APPENDIX 3: EASTERN CAPE AND SOUTHERN KZN PROGRESS REPORT

CA Farmer Innovation Programme for smallholders.

Period: October 2017 - September 2018

Farmer Centred Innovation in Conservation Agriculture in upper catchment areas of the Drakensberg in the Eastern Cape and Southern KZN regions of KwaZulu-Natal

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Identification of the project

Description and selection of study areas

Matatiele has remained an area of focus for the programme, albeit with a smaller group of participants and working in fewer localities (Nkau, Mqhobi, Sehutlong and Khutsong) primarily managed by the local facilitator, Bulelwa Dzingwa.

Expansion into Southern KwaZulu-Natal (SKZN) has been successful and there has been expansion into 5 new villages (Ngongonini, Plain Hill, St Elois, Emazabekweni, Plaatistat) making the total project footprint of 13 villages. The good relationships with stakeholders in the Ubuhlebezwe and the Nksozana Dlamini-Zuma Local Municipalities and with KwaNalu (The KwaZulu-Natal Agricultural Union) have been extremely helpful in this regard.

Five Local Facilitators (LFs) have been active in SKZN this season, as other villages did not have people who volunteered or were elected into these positions. Three Village Savings and Loan Associations (VSLA) have been supported in Madzikane and Matatiele and a new group has started in Nnongonini.

Approach and Methodology

The farmer-centred innovation systems research process underpinning the programme, which is based on working intensively with farmer learning groups and local facilitators in each of the villages, has been continued and strengthened.

Within the learning groups farmer innovators volunteer to set up and manage farmer managed adaptive trials as the 'learning venues' for the whole learning group. Farmer Field School (FFS) and Participatory Innovation Development (PID) methodologies are used within the group to focus the learning on the actual growth and development of the crops throughout the season. New ideas are tested against the 'normal' practise in the area as the controls. Farmers observe, analyse and assess what is happening in the trials and discuss appropriate decisions and management practices. Small information provision and training sessions are included in these workshops/ processes. These are based also on the seasonality of the crop and the specific requests and questions from farmer learning group participants.

Local facilitators are chosen from within and by members of the learning group to be a person who has the required experience, knowledge and a willingness to support the other farmer innovators in their implementation. Facilitators are only chosen and appointed where people with the appropriate skill and personality exists. Local facilitators receive a stipend for a maximum of 10 working days per month, for their support to the farmer innovators. They fill in detailed timesheets outlining their activities against which they claim a monthly stipend.

Learning group members agree to a season long learning process and put forward the farmer innovators to run the trials. Each prospective innovator is interviewed and visited and signs an agreement with the Grain-SA team regarding their contribution to the process. They undertake to plant and manage the CA trials according to the processes introduced as well as a control plot of the same size. For the latter, farmers provide their own inputs.

The adaptive trials are also used as a focus point for the broader community to engage through local learning events and farmers' days. Stakeholders and the broader economic, agricultural and

environmental communities are drawn into these processes and events. Through these events *Innovation Platforms (IPs)* are developed for cooperation, synergy between programmes and development of appropriate and farmer led processes for economic inclusion. These IPs also provide a good opportunity to focus scientific and academic research on the 'needs' of the process.

In this season (2017-2018) we have continued to focus on the following elements of the model, namely:

a) Support farmers who are in their 1st, 2nd and 3rd season,
b) Inclusion of summer cover crops in the crop rotation trials
c) Continuation with experimentation with winter cover crops
d) Initiation of nodes for farmer centres that can offer tools, input packs and advice
e) Continued support for the local maize milling operation for maize meal and cattle feed in Khutsong.
f) Support for acquisition of an electric maize thresher for the group in Madzikane
g) Introduction of 2 row tractor drawn planter

Key activities: October 2017-September 2018

Implementation has continued in three areas (Matatiele, Creighton, and Ixopo) in 13 villages. Five (5) new villages were brought on board this season. Three (3) VSLAs have been started (Madzikane, Nokweja, Ngongonini). Two (2) farmers days were held: one in Madzikane and one in Springvalley in association with Landcare (DARD), a co-funder for this season. A farmers' day focussing on soil health was held in Mqhobi in the EC.

The overall programme is on track and the budget is deemed sufficient for completion on target in September 2018.

Financial reporting

Below is a summary of the key result areas and budgets provided under the 2017-2018 project cycle.

Table 1: SKZN and EC SFIP budget outline for 2017-2018

Milestones/ Outputs	Key activities	Outcomes/ Deliverables	Budgets
	Capital Equipment	Incl soil samples, knapsack sprayers and planters	R37 290,00
Farmer experimentation EC and SKZN	Administration and sundries	Travel, accommodation, admin, manuals etc	R 94 160,00
	Farmer centred innovation systems	Farmer experimentation, savings groups, monitoring, review	R 503 964,00
	Innovation platforms	Stakeholder meetings, platform building and events	R14 445,00
Sub - TOTAL: Oct 2017-Sept 2018			**R 649 859,00**

Expenditure by MDF has followed the key activities above. Regarding capital equipment and Farmer Experimentation, a few modifications were made, given the co-funding that was received

through the KZNDARD Land Care programme (R113 500) and the payment of subsidies by farmers (R1 530). This provided for increased budgetary allowances and thus also meant savings on capital equipment of around R42 000, which has been used within the Farmer centred innovations systems key activity area.

Expenditure on capital equipment and farmer experiments is detailed below.

Table 2: Expenditure on the Capital Items and farmer Experimentation portions of the budget; 2017-2018

Date	**Inputs**	**Amt**	**Pd for by grainSA**	**Input subsidy payments**	
2017/10/24	TWK Agri-Ixopo		R32 024,07		
2017/10/31	Farmers AgriCare; Gramoxone, Dual Gold, Decis Forte	R2 671,30			
2017/11/10	AGT Foods- Cover Crops	R17 624,40			
2017/11/17	Khayalethu Store: Ixopo, inputs	R260,50			
2017/11/22	TWk Ixopo;Twine, Paraquat, gloves, juice	R244,70			
2018/01/15	TWK Ixopo Gramoxone	R608,00			
2018/01/17	Farmers input subsidies			R 1 530,00	Ngongonini subsidies
2018/06/12	Victoria Packaging; 50kg bags	R70,00			
2018/07/19	HIS- thresher repair	R1 419,96			
		R22 898,86	R 32 024,07	R 1 530,00	
	Total	**R 53 392,93**			
Budget	**Description**	**Amount**	**KZNDARD Landcare**	**Amount**	
Capital equipment	Soil samples, tools, quantitative measurements	R 37 290,00	Co funding farmer experiment, capital expenditure	R113 500,00	
Farmer experiments	Seed, herbicide, fertilizer	R 58 208,00			
	Total	**R 95 498,00**		**R113 500,00**	

Results achieved to date

Learning groups have been set up in each village and have had regular meetings. Training/learning workshops have been conducted and monitoring and mid-season learning events have been held

The learning groups provided the innovation platforms also for discussion of the value chain issues, such as bulk buying, harvesting, storage and milling options and marketing.

Local facilitators were chosen by their groups for 5 villages (Nkau, Nokweja, Madzikane, Ofafa, and Springvalley). These facilitators have assisted with trial planting and monitoring in their areas and will be instrumental in arranging cross visits and farmers' days.

Stakeholder engagement and awareness raising has continued. Three farmers days have been held, focussing on progress, soil health and use of different varieties of maize.

The stakeholder forum in Madzikane has been continued to create a platform for involvement of Government and Municipal Stakeholders. Presently a proposal is being developed for Cooperative support through the Department of Small Business Development with the assistance of Roy Dandala from KwaNalu and Nqe Dlamini from StratAct.

Three (3) VSLAs have been supported, of which two have been formed in the present season; one in Madzikane and one in Ngongonini.

The table below outlines activities related to objectives and key indicators for the period of October 2017-September 2018.

Table 3: SUMMARY OF PROGRESS (OCTOBER 2017 – SEPTEMBER 2018) RELATED TO OBJECTIVES AND KEY ACTIVITIES

Objectives	**Key activities**	**Summary of progress**	**% completion and comment**
1. Document lessons learned	Documentation for learning and awareness raising	- Manuals and learning materials) - Sharing of information through innovation platforms processes - Articles and promotional material	-Use of GrainSA promotional videos, Pp presentations, CA manuals and learning handouts in events and meetings - Participation in Ubuhlebezwe LM agricultural forum, Madzikane, Springvlley and Mqhobhi farmers' days (100% completion) - 3 Conference papers:@ACCA, LaRSSA and LandCare - 3 articles for the SAGrain newsletter; incl a case study for Mr Xaba (Madzikane) (100% completion)
	Interim and Final report	- Interim and annual report	- Interim and annual reports finalised (100% completion)
Objectives	**Key activities**	**Summary of progress**	**% completion and comment**
2. Increase the sustainability and efficiency of CA systems	1st level experimentation:– use their own practice as a control – size 400m^2 ha exp, Control.	- 9 villages, 44 farmers	- 100%. Basic CA design-intercropping with maize beans and cowpeas on a 100m^2- 400m^2 plot, with a control plot managed entirely by the participant. Adaptation trials included late season planting of beans with a mixture of winter and summer cover crops.
	2nd level experimentation: g farmers use their own practice as a control – size: size 400m^2 ha exp, 400m^2	- 8 villages, 25 farmers	- 100%. Adaptation trials included late season planting of beans with a mixture of winter and summer cover crops. Most participants opted to continue with intercropping practice from their 1st year.

	3rd level experimentation; own contribution, larger plots, own	- 3 villages, 4 farmers	- 100%. Larger level plantings using oxen drawn planters and including cover crops of own choice such as Lucerne. Intercropping still practised. Awa crop rotation and summer and winter cover crops.
	Develop and manage PM&E framework; – weekly and monthly M&E visits	- M&E forms redesigned and used - Digital monitoring system piloted	- 100%. Planting and growth monitoring completed, along with yield measurements for maize, beans and cowpeas. Yearly review and planning sessions conducted.
	Facilitation of innovation platforms	- Co- facilitation of information sharing and action planning with stakeholders and role players	- 100%. Continuation with stakeholder meetings and events.
	CA working group, and reference group	-Planned for Aug 2018	-
	Sharing of information using a range of innovation platforms	- Presentation at UWC postgraduate student symposium for PLAAS	- See above

A performance dashboard is indicated below. This provides a snapshot of performance according to suggested numbers and outputs in the proposal.

Table 4: PERFORMANCE DASHBOARD; SEPTEMBER 2018

Outputs	Proposed (March 2017)	Actual (Sept 2018)
Number of areas of operation	4	3
Number of villages active	13	13
No of 1st level farmer experiments	48	44
No of 2nd level farmer experiments	17	25
No of 3rd level experiments	3	4
No of local facilitators	5	5
No of direct beneficiaries	114	138
Participatory M&E (farmer level)	Yes	Yes
VSLAs		4
Soil health samples	27	9
Soil samples	36	22
CA manual (English and Zulu)	Yes	CA manual English – yes CA manual Zulu-yes

Initiation of learning groups in Southern KZN has been going very well and CA has been introduced in 9 villages with a total of 58 new trial participants. Of these participants 43 managed to continue with their trials to harvest.

Twenty nine (29) Participants including both SKZN and Matatiele are continuing into their 2nd and 3rd years of CA experimentation

The table below summarises the planned and actual farmer trial implementation for the 2017-2018 planting season. A total of 95 trial participants volunteered through the planning processes across 13 villages in three areas. Ninety three (93) of these farmers planted trials (around 91% of participants). The season was quite dry to start with and a number of participants had patchy germination as a result, especially in Matatiele.

Table 5: SUMMARY OF FARMER INNOVATION NUMBER AND AREAS PLANTED PER VILLAGE IN THIS CA PROCESS; EASTERN CAPE, 2017-2018

Area	Village	Farm-ers selec-ted	Farmers planted (1st level)	Farmers planted (2nd level)	Farmers planted (3rd level)	Experimentation	Comments; incl planters used.
Matatiele	Sehutlong	4	1	1	2	Summer cover crops, crop rotation, OPVs, winter cover crops, intercropping	Bulelwa Dzingwa – local facilitator for Nkau, Mghobi and Sehutlong. She has continued to manage the CA experimentation in Matatiele- but has a much smaller group of participants this season
	Nkau	3	1	1	1	Summer cover crops, crop rotation, OPVs, winter cover crops, intercropping	
	Mqhobi (2017=8)	2		2		Intercropping – new village and group	
	Khutsong	1			1	Summer cover crops, crop rotation, OPVs, winter cover crops, intercropping	Mapheele also experimenting with Lucerne Animal drawn planters used here in larger areas
Creighton	Madzikane	10		7		Intercropping (beans and cowpeas), late season beans and cover crops 2 row-planter (7 participants)	Partnership KwaNalu. GM control plots, trials for PANNAR. Local facilitator: Mr CD Xaba
Ixopo	Ofafa (2017=4)	8	2	5		Intercropping, summer and winter cover crops,	Local facilitator; Mr Ndlovu. Area is hilly and steep with variable to bad soils
	Springvalley (2017=9)	6		5		Intercropping, summer and winter cover crops,	Local Facilitator; Mr B Dlamini. Local homestead based fields. Area is hilly nad steep with variable soils
	Plaatistat (new grp)	13	6			Intercropping, summer and winter cover crops,	Local facilitator The beginnings of a farmer centre. Here there are larger fields- need for a tractor drawn planter.
	PlainHill (new grp)	12	9			Intercropping, summer and winter cover crops,	Expansion area from Spring Valley supported by Mr B Dlamini the LF

	Nokweja (2017=9)			4		Intercropping, summer and winter cover crops,	Local facilitator, Mr Mkhize. They are also working in larger fields with DARD and GrainSA FDP
	St Elois (new group)	9	5			Intercropping, summer and winter cover crops,	Expansion area from Nokweja supported by Mr Mkhize the LF
	Emazabekweni (new group)	8	5			Intercropping, summer and winter cover crops,	Expansion area from Nokweja supported by Mr Mkhize the LF
	Ngongonini (new group)	16	11			Intercropping, summer and winter cover crops,	Expansion area from Nokweja supported by Mr Mkhize the LF
TOTAL	13	92	40	25	4		**Total area planted to trials~ 3,6 ha**

There is a trend of increasing number of villages and participants over the period of implementation, despite the need to incorporate new villages in every year for the SKZN and EC region. This points towards the success of the methodology of using Innovation platforms, learning groups and farmer led experimentation as a process for creating awareness and improving implementation of CA in smallholder systems

Table 6: Summary of areas of implementation and participant numbers from 2013-2017 in the EC&SKZN region.

