangrik om nie te vergeet van hierdie areas nie. Kyk ook hier vir simptome op alle plantwortels.

- **“Vries”**

Indien 'n besmette area geïdentifiseer is, moet die grond liefers nie versteur word nie. Die spore is baie mobiel en kan maklik beweeg, hetsy in klonte grond wat vassit aan skoene, wiele, implemente, ens. of met behulp van die stof wat deur die wind gewaai word. Die aanbeveling in die literatuur is dat die betrokke stuk grond bedek word en/of geen-bewerking geïmplementeer word.

- **Wees bedag/waaksaam**

Aangesien canola produsente van die Wes-Kaap groot lande moet bestuur, is hierdie aksie baie moeilik om uit te voer. Moenie voertuie van onbekende afkoms in onbesmette lande toelaat nie. Enige “vreemdelinge” moet liefers hul voertuie, ens. eers steriliseer soos om die bande met ontsmettingsmiddel te spuit, voordat hulle wel op 'n land toegelaat word.

- **Wees fluks**

Alhoewel dit moontlik 'n irritasie sal wees om vol te hou, is daar tóg meriete in om die modder van voertuig- en implementwiele en hul onderkante te verwyder. Die ideaal is dat toerusting, implemente, voertuigwiele en enige items waaraan grond kan vasklou, behoorlik skoongemaak en gesteriliseer word tussen verskillende lande/blokke. Selfs al word die grond slegs gedeeltelik verwyder, sal dit steeds help om spoor-oordrag te verminder. Indien daar positief geïdentifiseerde Dikvoet-geïnfesteerde

areas in die omgewing is, is dit 'n goeie idee om hoë druk waterspuit te gebruik hiervoor (Figuur 4).



Figuur 4 : Hoë druk spuitskoonmaak

'n 50% Hipochloried-water-oplossing (gewone huishoudelike bleikmiddel) is 'n effektiewe steriliseringsmiddel, maar moet gereeld vars aangemaak word. Produsente en besoekers se skoene kan ook hiermee gesteriliseer word. Hou in gedagte dat 1g grond tot 20 000 Plasmodiophora-spore kan dra!

- **Roteer**

'n Rotasiestelsel met die afwesigheid van enige Brassica-gewasse vir ten minste 2 jaar, behoort spoorgetalle in die grond te laat verminder.

- **Reageer**

Stuur verdagte plantmateriaal in 'n verseëde sak na 'n laboratorium om getoets te word. Die Universiteit van Stellenbosch het 'n diagnostiese laboratorium waar monsters deurlopend getoets kan word.

- **Bestuur**

Indien 'n area positief vir Dikvoet besmetting geïdentifiseer word, behoort dit met 'n grasgewas toegesaai te word vir 'n aantal jare. Saai ook 'n groot area as buffer rondom hierdie besmette kol met grasse. Indien die area dalk by die ingang na 'n kamp is, oorweeg die moontlikheid om die ingang te verskuif.

- **Bied weerstand**

Daar is verskillende rasse van Plasmodiophora. Kanada het 'n aantal weerstandbiedende kultivars, maar hulle is nie effektief teen alle rasse nie. Kultivars word geklassifiseer as weerstandbiedend (minder as 30% besmetting as vergelyk word met vatbare kontrole), matig vatbaar (minder as 30-50% besmetting as vergelyk word met vatbare kontrole) en vatbaar (50-100%). In Kanada is kultivars met weerstand 'n noodsaaklike skakel in die beheer van Dikvoet op die plaas. Kultivars met weerstand moet afgewissel word om genetiese skuiwe binne die siekte te voorkom. Die afwisseling van kultivars moet deel vorm van 'n geïntegreerde beheerstelsel. Dis onbekend, hoewel baie onwaarskynlik, of enige kultivars in Suid-Afrika weerstand teen Dikvoet het. In Australië vanwaar ons kultivars kom, kom Dikvoet (nog) nie op canola voor nie.

Die Wes-Kaapse Departement van Landbou het in 2019 begin om grondtemperature by verskeie lokaliteite waar canola-proewe geplant word, te monitor. Die doel hiervan is om 'n vertrekpunt te hê vir die monitering van Dikvoet in canola-produiserende gebiede van die Wes-Kaap. Enige verdagte lande en materiaal kan by die Plantpatologie-afdeling (kontakbesonderhede onderaan) op Elsenburg aangemeld word. Hierdie siekte is 'n gemeenskaplike vyand van alle Brassica-produsente en daarom is dit in die beste belang van alle rolspelers om saam op die spoor van hierdie vyand te bly!

