

APPENDIX 3: EASTERN CAPE AND SOUTHERN KZN ANNUAL REPORT

CA Farmer Innovation Programme for smallholders

Period: October 2016 - September 2017

**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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August 2017

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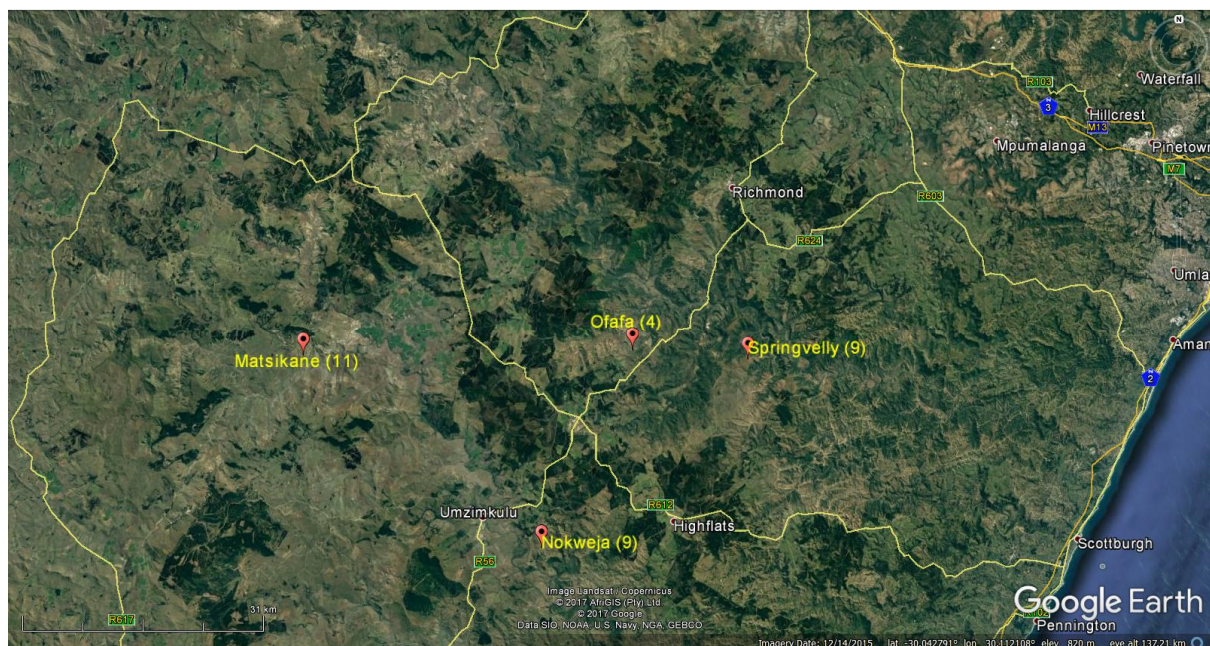
Summary

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 KZN has been successful and the 4 learning groups established between Creighton and Ixopo are showing great promise for continuation. The good relationships with stakeholders in the Ubuhlebezwe and Dr Nkosazana Dlamini-Zuma Local Municipalities and with KwaNalu (The KwaZulu-Natal Agricultural Union) have been extremely helpful in this regard.

Below is a Google Earth map to show the rough location of the Southern KZN sites. The number of participants in each areas is included in brackets.



In this season (2016-2017) we have continued to focus on the following elements of the model, namely:

- a) Support farmers who are in their 2nd and 3rd season,
- b) Conscious inclusion of crop rotation to compare with intercropping trials
- c) Inclusion of summer cover crops in the crop rotation trials
- d) Continuation with experimentation with winter cover crops, but planted in separate plots rather than in-between maize
- e) Mulching as a form of ground cover
- f) Initiation of nodes for farmer centres that can offer tools, input packs and advice
- g) Continued support for the local maize milling operation for maize meal and cattle feed in Khutsong.

Key activities: October 2016-September 2017

For the 1st year of the 2nd phase of this CA SFIP we have given attention to broadening the organisational scope and areas of operation of the programme. Expansion into smallholder maize production areas in Southern KZN has been a key focus.