EC+SKZN	No of villages	Learning group members	Farmer experiments	Harvested	Area under trials	Total area planted *
2013-2014	3	61	23	22	0,46ha	0,8ha
2014-2015	10	110	63	26	0,5ha	1,4ha
2015-2016	8	96	43	28	0,42ha	2,5ha
2016-2017	11	121	70	52	1,1ha	5,1ha
2017-2018	13	138	82	72	3,6ha	8ha

*Control plot sizes have been measured accurately only for a proportion of the participants. This value is thus an estimate

The number in the column named farmer experiments are the number of smallholders registered each year (at the beginning of the season) to do their farmer level trials. The number in the Harvested column are those who planted and harvested their trials. Some smallholders plant, but have crop failure and thus do not harvest, while other end up not planting. Reasons provided by farmers for not planting include:

- Season too dry and opted not to plant
- Waited too long and then could not plant
- Lack of labour
- Cattle not sent into the mountains for summer grazing in time to plant
- Non-payment of subsidy amount
- Ill health, migration of family members

- Inability to plant the control plots as per the agreement with each farmer

The model is that participant farmers plant a CA trial (100 m2, 400m2, or 1000m2 – choice up to the farmer), alongside their normal maize plantings- or controls. Their control plot has to be at least the same size as their trials. Even with this agreement a proportion of participants (around 35%) do not plant control plots.

Table 7: Adoption rates for smallholders undertaking CA in the SZKZN&EC region

EC, SKZN	2013	2014	2015	2016	2017
1st	22	19	22	44	52
2nd		7	5	2	30
3rd			1	6	4
4th					

This table indicates the number of new participants coming on board each year and the number that continue with experimentation. There are some drop off rates and then recovery rates again as people restart the process. One of the major contributing factors to the stop-start process has been the weather, given the severe drought in 2015, very few participants planted but took up the process again in 2016. Also, upon the initial introduction of the subsidy a number of participants withdrew, but decided at a later stage to re-enter the programme and pay the subsidy. So, the numbers are not a clear linear process of uptake and attrition as one might have expected.

What is significant is that every year new participants are brought on board and that overall the number of farmer participants undertaking trials and keeping on with the CA for a period of time is growing steadily.

The picture for the EC, SKZN sites is even less linear than other areas– generally here the uptake in the second year has been a lot lower than for Bergville for example, especially in the first three years. As the study areas have been changing more rapidly in those areas and some places have been moved away from, there are as yet no 4th year implementers in that site. In the EC it has been harder to sustain the experimentation process. New participants started every year, but very few continued. There were a number of factors that contributed; one being the much lower yield potential in this area (Matatiele, Mt Frere, Mt Ailiff) and the other being the unwillingness of participants to put in the labour required to maintain their trials and control plots. The latter has to do with a dependency syndrome that has been created through the Eastern Cape Department of Agriculture's process of ploughing and planting for people. They have become unused to doing the work themselves. A decision was taken by this team to refrain from continued support in these cases and to move to new areas instead – thus the systematic move away from the EC into SKZN.

Overall trial design process

As this is an existing 'technology' the farmer level experimentation is in essence an adaptation trial process.

Year 1:

Experimental design is pre-defined by the research team (based on previous implementation in the area in an action research process with smallholders). It includes a number of different aspects:

- Intercropping of maize, beans and cowpeas
- Introduction of OPV and hybrid varieties for comparison (1 variety of maize and beans respectively)
- Close spacing (based on Argentinean model)
- Mixture of basin and row planting models
- Use of no-till planters (hand held and animal drawn)
- Use of micro-dosing of fertilizers based on a generic recommendation from local soil samples
- Herbicides sprayed before or at planting
- Decis Forte used at planting and top dressing stage for cutworm and stalk borer
- Planting of cover crops; winter mix in Autumn

Experimental design includes 2 treatments; planter type (2) and intercrop (2). See the diagram below>

	PLOT 1: Hand Hoe			PLOT 2: Planter	
10m or 5m	Maize 1, bean 1	Maize 2, Bean 1		Maize 1, bean 1	Maize 2, Bean 1
	Maize 1, Bean 2	Maize 2, Bean 2		Maize 1, Bean 2	Maize 2, Bean 2
	10m or 5m				
	PLOT 3:	OR repeat plot 1 and 2		PLOT 4:	
	Hand hoe	Planter		Hand hoe	Planter
	Maize 1,cowpea	Maize 1,cowpea		Maize 1, Dolicho	Maize 1, dolichos
	Maize 2, Cowpea	Maize 2, Cowpea		Maize 2, Dolicho	Maize 2, Dolichos

Figure 1:Expample of plot layout for the 1st level farmer trials

The basic process for planting thus includes: Close spacing of tramlines (2 rows) of maize (50cmx50cm) and legumes (20cmx10cm) intercropped, use of a variety of OPV and hybrid seed, weed control through a combination of pre- planting spraying with herbicide and manual weeding during the planting season and pest control using Decis Forte, sprayed once at planting and once at top dressing stage.

Year 2:

Based on evaluation of experiment progress for year 1, includes the addition of options that farmers choose from. Farmers also take on spraying and plot layout themselves:

- A number of different OPV and hybrid varieties for maize
- A number of different options for legumes (including summer cover crops)
- Planting method of choice
- Comparison of single crop and inter cropping planting methods
- Use of specific soil sample results for fertilizer recommendations

- Early planting
- Own choices

Year 3:

Trials are based on evaluation of experimentation process to date; to include issues of cost benefit analysis, bulk buying for input supply, joint actions around storage, processing and marketing. Farmers design their experiments for themselves to include some of the following potential focus areas:

- Early planting; with options to deal with more weeds and increased stalk borer pressure.
- Herbicide mix to be used pre and at planting (Round up, Dual Gold, Gramoxone)
- A pest control programme to include dealing with CMR beetles
- Intercropping vs crop rotation options
- Spacing in single block plantings
- Use of composted manure for mulching and soil improvement in combination with fertilizer,.
- Soil sample results and specific fertilizer recommendations
- Planting of dolichos and other climbing beans
- Summer and winter cover crops; crop mixes, planting dates, management systems, planting methods (furrows vs scatter)
- Seed varieties; conscious decisions around POVs, hybrids and GM seeds
- Cost benefit analysis of chosen options

Possible agrochemical spraying regime options

1. Roundup 2 weeks before planting- if there has been some rain and weeds. Dual Gold at planting (or just after planting with Decis Forte/Kemprin).

2. Gramoxone at planting (just before or after planting) with or without Dual Gold and Decis Forte/Kemprin– Dual Gold does not work on dry soil (Followed by heavy rain)

Soil Fertility and Soil health

Soil Fertility

Soil samples were taken for the new areas in SKZN where the trials have been initiated, namely Plainhill, St Elois, Ngongonini, Emazabekweni. An analysis of the differences in soil fertility for the new villages was provided in the interim report. The table below summarises the results per village, for the 28 samples that have been taken over the last two seasons, to get a coherent indication of fertilizer requirements for this project's participants.

Table 8 : Summaries for soil fertility parameters and fertilizer requirements for the SKZN and Matatiele (2017)

AREA	pH	% Acid sat	%C	%N	%Clay	MAP	KCL	LAN	Lime	
							50kg bags/ha		t/ha	Note: Average was taken for those needing
Springvalley	5,5	0,5	2,76	0,19	51,3	3,8		1,46	0	
Plainhill	4,3	19	3,2	0,2	59	3,8	2,4	2,6	4	
Ofafa	5,4	0,6	3,7	0,38	40	1,8		2,1	0	

Nokweja 2016	4,0	25,5	4,43	0,31	49,2	2,7		1,7	4,4	lime – not all participants
Nokweja 2017	4,5	12,5	3,9	0,4	48	2,6		3,8	4,25	
St Elois	5,3	1,25	3,4	0,3	50	3,2		3,2	0	
Ngongonini	4,5	19	4,9	0,4	50	2,3		2,7	4,2	
Emazabekweni	4,4	2,8	3,1	0,2	58,6	2,8		3,4	0	
Madzikane	4,3	14,9	3,1	0,23	48,1	3		1,6	4,8	
Matatiele	4,46	8,9	1,4	0,1	19,6	2,6		2,4	1,06	
AVERAGE						**3**		**2**	**3,8**	

The generic fertilizer recommendation provided to participants at the start of the trials is 5 x 50kg bags of MAP, 3 bags of LAN and 3,8t/ha of lime (just for those who require lime).

From the above summary table it is clear that the generic recommendation can in fact be reduced to 3 bags of MAP and 2 bags LAN. Attention will need to be given to those participants needing lime and an increased lime requirement specifically in Nokweja, Ngongonini, Plainhill and Madzikane will be important -with a generic recommendation of 3,8t/ha of Lime. For Matatiele this quantity should be 1t/ha.

Soil health

The Haney Soil Health Test (SHT) looks at parameters outside of the conventional inorganic soil fertility measurements in soil. The Haney SHT is an integrated approach to soil testing using chemical and biological soil test data. It is designed to mimic nature's approach to soil nutrient availability as best we can in the lab.

So, what does the soil life look like?

The soil is a complex combination of life forms; bacteria, fungi, protozoa, arthropods and worms, all in an intricate dance of ingestion and egestion that creates the "food" for plant roots and the cycling of nutrients needed for sustainability and regeneration in a system.

Organisms in a healthy soil
(by prof. P. Douillet)

Organism	Number/ ha	Kg / ha
Bacteria	2,000,000,000,000,000,000	2,914
Actinomycetes	50,000,000,000,000,000	1,457
Fungae	500,000,000,000,000	2,914
Algae	9,884,000,000	101
Protozoa	5,000,000,000,000	101
Nematodes	197,680,000	50
Arthropodes	20,163,360	930
Worms	98,840	499

Of these organisms, bacteria have the highest concentration of N at a C:N ratio of 5:1, fungi have a ratio of around 10:1, protozoa 30:1 and nematodes 100:1. Along with the basic chemical properties of the soil, the combination and quantity of these organisms then determine the C:N ratio in your soil. The lower this ratio is, the more organisms are active and the more available the food is to the plants. Good C:N ratios for plant growth are <15:1

It is also important to note that you can have a low or optimum C:N (WEOC/WEON) within a range of values of available water extractable organic carbon (WEOC) in the soil If this value is low, it will reflect in the $C0_2$ respiration, which will also be low. So less organic carbon means less respiration from microorganisms, but again this relationship is unlikely to be linear. The Microbially Active Carbon (MAC = WEOC / ppm CO_2) content is an expression of this relationship. If the percentage MAC is low, it means that nutrient cycling will also be low. One needs a %MAC of at least 20% for efficient nutrient cycling.

Soil health as it relates to soil fertility is all about nutrient cycling of which N is the most complicated as it is sequestered from the atmosphere and the other elements are all mineral derived (P,K etc). Nitrogen cycling is a vital component of all the other soil health functions. When N is in place most if not all the other nutrients are properly cycled and made available to plant roots. The initial driver of this process is the soluble carbon sugars from the root exudates that kick starts the process by providing a usable carbon source that enables the free living nitrogen fixers to utilise the atmospheric nitrogen. This is the starting point of the nutrient cycling process. As these bacteria are consumed by the next trophic level, so the nitrogen pool is established for other microbes and organisms.

Haney SHT indicators

Solvita 1-day CO2-C burst test: This number in ppm is the amount of CO2-C released through respiration in 24 hr. from soil microbes after your soil has been dried and rewetted (as occurs naturally in the field). This is a measure of the microbial activity in the soil and is highly related to soil fertility. In most cases, the higher the number, the more fertile the soil.