Lizette Nowers

lizetten@elsenburg.com

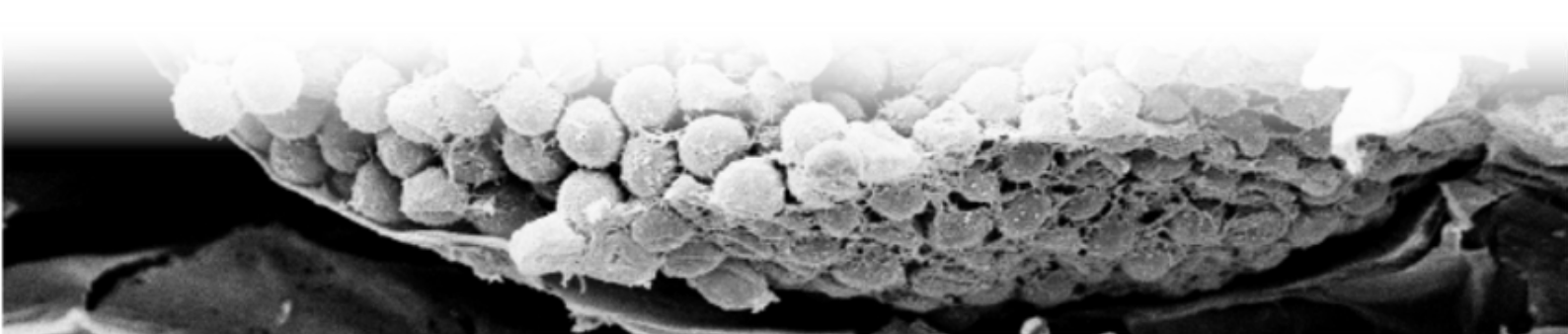
021-808 5269

Piet Lombard

pietl@elsenburg.com

021-808 5415

1. <https://www.grainews.ca/topics/twelve-tips-to-clubroot-management#heres-a-dozen-tips-to-deal-with-clubroot-%e2%80%a8both-before-and-after-you-%e2%80%a8have-a-problem; 21/01/2019>





Making investments in natural capital count

James N. Blignaut*

School of Public Leadership, Stellenbosch University, Stellenbosch, South Africa
South African Environmental Observation Network (SAEON), Pretoria, South Africa



ARTICLE INFO

Keywords:

Environmental crisis
Easement
Assets
Restoration
Economics
Accounting
Natural capital

ABSTRACT

The disconnect between land managers bearing the cost of restoration and land management, and society benefitting from the ecosystem services flowing from natural capital, leads to sub-optimal investments in restoration and land management. To bridge this disconnect a system involving easement agreements is proposed whereby the issuer of the easement (the investor) is buying the right to determine the management practices on the land from an easement holder (the land manager). In return the marginal change, or additional value generated by the restoration and/or land management, through an easement intermediary, features as an asset value on the balance sheet of the easement holder. This catapults investment in natural capital from the expenditure realm, and the minimisation thereof, to an option of portfolio diversification and value addition while contributing to general economic welfare. In this way it is possible to invest in natural capital and make that count – by accounting for it on an entity's balance sheet as an asset.

1. Introduction

The economic benefits of restoring natural capital have been well documented (Aronson et al., 2010; De Groot et al., 2013; Blignaut et al., 2014; Elmqvist et al., 2015). It has also been indicated that the economic value of ecosystem goods and services, when taking a natural capital accounting approach, often far exceeds the documented, or published, value of natural capital (Mudavanhu et al., 2017). Yet, despite the obvious value in restoring and maintaining natural capital, the world is facing a crisis of potentially catastrophic proportions with respect to an environmental breakdown (Steffen et al., 2018; Laybourn-Langton et al., 2019).