Implementation has continued in three areas (Matatiele, Creighton and Ixopo - Highflats) in 8 villages.

The budget set aside for this process is set out in the small table below. At present finances are on track to complete the project within budget by the end of September 2017.

Milestones/ Outputs	Key activities	OUTCOMES/ DELIVERABLES	Budgets
	Capital Equipment		R32 800,00
	Documentation and M&E	Meeting and monthly reports	R 88 000,00
	Experimentation	List of participants, interviews and contracts, awareness and training, experimentation and monitoring	R 470 900,00
	Innovation Platforms	Stakeholder meetings, platform building and events	R13 500,00
Sub - TOTAL: Oct2016-Sept2017			R 605 200,00

The table below outlines progress in project activities and indicates percentage completion at the end of the season.

TABLE 1: SUMMARY OF PROGRESS (OCTOBER 2016 - SEPTEMBER 2017) 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	- Finalisation of CA manual (Eng and Zulu) - Soil health symposium – presentation and participation (Nov 2016) - Finalised PID report and progress reports for CA SFIP- on MDF website - Sharing of information through innovation platforms processes - Articles and promotional material	- 100 copies of E and Z manuals printed. A further print run expected. <i>(100% complete)</i> - 100 copies of group and individual savings books printed and in use. A further print run of 200 copies done in January 2017 <i>(100% complete)</i> - DRDLR discussions, meetings, LM forums for Ubuhlebezwe and Dr Nkosazana Dalmini-Zuma LM's. Madzikane farmers' forum, farmers days in Nokweja and Matatiele <i>(100% completion)</i> - Summary of project process handout and farmer centre power point for awareness raising events and meetings <i>(100% completion)</i>

	Interim and Final report	- 6 monthly interim report	- Interim and final reports finalised. <i>(100% completion)</i>
Objectives	Key activities	Summary of progress	% completion and comment
2. Increase the sustainability and efficiency of CA systems	1 st level experimentation:- use their own practice as a control – size 100m ² exp, 100m ² control,	- 8 villages, 54 farmers	- 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. <i>(100% completion)</i> Adaptation trials included late season planting of beans with a mixture of winter and summer cover crops. Monitoring and yield data taken
	2 nd level experimentation:- size: size 100m ² exp, 100m ² control	- 1 village, 13 farmers	- 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 1 st year. Monitoring and yield data taken. <i>(100% completion)</i>
	3 rd level experimentation; own contribution, larger plots, own ideas (2 villages, 7 farmers in total)	- 2 villages, 3 farmers	- 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. Monitoring and yield data taken. <i>(100% completion)</i>
	Develop and manage PM&E framework; – weekly and monthly M&E visits	- M&E forms redesigned and used - Digital monitoring system piloted	- Monitoring completed, yield data taken. <i>(100% completion)</i>
	Facilitation of innovation platforms	- Co- facilitation of information sharing and action planning with stakeholders and role players	- 2-3 local level farmers days – Madzikane farmers symposium held in Feb 2017. Farmers open day held in Nkai in March 2017, various stakeholder meetings inclusive of farmers at municipal level (Nokweja, Madzikane) <i>(100% completion)</i>
	CA working group, and reference group	- Attended and presented in Feb 2017. Next working group end of Sept 2017	- <i>(100% completion)</i>
	Sharing of information using a range of innovation platforms	- Presentation at LandCare conference end 2016	- Presentations done in forums run by the DAFF, DRDLR and Harry Gwala DM, awa Ubuhlebezwe and Dr Nkosazane Dlamini-Zuma LMs. <i>(100% completion)</i>

Results achieved to date

Learning groups have been set up in each village and have had regular meetings. Training/learning workshops have been conducted for the following topics:

- How to implement CA; introduction to the principles, soil fertility issues, crop diversification and different planting options for CA
- Working with herbicides and knapsack sprayers; information on different herbicides their uses and safety measures as well as operation of knapsack sprayers, protective clothing etc.
- Trial plot layout and planting using different CA planting equipment such as hoes, MBLI planters, and animal drawn not-till planters.
- Top dressing and pest control measures for mid-season growth of crops and planting of cover crop mixtures where people have been interested in this option

The learning groups provide the innovation platforms to discuss various topics, including the value chain issues, such as bulk buying, harvesting, storage and milling options and marketing.