Test results ppmCO_2-C	**N-Mineralisation Potential**	**Biomass**
>100	High-N potential soil. Likely sufficient N for most crops	Soil very well supplied with organic matter. Biomass>2500ppm
61-100	Moderately-high. This soil has limited need for supplemental N	Ideal state of biological activity and adequate organic matter
31-60	Moderate. Supplemental N required	Requires new applications of stable organic matter. Biomass<1,200ppm
6-30	Moderate-low. Will not provide sufficient N for most crops	Low in organic structure and microbial activity. Biomass<500ppm
0-5	Little biological activity; requires significant fertilization	Very inactive soil. Biomass<100ppm. Consider long-term care

C:N ratio. This is the ratio of organic C to organic N from the water extractable fraction, which is easily accessible to microbes. This ratio is a critical component of the nutrient cycle. A C:N ratio of above 20:1 indicates that no net N and P mineralisation will occur, meaning that these elements are tied up in microbial cells. As the ratio drops N and P are released to the soil water solution where it can be taken up by growing plants. A good ratio is from 8:1 to 15:1

Soil Health Calculation (SHC). This value can be between 0-50, butwe like to see this value above 7.

The new calculation for the SHC is the following: CO_2 / 10 + WEOC / 50 + WEON /10 - for all CO_2 readings up to 100 ppm

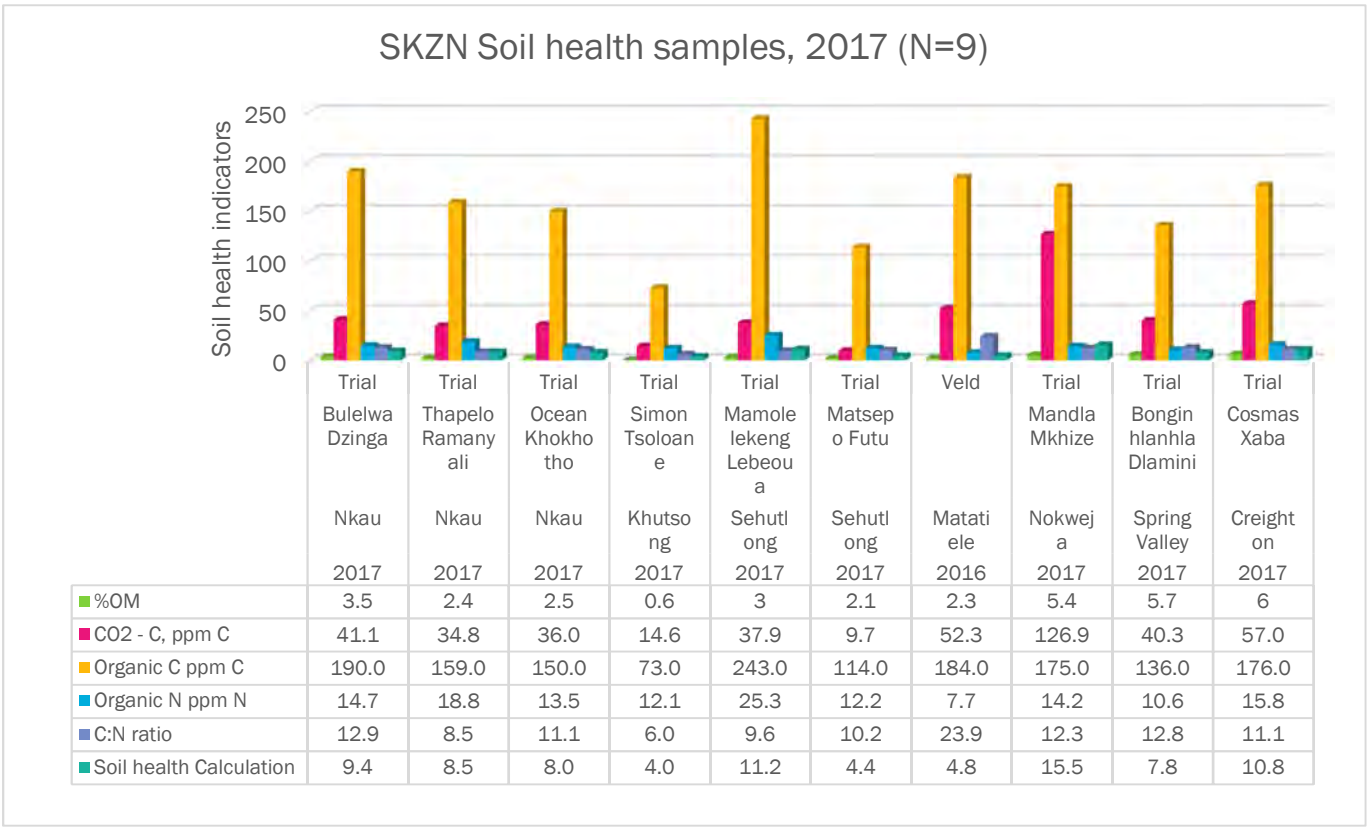
- If the CO2 reading is between 101 to 200 then the dividing number becomes 12.
- Between 201 and 300 it increases to 14 so as to decrease the CO_2 weighting in the formula and give more weight to the WEOC that really drives the system at the first trophic level.

The scale for the SHC is 0-3; 3-7; 7-10; 10-25; 25-50

Soil health tests have been conducted for a small number of participants between 2015-2017 (4) and for 7 participants in total during that period across three villages in Matatiele. This analysis, along with an analysis of changes in soil health scores due to different cropping practices were presented in the interim (6 monthly report in March 2018).

Haney SHT's have also been done for two new entrant participants in Nkau. This allows a comparison between SHT values for start-up of CA in the area and those that have been done for a number of years, as well as monitoring changes over a period of time. These results are also compared with a selection of other new entrant participants for SKZN (Nokweja, Spring Valley and Madzikane). The trends and results are presented below.

Veld samples are taken to provide a 'natural' benchmark against which to compare the cropping samples. The assumption is that the veld in the area provides a good example of a natural balance of soil health indicators for the particular area and particular type of soil.



	Trial Bulelwa Dzinga Nkau 2017	Trial Thapelo Ramanyali Nkau 2017	Trial Ocean Khokhotho Nkau 2017	Trial Simon Tsoloane Khutsong 2017	Trial Mamolelekeng Lebeoua Sehutlong 2017	Trial Matsepo Futu Sehutlong 2017	Veld Matatiele 2016	Trial Mandla Mkhize Nokweja 2017	Trial Bonginhlanhla Dlamini Spring Valley 2017	Trial Cosmas Xaba Creighton 2017
%OM	3.5	2.4	2.5	0.6	3	2.1	2.3	5.4	5.7	6
CO2 - C, ppm C	41.1	34.8	36.0	14.6	37.9	9.7	52.3	126.9	40.3	57.0
Organic C ppm C	190.0	159.0	150.0	73.0	243.0	114.0	184.0	175.0	136.0	176.0
Organic N ppm N	14.7	18.8	13.5	12.1	25.3	12.2	7.7	14.2	10.6	15.8
C:N ratio	12.9	8.5	11.1	6.0	9.6	10.2	23.9	12.3	12.8	11.1
Soil health Calculation	9.4	8.5	8.0	4.0	11.2	4.4	4.8	15.5	7.8	10.8

Figure 2: Soil health indicators for a selection of new and older participants in the SKZN&EC region; 2017

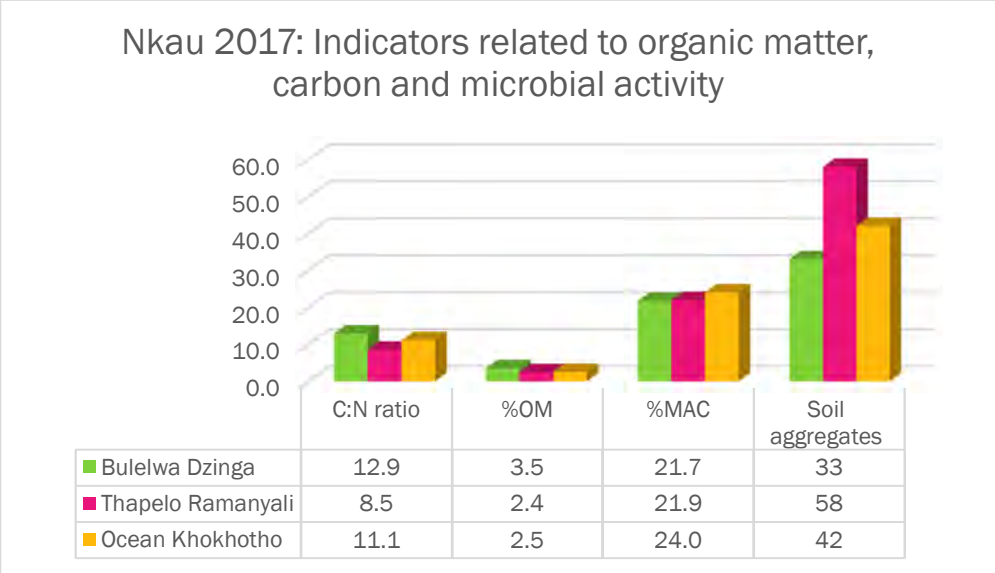
Points of interest from the above figure are discussed below.

NKAU (Matatiele)

- The soils in Nkau are reasonably sandy (15-19% clay), Have pH's ranging between 3,9-4,3., acid saturations of 10-30%, % Organic Carbon of around 1,1-1,3 and % Nitrogen of around 0,13%.Soil sample results for particpants in this area are all reasonably similar and fall wthin the ranges provided.

  In this area Bulelwa Dzingwa has been practicing CA (Rotation of plots consisting of : Intercropping maize with beans and maize with cowpeas; summer cover crops and single crop blocks of maize and beans) for 4 years and the other two participants are in their first year of implementation. (Intercropped plots of maize with beans and maize with cowpeas). For Bulelwa one can see the increased **build-up of soil organic matter (SOM)** (3,5%), as opposed to 2,4% and 2,5% respectively for Thapelo and Ocean. Their values of %SOM are close to the veld baseline (also taken in Nkau, close to Bulelwa's home) for the area and one can assume that the build-up of SOM for Bulelwa is due to her CA cropping practices.

- **Microbial respiration (CO_2-C),** similarly is higher for Bulelwa than for the newer participants, indicating an increase in microbial activity under CA. Here the veld baseline respiration (52,3ppm) is still higher than that of the cropped areas (41.1, 34.8 and 36ppm) respectively for the three participants.



	C:N ratio	%OM	%MAC	Soil aggregates
Bulelwa Dzinga	12.9	3.5	21.7	33
Thapelo Ramanyali	8.5	2.4	21.9	58
Ocean Khokhotho	11.1	2.5	24.0	42

Further analysis is possible using information from the soil health tests. **The percentage microbially active carbon (% MAC)** gives an indication of the percentage of the organic C that was microbially active at the time of sampling. There are a number of factors that can influence % MAC:

a) The overall population of microbes in the soil, if it is small, then there can be more carbon available than is being used and if it is large it can use more organic carbon than is being

generated – the prior can happen in infertile soils low in organic matter and the latter in fertile soils with high growth rates in annual crops.

b) Climatic conditions – microbial activity varies with temperature and moisture in the soil- with reduced microbial activity in very cold, very hot and dry conditions.

c) The balance of microbial types / groups and trophic levels in the microbial population. This is closely related to the C:N ratio. Higher carbon values in relation to nitrogen values will dampen the microbial activity for a period and moves the balance of the microbial population away from bacterial to fungal activity allowing the carbon to be digested and recycled by the fungi. This includes the Mycorrhizal activity in the root zones and presence of aggregates in the soil.

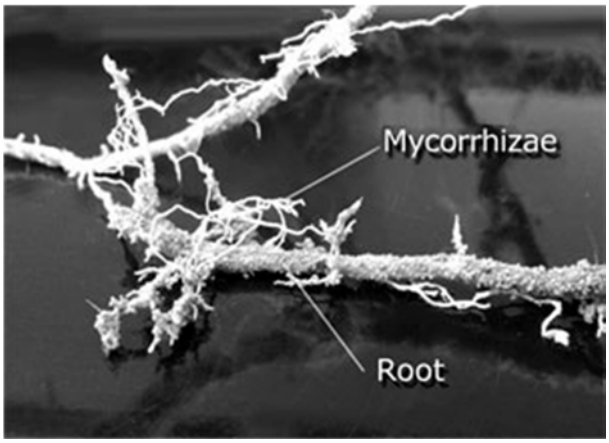
These trends are obvious in the three samples described above. Although Bulelwa Dzingwa is managing to build up SOM in her soil and her microbial respiration score is also higher than that of the other two new entrant participants, her sample shows a higher C:N ratio, lower %MAC and lower soil aggregate stability. This points towards increased stocks of carbon in her soil (reserves), but also towards a microbial population (soil food web) that is slow to assimilate and release the food source (organic C) to plants. It could be due to the fact that her soil was potentially more biologically depleted (e.g. the absence of some keystone microbial species such as mycorrhizae) by continuous cropping, given that both new entrant farmers had not cultivated their fields for a number of years, prior to starting CA.