This crisis, in part, is due to the disconnect between the members of society who are responsible for, and thus bearing the cost of, land management, and society at large that benefits from land management. This disconnect leads to sub-optimal investments in restoration as well as prudent and sustainable land management. The problem is exacerbated by the fact that the current financial and economic system neither provides incentives nor motivates land managers towards judicious land management practices. On the contrary, short-term financial gains are often considered an objective and an achievement, thus leading to the over-exploitation of natural resources. This crisis requires the investment in the limiting factor to economic development, a limiting factor which is no longer man-made capital, but natural capital (Aronson et al., 2006). Natural capital, the limiting factor to

economic development, has become an issue of both national security and importance (<http://definitions.uslegal.com/n/national-security>). Of such is the need for speedy and effective intervention, especially in the quest to accelerate the delivery of the commitments with respect to the sustainable development goals (SDGs), that governments will do well to harness the capability of private and public sectors alike through both a legal and formal accounting framework. We turn to such a framework now.

2. Easement agreements

For sustainability to become more than just rhetoric, this disconnect between those bearing the cost of land management and those benefiting from restoration as well as prudent and sustainable land management, has to be breached. One way of breaching this chasm is by entering into a legal agreement which governs how the land in question is being used. This can be done through what is known as an easement. An easement is defined as the right to use and/or enter onto the real property of another without possessing it (<https://legal-dictionary.thefreedictionary.com/easement>). An easement is thus defined by its terms of use, and not by title deed; ownership is not debated, contested, or discussed within the agreement, however, the way in which the land is being used is. Since an easement is not linked to the title deed, but to the management practice of a parcel of land, the easement agreement remains intact even if the property is sold. An affirmative easement

* Address: School of Public Leadership, Stellenbosch University, Stellenbosch, South Africa.
E-mail address: jnblignaut@gmail.com.

<https://doi.org/10.1016/j.ecoser.2019.100927>

Received 20 February 2019; Received in revised form 26 March 2019; Accepted 9 April 2019
2212-0416/ © 2019 Elsevier B.V. All rights reserved.

entitles the holder to do something on another person's land, while a negative easement prevents the owner of the land to do something. An easement is thus a contractual arrangement between two parties, without impacting on the tenure regime, which determines the way in which a land parcel may or may not be used. Easements have been used extensively to achieve various biodiversity conservation objectives (https://www.nature.org/en-us/about-us/who-we-are/how-we-work/private-lands-conservation/?tab_q=tab_container-tab_element_670; <http://www.wwf.org.za/?20241/first-conservation-easement>; <https://www.conservationeasement.us>). Here we will extend the use of this legally binding mechanism to productive farm lands. Practically this implies that the issuer of the easement agreement (the person requesting a particular land management regime), in one way or another, compensates the holder of the easement (the land manager). This is achieved when the issuer buys the right to determine the land management practice.

3. Defining an asset

Buying the right to determine the land use management practice can be seen as an investment, because the value of the easement contract (or its proxy) has the potential to become an asset registered on the balance sheet of the issuer. This is made possible by the definition of an asset according to the International Accounting Standards Board (IASB). It reads as follows:

An asset is a present economic resource controlled by the entity as a result of past events (IASB, 2018: par. 4.3).

An economic resource is subsequently defined as a right that has the potential to produce economic benefits (IASB, 2018: par. 4.4), and/or produce economic benefits for an entity by entitling or enabling it to avoid cash outflows, or to enhance the value of other economic resources (IASB, 2018: par. 4.16). This definition of an asset and an economic resource technically makes it possible, in conjunction with and through an easement contract, for the issuer of the easement (the investor) to add value to its entity by investing in restoration and sustainable land management on the property of the easement holder (e.g. a farmer). This becomes possible because buying the right to determine the land management practices on a land parcel has the potential to either protect the value of an issuer's economic resources and/or assets from losses (loss avoidance), or to contribute to either cash inflows or an increase in the value of the entity's other economic resources. Bilateral agreements between the issuer and the holder, or multi-lateral agreements through an easement facilitation unit, are also possible.

4. An example

To illustrate the operation of the concept discussed in this paper, a hypothetical example is given below. An easement facilitation unit, or an intermediary which may or may not be a financial intermediary or an easement fund, is used (also see Fig. 1).

4.1. The current status

1. Farmer Joe acts as the custodian of 1000 hectares of farmland, but for illustrative purposes all calculations and figures in this example are based on a single hectare. To farm this land, he acquires inputs in the form of finances (from a bank), and material (from input providers). He produces grain and sells that to a farming co-operative, which sells to the wholesaler, who, after substantial value addition, sells to a retailer. Through this value chain, a 10-fold addition in value takes place.
2. The entire value chain, be it the suppliers of inputs, or the downstream users of the produce, relies on Farmer Joe's success. Farmer Joe, however, is facing a decline in soil health and farm productivity, an increase in the cost of external inputs such as fertilisers

and pesticides, a decline in the profit margin, and the brunt of the impact of climate change.