The Soil Labile Amino Nitrogen (SLAN) test measures the "nearly available Nitrogen" bonded in an organic molecule. It provides the amount of "upstream nitrogen" bound in the soil organic component and represents the total releasable N over time.

The short term release N is that fraction that is “almost” available for plant use and along with long term release N (humus) are the two fractions most affected by build-up of organic matter in the soil. It is possible to work out a Rand value for the

The types of fungi that survive in ***conventionally*** managed agricultural soils are mostly decomposers; they obtain energy from decaying organic matter such as crop residues. Generally, these kinds of fungi have relatively small ***hyphal networks***. They are important for soil fertility and soil structure, but play only a minor role in carbon storage.

Below: Mycorrhizal fungi grow very closely associated with plant roots and create networks of filaments (hyphae within the soil)

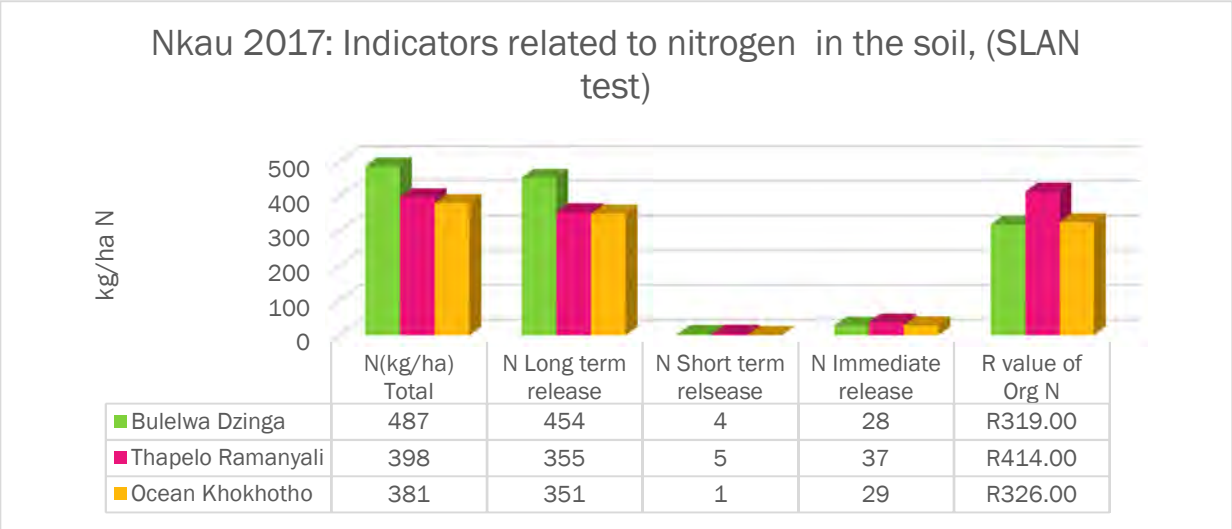


(From:http://www.heartspring.net/mycorrhizal_fungi_benefits.html)

Mycorrhizal fungi differ from decomposer fungi in that they get their energy in a liquid form, as ***soluble*** carbon directly from actively growing plants. There are many different types of mycorrhizal fungi. Mycorrhizal fungi access and transport water - plus nutrients such as phosphorus, nitrogen and zinc - in exchange for carbon from plants.

Some of this soluble carbon is also channelled into soil aggregates via the hyphae of mycorrhizal fungi and can undergo humification, a process in which simple sugars are made up into highly complex carbon ***polymers.*** The soil conditions required for humification are reduced in the presence of herbicides, fungicides, pesticides, phosphate and nitrogen fertilisers - and enhanced in the presence of root exudates and humic substances such as those derived from compost.

inorganic and organic N still available in the soil – which becomes a saving in application of mineral fertilizers containing N.



	N(kg/ha) Total	N Long term release	N Short term relsease	N Immediate release	R value of Org N
Bulelwa Dzinga	487	454	4	28	R319.00
Thapelo Ramanyali	398	355	5	37	R414.00
Ocean Khokhotho	381	351	1	29	R326.00

Figure 3: The SLAN test results for Nkau, 2017

In the above figure the following trends can be seen.

1. For Bulelwa Dzingwa there is a definite build-up of Nitrogen in the soil. This is a combination of organic N and inorganic N (applied in the form of fertilizer). The total N in her soil is significantly higher than for Thapelo and Ocean. She also has a large fraction of long term release N (454 kg/ha). This is the fraction that has been progressively increasing over the three years of measurement. It is significant as it indicates improved soil health and resilience of her soil. This fraction is also higher than for the new entrant participants (398 and 381kg/ha respectively). However, the short-term and immediate release of N is very low and indicates to a partially functional soil food web.

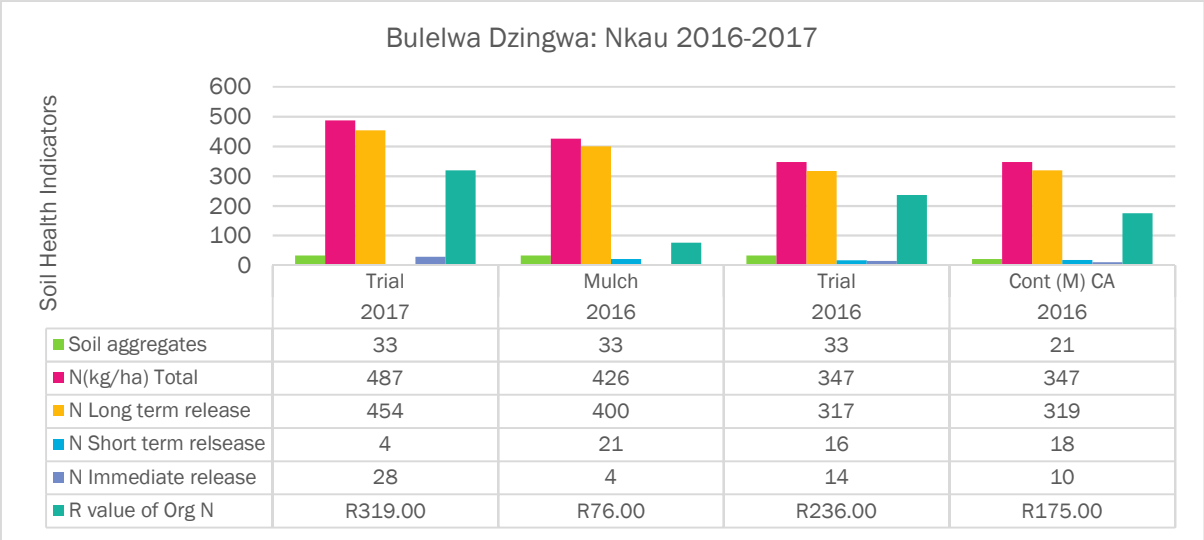
2. The savings in Nitrogen fertilizer applications are calculated from the immediate release N. In this case it is higher for both Thapelo and Ocean than for Bulelwa, which corresponds with the %MAC described above. These values (R250-R450) are reasonably typical of all participants in CA and represent a saving of about 30% on inorganic fertilization through the building up of the organic components in the soil within a few years. This contribution becomes significantly higher when high biomass legumes (such as lab-lab beans, and cowpeas) and multispecies cover crop options are used.

Below is an analysis for Bulelwa Dzingwa looking at different cropping options including her monocrop CA control plot, her trial plot (maize and bean intercrop) and a plot where mulching was applied.

1. There is a small amount of short-term release or reserve N in her soil (4kg/ha). If this is compared to the 2016 season, it can be seen that this fraction was much higher. But in combination, the short term and immediate release N fractions are similar between the two years (32kg/ha in 2017 vs 30kg/ha in 2016).

2. Her mono-cropped maize CA control plot shows a much lower value of available N and a lower rand value of savings in N (R175/ha). This indicates that the intercropping of maize and beans provides for a significant increase in available Nitrogen to the next season's crops.

3. The mulching provides for a significantly higher long term release N value, which is then carried through to the 2017 season.



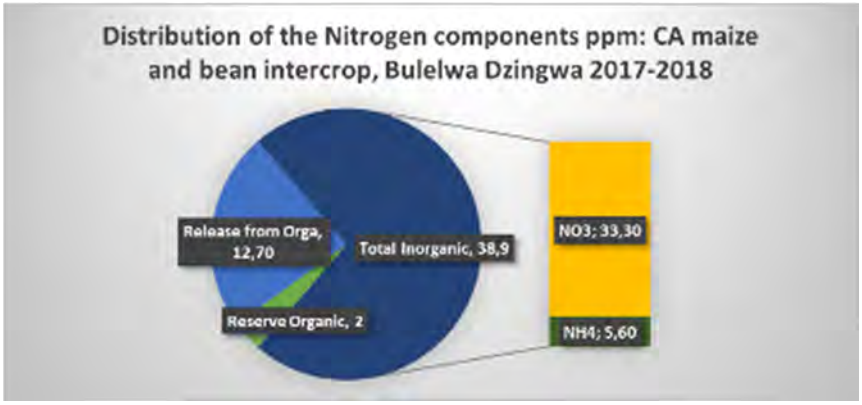
	Trial 2017	Mulch 2016	Trial 2016	Cont (M) CA 2016
Soil aggregates	33	33	33	21
N(kg/ha) Total	487	426	347	347
N Long term release	454	400	317	319
N Short term relsease	4	21	16	18
N Immediate release	28	4	14	10
R value of Org N	R319.00	R76.00	R236.00	R175.00

Figure 4: SLAN test results for Bulelwa Dzingwa, 2017

Nitrogen

In Matatiele where participants have been active for 3-4 years, there is a build-up of organic nitrogen in the soil over time, but also increased release of N. This is indicated in the figure below showing a higher N release than reserve. The immediate release N is mostly provided by chemical fertilization (indicated by high amounts of NO3 inorganic fertiliser) and mineralized organic N and long term N is slowly released to the plants and not available in the nutrient pool in the short term.

This does not happen in conventional (inorganic) farming systems and is thus a good indicator of the regenerative nature of CA. It also happens at a much slower rate in mono cropped plots, when compared to diversified cropping (intercropping and cover crop options)

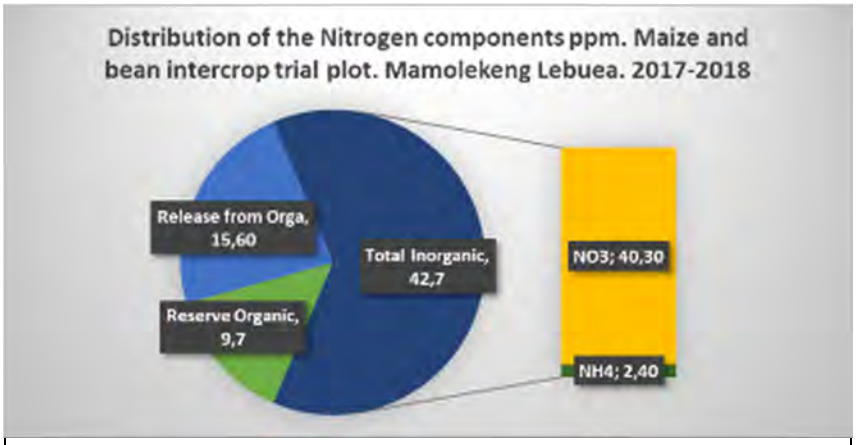


An analysis of Nitrogen components for Bulelwa Dzingwa (Nkau, Matatiele); 2017-2018 – Trial plot

BIOLOGICAL ANALYSES						
Sample #	SOLVITA CO2 Burst	WATER EXTRACT		C/N	Soil Health Calculation (Index)	Comment
	CO2 - C, ppm C	Organic C ppm C	Organic N ppm N			
MAT 6	41,1	190	14,7	12,9	9,4	Very Good

Bulelwa Dzingwa, from Nkau in Matatiele has been practicing CA for 4 years. Although her soil conditions are only fairly good and her yields are also not particularly high, there are definite signs of her soil health improving over time. **Yield 2016-2017 maize 4,1t/ha, beans 2t/ha.**

The interesting point for Bulelwa is that her CA practices are building up reserve N and release N in her soil and slowly assisting in building soil health and fertility to sustain incrementally increasing yields with lower levels of fertiliser.



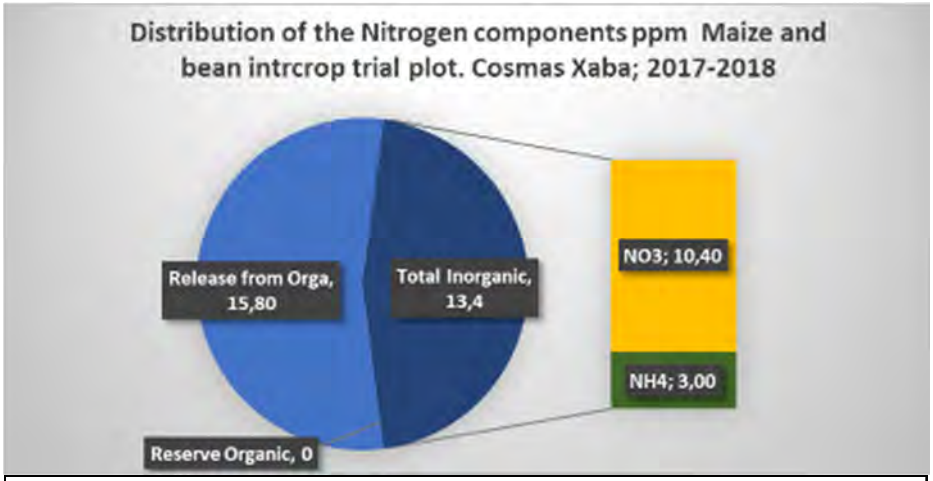
An analysis of Nitrogen components for Mamolelekeng Lebeoua (Sehutlong, Matatiele); 2017-2018 – Trial plot

BIOLOGICAL ANALYSES						
Sample #	SOLVITA CO2 Burst	WATER EXTRACT		C/N	Soil Health Calculation (Index)	Comment
	CO2 - C, ppm C	Organic C ppm C	Organic N ppm N			
MAT 3	37,6	243	25,3	9,6	11,2	Excellent

Mamolekeng Lebuea is the best farmer among our participants in Matatiele. She has managed to maintain and build her soil health, prior even to working with CA and her involvement of 4 years in CA has continually improved her situation. **Yields for 2016-2017were: maize - 7,2t/ha and beans - 2t/ha**

Mamolelekeng has been able to increase her reserve and release N fraction substantially, along with building organic carbon. What is interesting in her case is the combination of a low C:N ratio and low CO2 respiration. This points towards low microbially active carbon. As the other indicators are good, this phenomenon can be interpreted as increased plant growth activity providing large amounts of WEOC in the form of sugars, at a rate that is faster then the present microbial community is able to consume – but this expected to 'catch up' as the N release is higher than N reserve and increasing.

A high fraction of N release is visible in the entrant (year 1) participants of SKZN, where the general soil characteristics are better than in Matatiele. An example is shown below.



An analysis of Nitrogen components for Cosmas Xaba (Madzikane-Creighton); 2017-2018 – trial plot

BIOLOGICAL ANALYSES						
Sample #	SOLVITA CO2 Burst	WATER EXTRACT		C/N	Soil Health Calculation (Index)	Comment
	CO2 - C, ppm C	Organic C ppm C	Organic N ppm N			
GRT 1	57	176	15,8	11,1	10,8	Excellent

Mr Xaba has been producing maize on a reasonably large scale for a number of years and has an advanced conventional system (also using GM maize). **Yields for his CA trial plots were 4,1 t/ha in 2016-2017 and for his control GM maize around 2,65 t/ha.**

Mr Xaba, being in the earlier stages of CA implementation has not managed to increase his organic Nitrogen. So even though he works in an area where his soils are a lot better than in Matatiele, as are the general weather conditions, his yields are on a par with Bulelwa's in Matatiele.

VSLAs (Village Savings and Loan Associations)

The number of Local Village Savings Groups (LVSG) Groups increased from 13 to 19 in the year 2018. Out of the 19 groups, 16 are in Bergville, 2 in Creighton and 1 in Nokweja. The groups consist predominantly of middle aged to elderly women with a majority who are unemployed and depend on social and pension grants in order to survive.

The VSLA groups were established with the aim to support CA learning groups to save money for agricultural inputs. The groups however, have received broader functions, such as members saving for household needs, paying back loans, paying for school fees and buying merchandise for their businesses. A VLS group operates for 12 months and on the thirteenth month the group has a share out of "profits" (interest gained) and thereafter begins another cycle. During these twelve months group members take out loans which they repay with a 10% interest fee added monthly which is how the groups generate income and growth.

Table 9: Summary of VSL records for SKZN for June 2018

GRP NO	Area	Village	GROUP NAME	YRS ACTIVE	NO. OF MEMBERS	# SHARES BOUGHT TODAY	VALUE OF SHARES (TODAY)	CUM # OF SHARES	VALUE OF TOTAL SHARES	LOAN REPAID TODAY	LOAN	NEW LOAN TAKEN	AMOUNT DUE NEXT MONTH
1	Creighton	Riverside	Senzokuhle	1	10	23	R2 400	49	R4 900	R120	R1 200	R2 300	R2 530
2	Creighton	Riverside	Masibambisane	2	13	52	R10 400	233	R46 600	R4 170	R29 100	R16 500	R32 010
3	Nokweja	Ngongonini	Ikusasa Lethu	1	12	28	R2 800	168	R16 800	R3 360	R10 840	R1 000	R9 284
	TOTAL				**35**	**103**	**R15 600**	**450**	**R68 300**	**R7 650**	**R41 140**	**R19 800**	**R43 824**

Ngononini : Ikusasa Lethu Group

Ikusasa Lethu Group started saving in February this year. The group is made up of 10 females and two males. The group was established as per request from the CA participants and their aim is to save up so they can have supplementary income which they can use toward payment of subsidies, purchase of inputs and various other commodities. They have proposed that in the coming year, the members of the group should only be CA participants so that people can benefit from farming as well as making an extra income. The table below shows the latest records for the group. For the month of June they saved R 2 800 and have a cumulative amount shares that comes to R 16 8000. Existing loans are R 10 840 and the new loan is R 1 000 as only one member borrowed. One of the challenges faced by the group was that, initially the record keeper struggled to keep coherent records, although she is improving at the moment.

Right; Members of the Ngongonini group busy with their savings process

Table 10: Records for the Ngongonini VSLA for June 2018

NO.	SURNAME	INITIALS	# SHARES BOUGHT TODAY	VALUE OF SHARES (TODAY)	CUM # OF SHARES	VALUE OF TOTAL SHARES	LOAN REPAID TODAY	LOAN	NEW LOAN TAKEN	AMOUNT DUE NEXT MONTH
1	Mkhize	Z	5	R500	30	R3 000	R300	R3 000		R3 300
2	Mkhize	NP	2	R200	8	R800	R100	R1 000		R1 100
3	Zulu	N	1	R100	11	R1 100	R590	R400		R440
4	Kheswa	T	5	R500	30	R3 000		R0		R0
5	Mkhize	L	5	R500	30	R3 000	R500	R740		R814
6	Kheswa	S	1	R100	6	R600	R1 100	R0		R0
7	Mkhize	L	1	R100	9	R900	R330	R0	R1,000	R1 100
8	Nkabane	E	1	R100	7	R700	R60	R600		R660
9	Shezi	L	2	R200	13	R1 300	R250	R2 500		R2 750
10	Phungula	N	1	R100	7	R700	R80	R800		R880
11	Gamede	M	2	R200	7	R700	R30	R300		R330
12	Mkhize	M	2	R200	10	R1 000	R150	R1 500		R1 650
			28	**R2 800**	**168**	**R16 800**	**R3 490**	**R10 840**	**R1 000**	**R13 024**

Madzikane: Senzokuhle Group (New Group)

The Senzokuhle Group from Madzikane started saving in May 2018. The group consists only of female members and has a total membership of 10 people. All of the members are new participants who have never worked with MDF before but heard about the organisation through Mr Cosmos Xaba's group and requested assistance in starting up a savings group. In the future, they also wish to be part of the CA. For June, their total savings came to R 2 400, and loans repaid came to R 120 and new loans were R 2 300. Their cumulative number of shares is worth R 4 900.

Right; Members of the new group in Madzikane busy with their savings process

Yields and implementation in SKZN

Southern KZN is a fairly new area under the CA programme with a total of 82 participants who are mostly in the first and second year of planting CA farmer-led experiments. In the 2017 growing season five new groups were established primarily in the Nokweja area about 20 km from Ixopo and these are Plainhill, Ngongonini, St Elios and Emazebekweni. Another group was also established in Plaatistat, in Enhlamvini area which is also under the uBuhlebezwe Municipality. A number of workshops were conducted at the start of the season to prepare the groups for planting and these included the introduction to CA as well as spraying and planting workshops. Crop growth monitoring was conducted mid-season to assess the growth of the trials.

The groups are supported by Local Facilitators in a number of the villages. In areas where no appropriate person comes to the fore, the field staff manage the learning group ad implementation processes.

Table 11: Local facilitators active in the SKZN&EC region; 2017-2018

Name and Surname	Area	Region	Years under CA
1.Bonginhlanhla Dlamini	Springvalley	SKZN	2
2.Mandla Ndlovu	Ofafa	SKZN	2
3.Mandla Mkhize	Nokweja	SKZN	2
4.Cosmas Xaba	Madzikane	SKZN	2
5.Bulelwa Dzingwa	Nkau	Matatiele	5

The new participants were keen to learn about CA and its principles when the programme was introduced but there were some who's interest dropped when they discovered that planting CA trials is done by hand and each person is responsible for his/her trial. St Elios is one such area, where only five people ended up planting and three of them attained yields. All the participants

in Ngongonini and Plainhill planted the 400 m^2 trials and 90% of them managed to obtain yields. In eMazabekweni, only four participants planted and three managed to obtain yields.

Some of the challenges faced by the farmers include livestock grazing, excessive rainfall which promoted the growth of weeds as well as rotting of beans and cowpeas due to extended wet weather conditions and uneven growth of maize which is more linked to soil fertility. There were also participants who's maize grew very well but the final yield was lower than expected and it was unclear why this was the case. Cowpea yields are for the most part absent as the farmers were not sure when to harvest cowpeas. Madzikane, Spring Valley and Ofafa started CA experimentation in 2016 and are in their second season. The following table shows the total number of participants who have registered, planted and harvested.

Table 12: Shows the total number of participants registered, planted and harvested

AREA	No of Participants Registered	No of Participants Planted	No of Participants Harvested
St Elios	9	5	3
Ngongonini	16	16	14
Emazabekweni	8	4	3
Plainhill	12	12	11
Plaatistat	13	7	5
Spring Valley	6	6	6
Ofafa	8	5	4
Madzikane	10	8	8
TOTAL	**82**	**63**	**54**
AREA	**No of Participants Registered**	**No of Participants Planted**	**No of Participants Harvested**
St Elios	9	5	3
Ngongonini	16	16	14
Emazabekweni	8	4	3
Plainhill	12	12	11
Plaatistat	13	7	5
Spring Valley	6	6	6

Average Maize Yield

In terms of maize yield, Madzikane has the highest average yield of 3.82 t/ha and Ofafa had the lowest yield of 0.61 t/ha. Despite the low average yield, this season was much better for Ofafa compared to last season where most of the participants obtained no yields. This can be attributed to the cover crops which were planted last year and an increase in rainfall. St Elios, Spring Valley and Ngongonini had average yields ranging between 2.3 t/ha and 2.87 t/ha. In order to reach break-even point, a commercial farmer needs to produce at least 4 t/ha of maize, but in the smallholder farming sector yields are often far below the required threshold for the economic viability of maize. The pie chart below shows the average yields for maize.

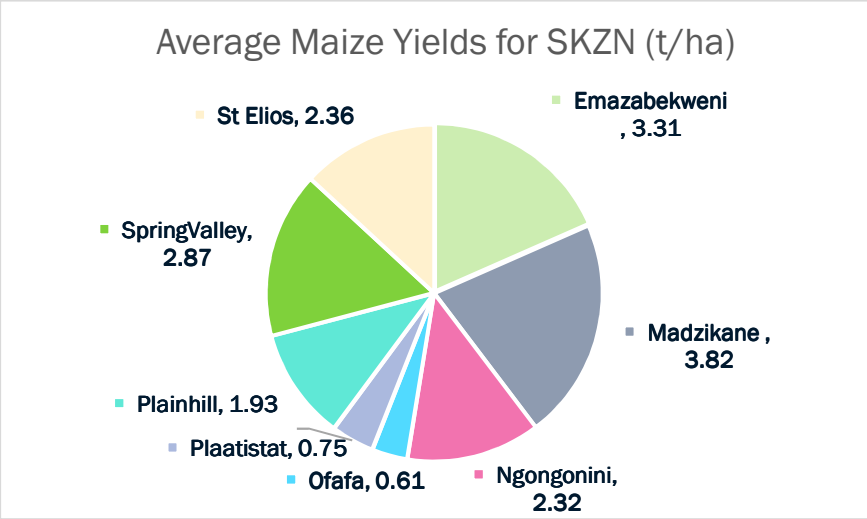
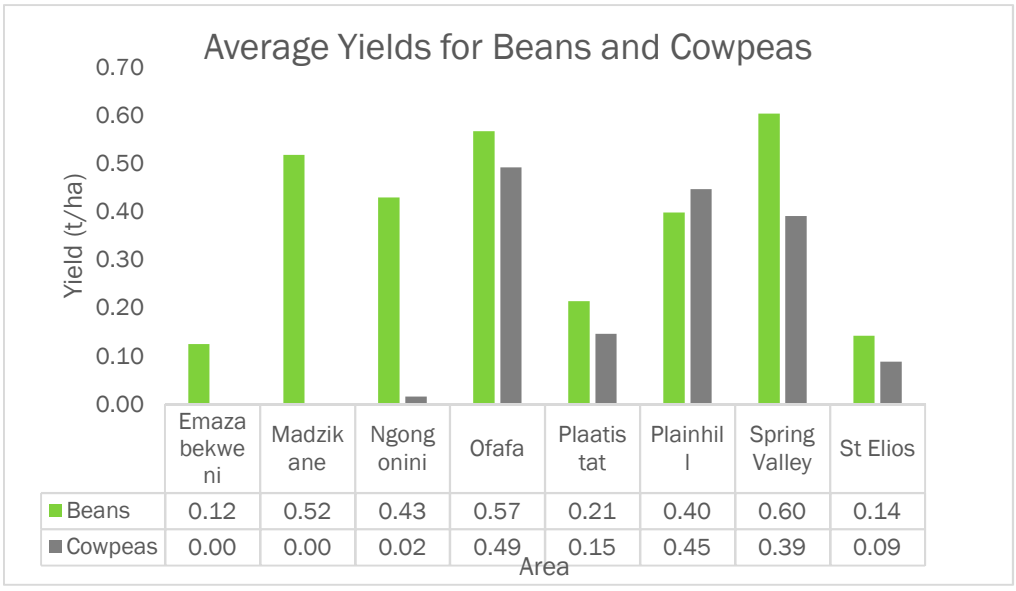


Figure 5: Average Maize yields for SKZN; 2017-2018

Average Legume (beans and cowpeas) Yields

Beans performed better than cowpeas in all areas, despite farmers saying that they were adversely affected by the late summer rainfall. The highest average yield for beans was 0.6 t/ha and the lowest was 0.12 t/ha. There were farmers who managed to get more than 1 t/ha for beans in the intercrop plots which suggests that beans are not necessarily affected negatively by maize as some believe. Cowpeas grew well in most areas and were effective in suppressing weeds. The highest average yield for cowpea was 0.45 t/h and the lowest was 0.02 t/ha. The poor final yield was mainly due to farmers not harvesting the cowpeas as well before cattle started grazing. The bar graph below shows the average yields for beans and cowpeas in Southern KZN.