3. Farmer Joe realises that for him to stay operational, he has to switch from conventional farming to conservation farming. This switch would include new farming practices such as minimum soil disturbance (using a no-till planter), crop rotation, the use of cover crops, and the reduction of external inputs (Lal, 2010). However, he does not have the means to afford this switch. He thus continues using his old methods while his activities continue to degrade the soil, leading to accelerated soil erosion and the depletion of nutrients. He runs the risk of being out of business within the next 2–10 years. In this example, we assume he will stop his business operation in year 10, unless he can change his practices. Changing his land management practices towards sustainable alternatives will enable him to continue, potentially indefinitely, but at least for another 20 years.
4. Farmer Joe requires an additional \$1000/ha/year for 20 years to enable him to convert from conventional to conservation agriculture. This amount includes the levelised capital cost as well as the cost of management. At a discount rate of 7%, the present value of this cost is approximately \$10 600.

4.2. The intervention

5. An entity (e.g. a farmers' co-operative, called herein The Entity) in Farmer Joe's value chain's business is at risk when Farmer Joe cannot continue producing at his current levels of production.
6. The Entity, through an intermediary (called The Intermediary), enters into an easement contract with Farmer Joe at a 30% transaction cost premium. The Entity thus buys shares in The Intermediary at cost price worth \$13 800 (see arrow 1 in Fig. 1). This investment enables The Intermediary to commit to an easement contract of $20 \times \$1000$ payments over 20 years (see arrow 2 in Fig. 1). The Intermediary buys the right to determine the land use practice and, as per agreement, that involves a switch from conventional to conservation agriculture.
7. Note: The Intermediary could operate an easement fund that operates several easement products in parallel, offering bundled investment opportunities in areas such as viticulture, horticulture, animal husbandry, crop production, mining and industrial development, or biodiversity, as well as a general, or composite products based on the weighted average of the portfolio.

4.3. The impact

8. Farmer Joe's projected marginal difference in yield, over 20 years, is 36.3 tonnes in favour of conservation agriculture (see arrow 3 in Fig. 1). At a unit price of \$3000/ton and a discount rate of 7%, the present value of the marginal gain in production is \$37 850 – a value that will be revalued annually. This impact as well as the land management practices are monitored by an independent company appointed by The Intermediary for this task. This company is paid for its services from the 30% transaction cost (see item 6 above).
9. The value of the marginal gain in the easement contract forms the basis for the revaluation of the share price of The Intermediary. The revalued share price reflects on The Entity's balance sheet as the holder of the shares in The Intermediary (see arrow 4 in Fig. 1).
10. The continued existence of Farmer Joe, and the security of supply, contributes to The Entity avoiding the loss in value addition of \$378 500, ten times the sales value of Farmer Joe's raw material.
11. The functions of ecosystems such as soil, biodiversity and water are restored leading to self-regenerating and sustainable agricultural systems with multiple benefits and services to the society, the environment (especially climate) and the economy.
12. Note: The Entity can sell the shares to third parties in the secondary market at its prerogative.