	Emazabekweni	Madzikane	Ngongonini	Ofafa	Plaatistat	Plainhill	Spring Valley	St Elios
Beans	0.12	0.52	0.43	0.57	0.21	0.40	0.60	0.14
Cowpeas	0.00	0.00	0.02	0.49	0.15	0.45	0.39	0.09

Figure 6: Average yields for beans and cowpeas in SKZN;2017-2018

Implementation per area

Madzikane

Madzikane farmers are in their second year of the CA programme and the 2017/18 growing season has gone fairly well in terms of maize yields, but very poorly when it comes to beans and cowpeas. Eight out of the ten participants managed to harvest maize and the yields were collected for seven of them as one participant, Mrs Xaba was not available when visited by the team. Bean and cowpea yields were quite poor with only three participants who harvested beans and no participants harvested cowpeas.

Planting

Four out of the eight participants planted using the two-row tractor drawn planter and these were Cosmos Xaba, Msizakali Dlamini, Mrs Shozi and Mrs Mkwana and the rest planted using hand hoes. The two row planter was introduced this season as a way to support farmers with larger plots that may not be easily planted using hand hoes or the MBLI planter. The biggest advantage of the two row planter was that it allowed for planting of intercrop plots in half the amount of time. Also, the planter reduced labour and the amount of fertiliser applied as the overall amount of fertiliser applied using the two- row planter was less than the fertiliser applied by hand or through broadcasting.

Figure 7: (Left) planting with the two row planter, (centre) Fields that has been planted by the two row planter, (right) Maize that was planted using the two row planter

Crop Growth Monitoring

In the trials that were monitored germination was 70-85% for maize and was not easy to quantify for beans due to the overgrowth of weeds. Germination and growth of cowpeas was poor in most of the trials. The participants planted maize intercropped with beans and cowpeas and their trials were 400 m^2 with the exception of Msizakali Dlamini and Cosmos Xaba who planted the bigger trials. Crop growth was good for maize which was dark green and had medium to large cobs. Some of the farmers had problems with birds and rats that ate the maize. Cover crops were planted in between the maize and beans while the trials were still growing. The farmers battled with weeds this season despite having planted cover crops and they alluded this to heavy rains. Weeds included both broadleaf and grass species which had a negative impact on final yield, especially for beans which were also adversely affected by the rain.

Figure 8: (Top left) maize grew well vigorously and was dark green, (top centre) good cob growth, (top right) maize intercropped with legumes and cover crops, (bottom left) winter and summer cover crops, (bottom centre) maize and legume intercrop plot with weeds overgrown , (bottom right) maize cob eaten by rats and birds

Results

The yields for the control plots ranged from 0.87-6.55 t/ha where three participants had yields above 4 t/ha which is the economical break-even point for maize production. The yields for the trials ranged between 1.77 and 4.92 t/ha with most participants ranging between 2.5 and 3.5 t/ha. When comparing the trial vs. control yields, 57% of the participants attained trial yields that were higher than the control yields, however the average yield for the control was higher than the average yield of the trials (refer to figure 9), although the difference was not significant.

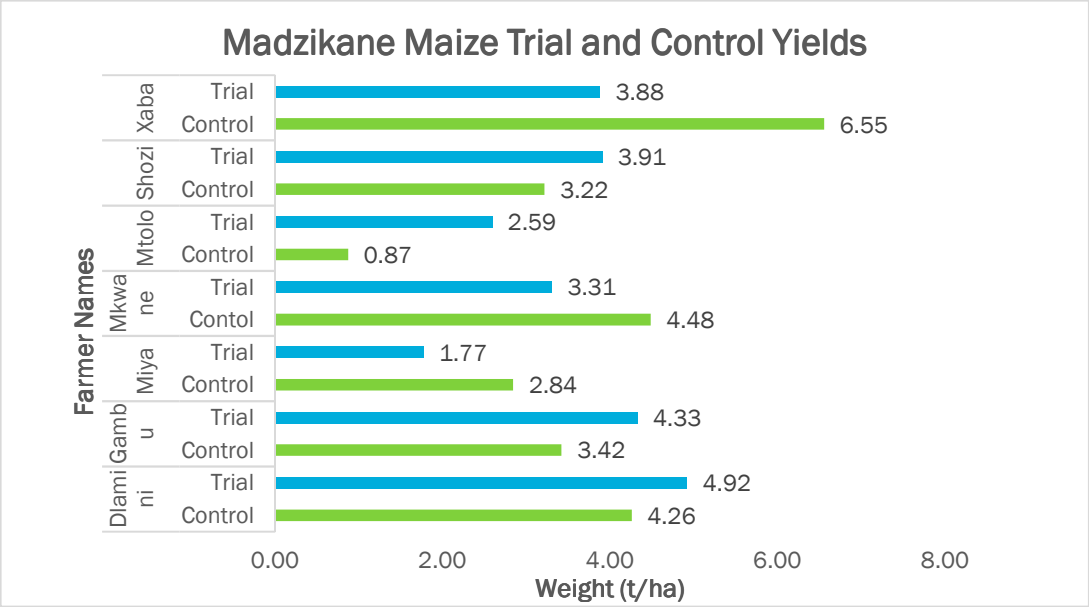


Figure 9: Madzikane maize trial and control yields

Below are small case studies for a few individuals from Madzikane.

Bawinile Mtolo

Bawinile Mtolo is an elderly woman and is also a first year CA participant who lives with her son and grandchildren. Her trial was 400 m^2 and she attained a maize yield of 2.59 t/ha for the trial and 0.87 t/ha for her control. When it comes to beans she attained a yield of 0.84 t/ha and 0 t/ha for cowpea. The good yield for beans can be attributed to wider inter-row spacing between the maize and beans, which reduced overshadowing of beans by maize. She did however have a problem with excessive growth of weeds.

Figure 10: (left) Gogo Mtolo, (middle) trial and control maize, (right) trial beans yield

Cosmos Xaba

Cosmos Xaba is a dedicated farmer who has been implementing CA for about four years of which the last two have been with Mahlathini. He is one of the programme's leader farmers and although his trial appeared to have been performing poorly during the growing season, he managed to obtain a yield of 3.88 t/ha which is just below the break-even point. He had a 1000 m^2 trial. For his control he attained a yield of 6.55 t/ha. His maize germination was good but beans and cowpeas did not germinate well, which led to an overgrowth of weeds in between the maize. He stated that this season they had good rainfall, but it affected him negatively in terms of weeding. The total yield for beans in Mr Xaba's trial was 0.233 t/ha and he attained no yields for cowpeas. The figure below shows Mr Xaba's maize and trial yields.

Figure 71: (left and insert) Control yield, (right and insert) trial yield (in sacks) and grain

Mrs Gambu

Mrs Gambu had a 400 m^2 and attained a yield of 4.33 t/ha for her trial and 3.31 t/ha for her control and her yield for beans was 1.17 t/ha which was very good. The yield for her trial plot was higher than for the control, but the control plot had bigger cobs (av. 0.266 kg) than the trial (av. 0.189 kg). Mrs Gambu was very pleased with her yield and said that she is noticing a steady improvement. She got no yields for cowpeas.

Figure 12: (top) trial and control maize, (bottom) trial bean

Springvalley

Spring Valley has performed reasonably well in terms of CA although there were some participants who obtained low yields. Table 11 shows the trial and control maize yields and they range from 0.35 t/ha to 4.764 t/ha with 67% of the participants having attained yields below 4 t/ha. Most of the participants did not plant controls due to limited space, however the two participants who planted controls had mixed results. Bongihlanhla Dlamini attained a higher yield of 4.764 t/ha for his trial compared to just 1.938 t/ha for his control. Letta Ngubo had a yield of 8.80 t/ha for her control and 4.704 for the trial. Bakhulumile Shoba who had a yield of 0.3 t/ha stated that her maize was grazed by cattle which also damaged the beans and cowpeas. She had been away most of the time due to deaths in the family and other commitments and was thus unable to look after the trial.

Table 13: Maize yields in Springvalley for the 2017-2018 season

SPRING VALLEY MAIZE YIELDS												
Name	**Surname**	**Experiment**	**Number of bags**	**Av. weight (kg)/bag**	**Av. Weight of cob**	**Av. weight of grain**	**weight of cob + grain**	**%grain weight**	**Grain weight (kg)**	**area (m2)**	**Weight (t)**	**weight (t/ha)**
Bonginhlanhla	Dlamini	Trial	7	16.150	0.038	0.151	0.188	0.800	142.923	300	0.143	4.764
		Control	3	16.150	0.038	0.151	0.188	0.800	38.761	**200**	0.039	1.938
Bakhulumile	Shoba	Trial	1	8.283	0.025	0.137	0.162	0.846	7.007	**200**	0.007	0.350
Duduzile	Dlamini	Trial							39.328	300	0.039	1.966
Nomntaso	Mkhize	Trial							58.350	300	0.058	2.918
Mzikayise	Sosibo	Trial							50.000	300	0.050	2.500
Letta	Ngubo	Trial							94.087	300	0.094	4.704
		Control (grain)							141.228	600	0.141	7.061
		Control	2	20.638	0.035	0.191	0.226	0.846	34.935	600	0.035	1.747
Total Yield Trial:												**17.203**
Average Yield Trial												**2.867**

Bonginhlanhla Dlamini

Bonginhlanhla Dlamini obtained a yield of 4.764 t/ha for his trial and 1.938 t/ha for his control. For beans he obtained a yield of 1.674 t/ha and no yield for cowpea. On the sole bean plot, Mr Dlamini had a yield of 1.23 t/ha. The beans were sold to community members at R 90 per 5L bucket. Maize was mainly for household consumption.

Figure 83: (left) control maize yields, (centre) trial maize yields, (right) trial and late beans

Mzikayise Sosibo

Mzikayise Sosibo lives with his wife and two grandchildren. The family lives in abject poverty and survive mainly on pension grants. Mr Sosibo is one of the proactive CA participants and has been consistent since he joined in 2016. This year he obtained a good yield for maize of 2.5 t/ha and which he said was his best yield thus far and he is still trying to figure out what to do with it as it is more than what he expected. In the previous season, Mr Sosibo also planted winter cover crops which did very well and could be the reason for the improvement in yields. The yield for the bean intercrop was 0.3 t/ha and 1.79 t/ha for the sole bean crop. He plans to sell the beans at R 100 per 5L. The figure below shows his sole bean crop and de-cobbed maize.

Figure 94: Mr Sosibo's sole beans (left) and de cobbed maize (right)

Letta Ngubo

A very dedicated farmer who had a 400 m² CA trial plot, Letta Ngubo obtained a yield of 4.70 t/ha for the maize trial and 7.06 t/ha for the control. She lives alone with a 6 month old baby who is her granddaughter and tends to her fields all by herself. She is a very hard worker, who's fields, both trial and control, are always well kept with less than 5% weeds. For beans she got 0.9 t/ha and for cowpeas she got a yield of 0.45 t/ha. She also intercropped her maize and legumes with summer and winter cover crops.

Figure 15: Letta Ngubo's Maize Trial (left) and Maize Control Yield (right)

Plainhill

Mbongwa Khoza

Mbongwa Khoza is 66 years old, planted a trial plot on the field which is <400m2. He does not have a control plot because the space was very limited. At first the crops were not performing very well on the trial. Maize was yellow and beans did not germinate well and it was wilting. The farmer seems to be discouraged and he hardly weeded his plot. The yields that were obtained for maize were 1, 864t/ha. Unfortunately, he did not obtain any yields for legumes (beans and cowpeas) due to poor germination at an initial stage.

The crops picked up after LAN application. It was quit surprising and motivating to see that he got maize with very good quality grains and large cobs. He was happy and well-motivated because he was not expecting to get the amount of yields he got.

Figure 16: A sample of Mbongwa Khoza's Maize cobs (left) and grain (right). He did not plant a control

Philisiwe Sosibo

She is 66 years old lady who lives with a family of 8 and she is unemployed. She planted on a 400m2 plot, the soil of her plot was characterised as very rock hence productive. He managed to get 0,614t/ha of beans and 2,376 t/ha of maize. Trial plot had four plots of maize intercropped with beans then cowpeas was planted as a sole crop on a separate plot. She harvested good yields of cowpeas which was 0,6t/ha.

Figure 17: (left) maize cobs from trial plots, (centre) bean trial yield, (right) cowpeas

Lindiwe Chonco

She is 60 years old, she joined CA programme because she loves farming. She planted on a 300m2 plot. She got 1,300 t/ha of beans and 1,537 t/ha decobbed maize. Maize and beans was intercropped. Cowpeas was planted as a sole crop; no yields were obtained for cowpeas because it was grazed by livestock. She will use the maize as Brewing malt.

Figure 108: Maize Grain (left), bean yield (right).

Emazabekweni

Million Ngubane

He is 69 years old, he is very passionate about farming in a way that he does not only produce for his family, he also sells his produce. He is a breadwinner of 11 family members and he is farming for a living.

Figure 1119: (left) Control maize, (right) trial maize yield

He implements both the trial and the control. In the trial plot he planted PAN 6479. The farmer is not sure what the cultivar he used on the control is. He has been using this cultivar for a long time and he has already found a market to sell the produce. Mr Ngubane was very impressed with the yields and the crop quality he obtained from the trial plot. He testifies that although the trial was intercropped with beans, it still gave him higher yields than the control plot. The farmer wishes to get yellow maize which can give him similar yields to PAN 6479.

The trial plot yields were 6,719t/ha and the control plot maize were 4,549 t/ha.

He obtained 0,100 t/ha for the bean intercrop. Separately he planted a 135m long line of Gadra beans as sole crop which gave him 3,028 t/ha. He did not harvest cowpeas.

Figure20: Million Ngubane's sole bean yield (left and centre), sole bean crop (right)

Eric Latha

He is 60 years old and having retired from work, is focusing on farming to generate income. Apart from maize he is also planting and selling beans, *amadumbe* and sweet potatoes. The trial plot yields are 2,61t/ha and the control plot yields is 1.35t/ha. He did not get any yields for beans, as it rotted due to excessive late season rainfall. Cowpeas were planted in one plot and no yields were obtained.

Figure 21: Eric Latha's trial grain and cobs

Thembekile Mchunu

Thembekile's school going son Qiniso managed the CA trial of ???m^2. He was assisted by his mother, but the yields were not good. The trial was planted on fallow land which is not fertile and planting was done late. Thembekile plans to use a different plot in the coming season. The yield for maize was 0,886 t/ha. There was no control plot.

Figure 122: Qiniso Mchunu's maize trial yield

Ngongonini

Sebenzile Mthethwa

She is living with a family of 8 people working under CWP. The trial plot was 200m^2. She obtained a yield of 2.64 t/ha for maize, 0,31 t/ha for beans and did not harvest cowpeas as they rotted in the field.

Figure 24: Shows Sebenzile's trial maize yields

Eunice Nkabini

She is a 39 years old lady, who is living with 6 family members. She is working as domestic worker in one of the neighbouring households within the community. Trial plot size was 400m^2 with no control. Bean yields obtained was 0,402 t/ha and maize yield was 2.082 t/ha. Cowpeas were not harvested.

Figure 135: Shows the trial maize yield (cob and grain) for Eunice

Buyisile Kheswa

She is a very passionate farmer who is unemployed living with a family of 4. The trial plot size is 400m^2 and she didn't have a control plot. She harvested 0,374 t/ha beans and 6,147 t/ha maize which she is intending to use for making brewing malt.

Figure 26: (left) Cingeni Kheswa, (right) trial maize yield

Cingeni Kheswa

She is a pensioner who is passionate about farming. She planted a 400m^2 trial but there was no control plot. In her trial she obtained 0,684 t/ha of beans and 3,66 t/ha of maize. Cowpeas went rotten and were not harvested.

Figure 27: Shows Cingeni's trial Maize yield

St Elois

Joseph Kheswa

He is 59 years old and unemployed. He is very passionate about fishing and farming. He is producing for household consumption and he spends most of his time fishing in the nearest river. He obtained 0.994 t/ha of maize and 0.652 t/ha and 0,652 kg beans on a 400m2 trial plot.

Figure 28: Shows the trial maize yield as well as bean yield

Mkhanyisi Mbanjwa

He is 58 years old, unemployed and generates income from farming. He is growing vegetables and sells produce locally. He obtained good yields of 4,259t/ha of maize, 0,750t/ha beans and 0.25t/ha cowpeas from the trial plot.

Figure 29: Shows the Maize trial yield for M Mbanjwa

Plaatistat

Jabulile Shoba

She is 52 years old and is the chairperson of the community organisation. She planted a 400m^2 CA trial and control plot. She obtained 1,36t/ha of maize in her trial plot and she obtained 2,27t/ha of maize on a control plot. No yields were obtained for beans and cowpeas.

Figure 30: Mrs Shoba had mixed her trial and control maize as she did not have enough space. Some of the maize was on the roof of her house

Mthokozisi Shabane

He is a young 30 year old, unemployed farmer. He is passionate about farming. He started only in late December and managed to harvest 1,321 t/ha of beans, 0,4325 t/ha cowpeas and 0,375 t/ha maize on his 450m^2 trial plot.

Figure 31: (left) Mthokozisi Shabane, (right) some of the trial maize yield

Tholakele Shange

She is 52-years old. The demonstration plot was done in her field. She had no harvests due to cattle invasions in her field.

Figure 32: Tholakele Shange(left), planting the demonstration trial plot together (middle) and her trial which was eaten by crows (right)

EC: Matatiele implementation progress

Introduction

Implementation in Matatiele has continued mostly under the direction and with support from the Local Facilitator, Bulelwa Dzingwa. Villages where she was active include Nkau, Moqhobi, Sehutlong and Khutsong.

For the past five years this area has proven challenging to work with. It has proven hard to grow anything on sandy soils with poor to no organic matter; rainfall variability hasn't made the situation any easier. Participants who planted early on in the season saw crop failure due to no moisture and had to replant. Their second attempts were very good, growth was good and bean harvests were very good for some, mainly in Moqhobi. In Sekhutlong, Mrs Mamolelekeng Lebueoa continues on getting positive results since her first year in program and is now getting creative with her experimentation.

Sekhutlong

There are now only three participants in this area who are still part of the programme as they have seen some improvement in their crops and soils and are still keen to continue despite bad weather. Mamolelekeng is the one participant giving hope to others that their soils can still change over time. Mamolelekeng has been pumping cattle manure into her plot for years now and this has greatly increased her organic matter and soil structure. Her soils are nice and dark brown, able to hold water and supply nutrients and this is evident in her tall maize with strong roots. Her tall maize did a sterling job in shading out weeds hence very little weeds on the plot. This year she planted 6 plots mid-December using seed from last year. She planted two sole maize plots, one sole bean plot and three maize-bean intercrop plots and no cowpea. Below are pictures taken from her trial, on the right, plots of sole beans and behind that maize-bean intercrop, on the left is her beans drying at different times and some rotting already.

Figure 33: Mamolelekng's crops

Although her crops are looking good there seems to be a disease attacking her maize. This was spotted last season and it seems to be spreading in the plot, more and more maize cobs come out deformed with something looking like rot. She was advised to take out all stalks with this disease as this would spread even more on her plot compromising her yield.

The disease is head smut, a fungal disease caused by *Sphacelotheca reiliana.* It is soil borne and more prevalent in areas where plants are stressed. It would unfortunately be favoured in the CA system with residues left on the soil. In addition livestock should not be fed infected materials as

the disease is further spread in their manure. Removal and burning of infected material and a rigorous process of crop rotation is advised

Figure 34: head smut on maize plants in Mamolelekeng's field.

Mamolelekng has two neighbours either side of her house; Matsepo and Malerato. Malerato is doing somewhat better than Matsepo in terms of her maize bearing mostly two cobs per stalk; it's tall with a nice green colour, planted 30 November 2017. She is not having a good season with her beans on the one plot she planted as they poorly germinated and of whatever germinated died off. Malerato has a control a bit bigger than the trial and is the only person with something to compare trials to. Her control plot was ploughed and planted to traditional seed with no fertilizer. Malerato's maize is looking very good, despite weeds on the plot, cobs have formed and weeds do not have a greatest of impacts. She has already started eating her maize green and has been keeping records. Matsepo on the on other hand has maize looking quite bad but with beans looking more promising (middle picture). Matsepo's maize at the edge of the plot where she had put mulch the previous season(left picture), is looking good with cobs forming early, while maize further in the plot lost the battle to weeds competing for nutrients evident through pale green coloured leaves and short stalks(right picture).

Figure 35: Left: Maize growing on a previously mulched plot looks good. Middle: bean crop maturing and Right – most of the trial lost the battle to weeds

Figure 36: Malerato's maize looking green and healthy

Nkau

Our local facilitator, Bulelwa Dzingwa, has been faced with a tough time when her son fell ill during the planting season and this greatly impacted on her work and support for other participants. She also planted her own plot quite late and this has meant poor growth and overgrowth of weeds on her plots.

Figure 37: Bulelwa's pale green maize planted late and cover crop plot infested with weeds

Noluthando Pili, a second year participant in the programme, planted her trial in time and crops are showing signs of health with cobs fully formed and maturing. She grows maize for both eating green and milling for maize meal; she also grows most of her vegetables such as tomatoes, green peppers, brinjals, cabbage and chilies all for household consumption and only sells surplus.

Mme Noluthando had a good season last year and she is convinced that CA is the way to go for her and family in their small plot. They are able to grow a variety of food, cheaper and more sustainably, which is why she decided to plant her control plot using CA as well, also doing the maize and bean intercrop. She put in cover crops and her sunflowers are ready. She also has her daughter involved in the programme and is interested in working closely with the project team for experience and exposure.

Figure 38: Noluthandos; maize and sunflower intercrop

Mqhobbi

Moqhobi is an Nkau extension area in its second year on the CA farmer level trial experimentation process. Things did not go well in the first season with a lot of people very pessimistic about CA and they were proven 'right' when crops did not grow well while control plots did considerably better. Thapelo Ramanyali and Mfana Khokhotho's plots, were the only two plots that showed hope in the CA process in the first year. This second year CA trials have shown even better results to those of conventional plots almost in the entire village, minimum tillage plots have thick and tall maize stalks, with maize somewhat still green by the end of May to early June period of the year, where most maize is definitely dry. To us this is a sign of increasing soil health able to keep water for longer, which is also evident in big maize cobs.

For Morena Khokhotho, the CA practice did wonders with his beans as he got a total of about 40kg where he had beans intercropped with maize and some sole bean plots. He is convinced that CA boosts soil fertility through intercrop and cover crops and that provides nutrients for his next crop to flourish. From his bean harvest, he will keep 20kg for his family and sell the other 20kg as he realizes CA as both a food source given an income generating activity for what they cannot grow.

Figure 39: Right; Ocean Khokhotho's plot with sunflower planted were there were beans. Left, a thick, tall, green maize stalk with a nice big cob.

Khutsong

After five years of poor results, Tsoloane Mapheelle is still keen to experiment with CA in the hope that his soils will change for the better. For the past season we have tried intercropping maize and beans and relaying that with summer and winter cover crops, but little has happened.

Tsoloane has also tried planting more annual crops such as rye grass and Lucerne, but lack of irrigation saw little grow and impact of the crops. Still keen to continue we have opted to change to splitting his plot to 10 m x 10 m plots planting various crops, some intercrop and some sole crops and rotating the plot every year. Mr Tsoloane is keen on the idea and is aware that this will require more manual labour doing smaller plots more carefully than using the oxen drawn planter as we have for the past seasons.

Figure 40: Tsoloane's cover crops looking good in between the maize, beans that germinated died off

Tsoloane's cover crops are growing very well and are now a bit taller than they were since the last visit. He will be bringing in his livestock to graze, but he will allow them strict grazing periods per day, so as to have more days to graze. Cover crops grew very well due to late season rains.

Figure 4114: Tsoloane Mapheele's cover crops

Spontaneous adopters

There have been local people looking at the trial over the years and attending farmers days to see if what we preach actually happens. Some individuals decided to wait and see before joining in the process. One such person is Tsoarelo Motsoko. Tsoarelo is a local young man who has been growing and selling broilers and producing potatoes, maize and beans for his family and for income for quite some years now. There are two adults in his family; employed at the local primary school as part time teachers through the school's governing body and a child receiving a support grant. Amidst unemployment uncertainty he figured doing agriculture was the cost effective way of providing food and generating an income but he was faced with problems where his maize refused to prosper.