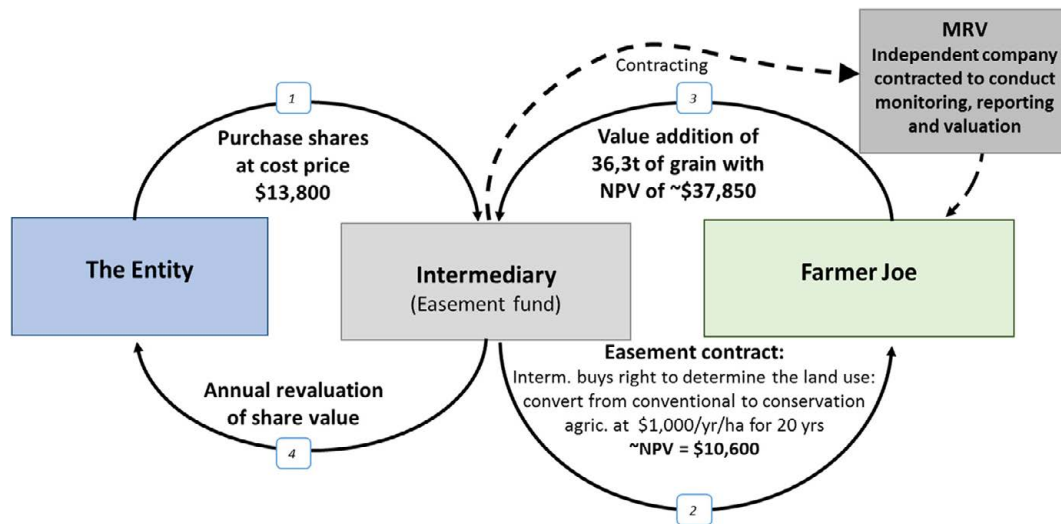


Fig. 1. The easement model.

13. Note: The Intermediary might opt for a preferential buy-back agreement and have the first right of refusal to Farmer Joe's grain.
14. Note: The Intermediary might opt to have an easement royalty, for example 10% thus \$3785, on the value addition and payable by Farmer Joe.
15. Note: Farmer Joe might opt out of the easement by buying the right to such at the cost of the easement. The price at which this could happen will have to be determined on a case-by-case basis given that it will be necessary to determine how much society and the environment benefitted versus what is lost or degraded until the time Farmer Joe would like to opt out.
16. Note: In case Farmer Joe does not comply with the agreement, he will forego future easement payments and might be responsible for compensating The Intermediary for any possible losses incurred.

4.4. Project boundary

As noted above, this proposed use of easements, in conjunction with the accounting definition of an asset, is within the context of productive farm land. This is an extension of the traditional use of easements within the context of biodiversity conservation. One important aspect herein is the focus on a change in land use, and the valuation of the easement contract based on a marketed good. This is since it is recognised that a change in land use is likely to render multiple beneficial ecosystem services, services that are often unaccounted and/or non-marketed. To bridge this gap this proposed model therefore do not require the quantification of all individual ecosystem services, but seeks to incentivise beneficial land use and to offer a co-finance mechanism to facilitate this land use transition by focusing on that which is marketed. It is acknowledged that this will neither solve all environmental problems related to unsustainable land use practices, nor does it quantify the range of ecosystem service benefits, but it does provide a cost-sharing mechanism under those conditions where a tradable good is produced. This is especially true within the context of agriculture. This is an important context since it is acknowledged that agriculture is the main land user and also land use converter globally and thus this mechanism should have broad applications in many, but not all contexts.

The better and more established the link between a land use change and the beneficial impact on ecosystem services and sustainability is, the higher the likelihood of project success as well. In cases where the link is more tenuous and ambiguous this proposed incentive mechanism is likely to improve research and development to reduce the degree of uncertainty.

5. Conclusion

The need for large-scale and rapid intervention through restoration and sustainable land management has never been greater. This requires collective action. Land managers by themselves cannot afford the required change in land management practices. The combination of an easement contract, the definition of an asset as well as the value addition of the land use change enables any firm, foundation, legal entity or person that has a vested interest in the restoration and the sustainable management of land and natural resources in general to invest in natural capital and make that count – by accounting for it on its balance sheet as an asset.

Such an investment will not only add value to the issuer of the easement, but to its entire cliental and society at large. Investment in restoration and sustainable land management is thus no longer an expenditure item subject to cost-minimisation strategies, but an investment in an asset which allows the investor to broaden its portfolio and reduce its exposure to natural resource-based risk. This mechanism thus enables the sharing of a gain and at the same time enhances the capability and productiveness of natural capital. The benefits would be many-fold, for example the support and enhancement of GDP, job creation, climate change adaptation, combat of desertification, and improvement in the food production balance. Not only would the issuer of the easement be able to generate revenues, but also would it be able to show its contribution to building natural capital in general, and the ecosystem services society enjoys from it.

Acknowledgements

The author would like to acknowledge the contributions of Nerine Stegmann, Danie Coetzee, Graham Terry, Garth Barnes, Pieter Steyn, Cobus Fraser, Eliot Taylor, Rob Nieuwenhuis, Maurits Bosman, Heinz Meissner, Hendrik Smith and the anonymous referees.