He was thinking his seed might be old as well as he has been using traditional seed for his maize and beans. He then asked our local facilitator in Bulelwa Dzingwa if he could try it out with MFD's inputs and fortunately for him there were inputs available. He planted a 400m^2 plot of maize-bean and maize-cowpea on 14th December 2018 and planted his control on the 18th December 2018. Gramaxone was sprayed before planting using hand hoes, growth has been very good and he has weeded once. He then later broadcasted and raked a mix of cover crops in the plots when maize was well developed; the mix was that of millet, sunflowers and sunnhemp. Birds feasted on his millet and sunflowers but he managed a 5kg sunflower harvest. He managed a 2.5kg bean and 1.5kg cowpea harvest; most cowpea went rotten in the plots. His maize looked very promising.

Figure 41:Above left, Tsoarelo Motsoko standing next to his tall green maize. Top right, Tsoarelo's control plot and bottom right, Tsoarelo's plot from a distance

Conclusion

Mqhobi, the Nkau expansion area from last year, had to plant twice this season due to crop failure from delayed rains. Socially things have also been difficult, as we had a participant passing away last year and that was quite a blow as Mr Tsatsi was one of the active people in the newly formed learning group. This year only two participants planted and things are looking better.

Stakeholder interaction- Innovation platforms

The table below summarises the networking, awareness raising and stakeholder forum interactions for the 2017-2018 season related to this project area.

	ACTIVITIES	STAKEHOLDERS
Networking	- DARD Colloquium on development of Smallholder Agriculture Provincial Policy (16-17Nov 2017): Presentations on farmer centres and VSLAs	Nqe Dlamini (AtratAct), MDF -
	-Participation in the CA working group set up through the Grain SA CA facilitator and provision of thematic input on progress and soil health (Mazwi Dlamini) (Feb 2018)	GrainSA, Maize Trust and CA FIP projects, MDF
	-CA planting and demonstration day in Nokweja; using 2 row planter (December 2017)	DARD, GrainSA FDP, ADA
	-PROLINNOVA (Programme for Local Innovation Development)- Workshop (Feb 2018)	MDF staff, INR and other NGO representatives
	- REITZ Regenerative Agriculture Conference (April 2018) attendance	MDF staff, interns attendance
	-Ubuhlebezwe LM Agric Forum quarterly meetings (Oct, and Dec 2017,April, June 2018). Presentations on progress with CA work in the LM.	MDF staff, Nqe Dlamini (StratAct)
	-No-till Conference attendance-Drakensville (4-6 Sept 2018)	- MDF staff, interns attendance
Madzikane stakeholder forum	Awareness/ open day – in association with Landcare (12 Dec 2017)	DARD, LandCare, KwaNalu, Cedara farming Systems Unit, MDF
	Planning meetings with kwaNalu for a stakeholder meeting around Land us management and funding options (16 March, 9 April 2018)	KwaNalu, Cedara farming Systems Unit, StratAct, MDF
	Continuation of negotiations around applying for Cooperative funding through DSBD (Dept of Small Business Development) (May-Aug 2018) Meeting held on 18 July 2018	KwaNalu, StratAct, MDF
Springvalley	Awareness/ open day – in association with Landcare (12 Dec 2017)	DARD, LandCare, KwaNalu, Cedara farming Systems Unit,StratAct, UKZN (Food Security)
Matatiele; Mqobhi	Soil health and CA open day (7 June 2018)	

Papers and presentations

- An article has been published in the SA Grain magazine entitled:

- Local best practice options in CA investigated. ***SAGRAIN March 2018***. M Dlamini and E Kruger.

- Three papers have been compiled for presentation at conferences:

- Within Conservation Agriculture work session, a presentation called " CA Innovations Systems for Smallholder Farmers: A focus on soil health" (E Kruger) for the ***Land Rehabilitation Society of Southern Africa(LaRSSA) conference in Drakensberg, 14 August 2018***
- A Paper called "Learning CA the Innovation Systems Way" (E Kruger) for the 2ACCA conference 15-17 September 2018, Benoni, Gauteng. (Paper submitted and accepted). ***2nd African Congress on Conservation Agriculture.***
- A paper called "Learning CA the Innovation Systems Way" (T Mathebula, E Kruger, M Dlamini and H Smith), for the ***8th Biennial LandCare Conference in Bloemfontein, 25-27 September 2018.***

Madzikane Stakeholder meeting -11 July 2018

This meeting is reported here as an example of the attempts being made in providing agency and empowerment for farmers in working wand negotiating with external stakeholders.

Figure 33: farmer participants at the stakeholder meeting.

Introduction

Farmers in the Madzikane Forum, led specifically by Mr Xaba and in association with KwaNalu called a stakeholder meeting to present to potential support organisations the farming they have been doing and their future plans. Stakeholders invited included the Traditional Authority, representatives from the Local and District Municpality and KZN DARD. MDF and Lima were also invited. Ms M.Y Malunga from the Dr. NDZ (LM)office and Mr L Jongisa from Harry Gwala DM office did not attend. This was especially disappointing to local farmers who had a lot of questions to ask the local municipality and district officials.

Purpose of the day delivered by Mr Xaba

The purpose of the day was to see what local farmers have been planting so far. This year they had heavy late season rains, after a dry start but despite this they harvested a lot of beans, cabbages and maize. There were however quite a few reported incidents of theft of maize in the fields.

The farmers are seeing a lot of progress thus far. Planting trials have been a big contributor to their success, as it expands their knowledge, and helps them to differentiate between seed varieties and makes it possible to choose between different seed varieties according to their planting abilities and cost. Mr Xaba added that they are now farming on more land and livestock have increased since the programme started. The farmers brought and displayed different varieties of maize, cabbages and beans. Unfortunately potatoes were not on display, all harvested potatoes were sent to the market.

Mr Xaba took the participants through the different varieties of maize farmers have been experimenting with, through assistance both from MDF and DARD

Variety name	**Picture**	**Comments**
PAN12	All PANAR seeds are produced in Greytown, they are expensive but produce bigger maize cobs.)	PAN12 produces very sweet maize with big cobs.
PAN6R680R		GM variety, so Roundup can be sprayed. Pesticides are also sprayed prior to planting
MONSANATO 7374 and MOSANTO 4080		GM varieties; both for eating and selling
PAN14		Did not use round up. No-till practice to plant these seeds.

SC701		This is a white variety for dry maize and can usually bring in a lot of money
SAHARA		This is an OPV with seeds similar to traditional maize. a 240 chemical spray is used to fight off any plant diseases.
Beans:Ukulinga		
Pumpkin: Maybuakhulu		

Kwanalu Farmers Union (Roy Dandala)

Mr Dandala from Kwanalu (WaZuu Natal Agricultural Union) was amongst the invited guests as one of the stakeholders working with local farmers in Madzikane. He opened his introduction to KwaNalu by mentioning that the focus of this day should be centred on the challenges faced by farmers followed by ways to collaborate with other organizations to try and solve these challenges.

The union works to find ways to solve challenges faced by local farmers, support farmers and represent their interests. This is achieved by collaborating with private and public sector partners and establishing networks. They also refer farmers to local municipalities and district offices for assistance. There are multiple organizations working together to improve the livelihoods of the Madzikane community.

In Madzikane, the union has been working closely with Mr Xaba one of the local farmers and Hlanganani to find ways to promote and support farmers. Mr Dandala emphasised that the need for farmers to organize themselves because working in teams allows for quicker and better access to information to solve common and recurring issues.

Currently the following organizations are working in Madzikane with local farmers:

a. *Department of Agriculture and Environmental Affairs*: Providing beans seedlings (trials) and PANAR maize seeds (trails)
b. *Mahlathini Development Foundation*: maize and beans (trials)
c. *LIMA*: potatoes

Kwanalu Farmers Union hopes this will continue because it is in the best interest of local small scale farmers. Mr Dandala made a final note requesting more engagement with all stakeholders working in Madzikane.

Mr S. Dlamini from the District Office (DARD)

Mr Dlamini from the Department of Agriculture and Rural Development (see picture above) working in the Ingwe Municipality gave a brief address on the issue of delivery of agricultural extension services to local farmers. He mentioned two areas: 1) Political shifts in government and 2) Criteria to receive services.

1) Political changes in government affect programme development. This is an important issue because when a new official gets into office he/she may develop their programmes which ends all other programmes in place. This is an issue that government cannot deal with immediately which delays delivery of services and equipment to farmers.

2) They start working with farmers who have 5 hectares of land or more which excludes a lot of farmers with less land. This is an issue because most small scale farmers work have less than 5 hectares of land.

Question and Answer session: Issues raised by farmers

a) Delivery of facilities and services: One home One garden programme: The community did not receive all services and facilities after the workshop presented by government where delivery of services and facilities were promised. Delivery of tractors: Tractor taken back before farmers could use it.

b) Lack of commitment ;There is a lack of support from government departments in Madzikane. As Mr Xaba puts it, ‘‘Where is the assistance?’’ ‘‘whose job is it to help the community’’ ‘‘what is governments role?’’. He added that, Mahlathini Development Foundation is the first organization to come to Madzikane and actually deliver on their promises. It seems that the government is not focused on helping farmers in Madzikane, instead its focus is on neighbouring communities such as Bulwer where farmers already have a lot services and facilities directed at them. The government is good at making promises, promising funding and service providers who will help farmers to no avail.

c) Land reform in relation to farming:Land was given to farmers in neighbouring communities but those local black farmers have given white farmers to use the land instead and do not use themselves to farm. There is a need to monitor the land reform process because there are a lot of questions surrounding the question, ‘‘What is happening on the land’’ and ‘‘Who is using the land?’’.

d) Access to markets : Farmers are harvest a lot of maize but do not have a market where they can sell their produce. Mr Xaba mentioned that, they are not making a lot of the money back that’s spent of seedlings and other farming equipment. The King of Madzikane mentioned that, the government is neglecting its responsibility to help farmers with this issue. He further stated that, Mr Mdletshe and Mr Jongisa from the

District office the officials who are not present are the right people to speak on this matter but aren't present which is sign that the government does not take Madzikane farmers issues seriously. During a local house meeting in February this issue was raised including not having enough tractors, the government has enough money to assist farmers but chooses not to.

Answer: The District office representative Mr Dlamini explained that, there is a shortage of equipment including tractors and drivers to deliver to all local farmers in the district. This has resulted in farmers having to wait long periods of time. The tractors are leased from service providers whose delivery of services are audited every three years, issues raised in this meeting will be raised in another meeting with and Mr L Jongisa and Mr Mdletshe from Harry Gwala district office who will try resolve these. This issue on political changes in government cannot be solved at local government level and extension officers present do not have answers to these questions. In terms of farmers access to markets the department urges farmers to please contact the district office to get in contact with the unit that can assist them (unit not mentioned). Finally, he expressed disappointment with only 24 farmers in attendance at the meeting.

Conclusion

The meeting was planned for farmers to share their experiences, farming practices, challenges and opportunities with the relevant stakeholders invited. However, as soon as the programme started it was clear that the farmers were not in control of the space they created to express their concerns. The Department of Agriculture and Rural Development were invited as guests but by the end of the programme it seemed that they were in charge. Farmers need to have a better understanding of what these created spaces are for and how they limit engagement rather than empower them. Irrespective of this issue local farmers were able to ask questions and expressed their concerns to the government representatives regarding delivery of agricultural extension services, land reform and access to markets.

Summary of issues and learnings from individual visits and monitoring

- Uptake of CA in Southern KZN has been a lot more promising than in the North-eastern parts of Eastern Cape.
- In Southern KZN there is a more definite distinction between larger cropping fields away from homesteads and homestead plots and fields. For the larger fields farmers are not prepared to work there unless some form of mechanisation is offered. Given also their inability to pay for inputs for these larger areas there is a high expectation of support for inputs.
- Both DARD and Grain SA- FDP provide mechanisation and input support for larger fields. Both organisations focus on GM varieties of maize and soy in these fields, although DARD also provides hybrid maize seed.
- The introduction of the two row tractor drawn planter has been well received in Madzikane and implementation is to be expanded to other SKZN villages in the future
- The season has been somewhat difficult; resulting in heat stress in maize and yellowing and dying off of beans
- Partnerships are being forged with LandCare, DARD and the LocaL Municipalities, as well as the FDP of GrainSA in implementation and awareness raising.

- Planting of Summer and winter cover crop mixes as a relay crop in the intercropped plots is still only meeting with marginal success. The MDF team is to push harder for participants to take on rotational planting of cover crop plots
- There are a few larger conceptual issues that may need some consideration going into the future of this programme
- Research and implementation aspects of the programme may need to be separated to an extent, so that greater focus can be provided to both, especially as the expansion into new areas leads to many smallholder participants.
- Stakeholder forums require the support and active participation of external role players; which can not always be achieved; more specifically for Government Departments and Municipalities who provide very little real assistance to smallholders, despite the rhetoric.
- The two-row planters is much in demands in a few areas in SKZN. Careful planning will need to be done to ensure coherence and timely planting.