References

- Aronson, J., Blignaut, J., Milton, J., Clewell, A., 2006. Natural capital: the limiting factor. *Ecol. Eng.* 28, 1–5.
- Aronson, J., Blignaut, J., De Groot, R., Clewell, A., Lowry II, P., Woodworth, P., Renison, D., Tongway, D., Cowling, R., Fontaine, C., De Wit, M., Farley, J., Levy, S., Milton, S., Rangel, O., Debrincat, B., Birkinshaw, C., 2010. The road to sustainability must bridge three great divides. *Ann. N. Y. Acad. Sci.* 1185, 225–236. <https://doi.org/10.1111/j.1749-6632.2009.05281.x>.
- Blignaut, J., Aronson, J., De Groot, D., 2014. Restoration of natural capital: a key strategy on the path to sustainability. *Ecol. Eng.* 65, 54–61. <https://doi.org/10.1016/j.ecoeng.2013.09.003>.

- De Groot, D., Blignaut, J., Van der Ploeg, S., Aronson, J., Farley, J., Elmqvist, T., 2013. Benefits of investing in ecosystem restoration. *Conserv. Biol.* 27 (6), 1286–1293. <https://doi.org/10.1111/cobi.12158>.
- Elmqvist, T., Setälä, H., Handel, S., Van der Ploeg, S., Aronson, J., Blignaut, J.N., Gómez-Baggethun, E., Nowak, D.J., Kronenberg, J., De Groot, R., 2015. Benefits of restoring ecosystem services in urban areas. *COSUST* 14, 101–108. <https://doi.org/10.1016/j.cosust.2015.05.001>.
- International Accounting Standards Board (IASB), 2018. *Conceptual Framework for Financial Reporting*. International Accounting Standards Board, London.
- Lal, R., 2010. Enhancing eco-efficiency in agroecosystems through soil C sequestration. *Crop. Sci.* 50, S120–S131.
- Laybourn-Langton, L., Rankin, L., Baxter, D., 2019. This is a crisis: Facing up to the age of environmental breakdown. IPPR. Available at: <http://www.ippr.org/research/publications/age-of-environmental-breakdown>.
- Mudavanhu, S., Blignaut, J.N., Stegmann, N., Barnes, G., Prinsloo, W., Tuckett, A., 2017. The economic value of ecosystem goods and services: the case of Mogale's Gate Biodiversity Centre, South Africa. *Ecosyst. Services* 26, 127–136. <https://doi.org/10.1016/j.ecoser.2017.06.005>.
- Steffen, W., Rockström, J., Richardson, K., et al., 2018. Trajectories of the earth system in the anthropocene. Available at: *Proc. Natl. Acad. Sci.* 115 (33), 8252–8259. <https://www.pnas.org/content/115/33/8252.short>.

Websites

- <http://definitions.uslegal.com/n/national-security>.
- <https://legal-dictionary.thefreedictionary.com/easement>.
- https://www.nature.org/en-us/about-us/who-we-are/how-we-work/private-lands-conservation/?tab.q=tab_container-tab_element_670.
- <http://www.wwf.org.za/?20241/first-conservation-easement>.
- <https://www.conservationeasement.us>.

SPOORELEMENT BESTUUR BY KORING

2019 Seisoen

ELEMENT	ROL IN DIE PLANT en KRITIEKE TYD VAN BEHOEFTE	TEKORT SIMPTOME en PROBLEEM GEVALLE	KRITIESE VLAK IN BLAAR (mg/kg)	
			5-6 Blaar	Blom
B Boor Boron	Ingebou in selwande Behoud en werking van membrane in selle Fisiologiese aksies by metabolisme - koolhidrate Verhoogde aktiwiteit van sommige ensieme Ontwikkeling van die stuifmeelbuis tydens blom. <i>Binne 21-28 dae na-opkoms. Weer by vlagblaar.</i>	Wit strepe tussen nerwe in blare Inkeppings op rante van jongste blaar Klein/kort are, ongevulde sade. Sekondere groei in aar.	6 - 12	6 - 10 >50 <i>toksies</i>
Cu Koper Copper	Betrokke by fotosintese Verwerking van N in plant Aktiewe opname wanneer plante jonk is, hoogste inhoud is tussen stoel en stamverlenging. Beweeg stadig in die plant. <i>Binne 14-21 dae na op-koms.</i>	Jong blare sterf terug van die punt, vertoon verdraaid "tip wither" Jong plante benodig meer water Plant stoel intensief. Dun halms, aarvorming onvoltooid. Are "blind" en wit gekleurde 'white ear" Wortelgroei word gestrem.	7 - 15	5 - 25 >70 <i>toksies</i>
Fe Yster Iron	Aktief betrokke by fotosintese. Beskikbaarheid in grond word benadeel deur wansbalanse met P, Mn, Ca/Mg-karbonaat, Hoë bi-karbonaat, droogte, natvoete. <i>Binne 14-21 dae na op-koms op kalkryke gronde. Herhaal spuit wanneer tekort simptome verskyn.</i>	Jongste blare verloor groen kleur. Duidelike tussen nerfse vergeling op jong blare. Dun stamme. Kort misvormde wortels. Algemene probleem op kalkryke gronde.	25 - 100	25 - 100
Mn Mangaan Manganese	Aktiveer ensieme wat in Krebs-siklus betrokke is Betrokke by fotosintese Bëinvloed suiker- en proteïnhoud. Grond pH(water)>7.0 – Mn tekorte kom voor. <i>Sterk behoefte by begin stoel fase - Binne 21-28 dae na op-koms.</i>	Tussen nerf vergeling op middle en later jong blare, wat later tot grys-bruin vlekke ontwikkel "grey speck disease". Saad wat nie vul nie. Algemene probleem op kalkryke gronde.	35 - 100	25 - 100

<p>Mo Molibdeen Molybdenum</p> <p><i>Belangrik by peulplant in wisselboustelsel</i></p>	<p>Omskakeling van Nitraat-N in die opbou van metabaliete in die plant;</p> <ul style="list-style-type: none"> • N-bron = Nitraat, het meer Mo nodig • N-bron = Ammonium, kan met minder Mo funksioneer. <p>Sintese van verskeie ensieme betrokke by energie in plantselle.</p> <p>Omskakeling van anorganiese P na organiese verbindings.</p> <p>Verhoog die fisiologiese werking van Yster.</p> <p><i>Saadbehandeling.</i></p>	<p>Eerste simptome kan wys by 3 blaar stadium – kan ook verwaar word met N-tekort simptome. Ligte vergeling met jongste blaar nog groen.</p> <p>Mo tekort lei tot hoë Nitraat vlakke wat nie na proteïen omgeskakel word nie.</p> <p>Tekorte op suur gronde. Kalk toediening om pH reg te stel is nodig.</p> <p>Saadbehandeling is standaard voorkomende en regstellende aksie.</p>	<p>>0.1</p>	
<p>Zn Sink Zinc</p>	<p>Betrokke by membraan deurlaatbaarheid Voorloper tot proteïen sintese.</p> <p><i>Binne 14-28 dae na op-koms. Herhaal spuit op kalkryke gronde 28 dae later.</i></p>	<p>Verskyn eerste op nuwe groei weefsel. Blaarrante bly groen met tussen nerfse vergeeling. Jong blare vertoon klein. Algemene probleem op kalkryke gronde.</p>	<p>25 - 70</p>	<p>15 - 70</p>

Optimum spoorelement vlakke in grondontleding.

Element	Cu	Mn	Zn	B
	<i>Ammonium-EDTA ekstraksie mg/kg</i>			<i>Warm water mg/kg</i>
Minimum vlak	2.0	10	10	1.0
Maksimum vlak	2.5	20	15	1.5

Peter Greeff

Tel: 082-9259136 / Tel: 021-9073015 e-pos: peter@orchman.com



BLWK Bestuurspan / CAWC Management Team

Lede

Hoppies Uys – hoppies@swdconnect.co.za
 Sakkie Rust – sakkie@rautenbachtransport.co.za
 MG Lötter – devlei@whalemail.co.za
 Hume Schonfeldt – humeschonfeldt@gmail.com
 Jakobus Mouton – andre@patat.za.net
 Amelia Genis – agenis@landbou.com
 Johann Strauss – johannst@elsenburg.com
 Pieter Blom (SSK) – pblom@ssk.co.za
 Ruan Schutte (GraanSA) - ruan@grainsa.co.za
 Pieter Burger (Kaap Agri) – pieter.burger2@kaapagri.co.za
 Lombard van Jaarsveld – lombardvj@overbergagri.co.za
 Gareth De Bruin (Kaap Agri) - gareth.debruin@kaapagri.co.za
 Peter Greeff – peter@orchman.com
 Pieter Swanepoel - pieterswanepoel@sun.ac.za

weekblad
Landbou

Click on the email address
 to send a person an email