Local level farmers' days were held in March to involve the larger community and provide a platform for sharing and planning in Matatiele (Nkau).

A farmers' symposium, co-hosted by KwaNalu (Mr Roy Dandala) was held in Madzikane (Creighton) that included all stakeholders active in the area presenting their approaches and processes. Participant trials for this programme as well as demonstration trials set up by PANNAR (Reggie Mchunu) on bean varieties and a CA spacing and maize variety trial set up by the CEDARA Farming Systems Unit were also visited by the participants. A Local CA Forum was set up as a result. Quarterly sharing and coordination meetings will be held.

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

Stakeholder engagement and awareness raising have included the following:

1. Participation in the Ubuhlebezwe LM LED forum and agricultural committee for inclusion of CA and farmer centres onto the economic development agenda in the Harry Gwala DM. A number of meetings were attended and four presentations have been given at these forums.
2. Attendance by four staff members of the Soil health symposium in Pretoria in November 2016.
3. Presentation of the Grain SA CA SFIP progress and learnings (By Mazwi Dlamini) at the LandCare conference in Kimberley at the end of 2016
4. Participation in the CA working group set up through the Grain SA CA facilitator and provision of thematic input on soil health work in the project (Sylvester Selala).
5. A number of meetings were held with the DRDLR to discuss collaboration in setting up and running farmer centre,- which are central in two of their present programmes, Apri-parks and RASED.
6. Meetings were held with the DEAT to discuss the CA programme in the context of a Climate-smart agriculture flagship programme and also in the context of a PES system.

7. Discussions have been held with various suppliers – inputs, tools and storage facilities – to negotiate arrangements suitable for the smallholder farmers.

The table below outlines activities related to objectives and key indicators for the period of October 2016 to February 2017.

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

TABLE 2: PERFORMANCE DASHBOARD; SEPTEMBER 2017

Outputs	Proposed (March 2016)	Actual (September 2017)
Number of areas of operation	4	3
Number of villages active	13	8
No of 1 st level farmer experiments	48	41
No of 2 nd level farmer experiments	17	3
No of 3 rd level experiments	3	4
No of local facilitators	5	5
No of direct beneficiaries	68	54
Participatory monitoring and evaluation process (farmer level)	Yes	Yes
CA manual (English and Zulu)	Yes	CA manual English – yes CA manual Zulu-yes

The number of active participants in the process decreased over the season as a number of participants did not plant. Overall, around 79% of signed-up participants planted. Of these 76% (41 participants) are new entrants into the programme, including nine (9) new participants in Matatiele, which is the only existing area in the programme. The team is very satisfied with the 1st season's activities in the areas where we continued. Two villages dropped off along the way, namely kwaThathani and Umzimkhulu. A number of new villages and groups (5 in total) have however been signed-up for the next season, as extensions for the areas involved.

Initiation of learning groups in Southern KZN has been going very well and CA has been introduced in 4 villages with a total of 43 trial participants as opposed to the suggested 28. In the Matatiele area, the local facilitator Bulelwa Dzingwa expanded into a new village Mqhobi and also had 8 participants in her home village Nkau. So in total there were 21 participants in Matatiele. Activities there have been going well with her support. The other Eastern Cape villages such as Mt Ayliff, Mt Frere and Mzongwana have not been included again due to waning interest in those areas.

The table below summarises the planned and actual farmer trial implementation for the 2016-2017 planting season. A total of 66 trial participants volunteered through the planning processes across 11 villages in four areas. Fifty four (54) of these farmers planted trials. The season was quite dry to start with and a number of participants had patchy germination as a result. Quite a few participants realised zero harvests (22), which is a total of around 41% and is surprisingly high.

TABLE 3: SUMMARY OF FARMER INNOVATION NUMBER AND AREAS PLANTED PER VILLAGE IN THIS CA PROCESS; EASTERN CAPE, 2016-2017

Area	Village	Farmers selected	Farmers (1 st level)	Farmers (2 nd level)	Farmers (3 rd level)	Experimentation	Comments; incl planters used.
	Sehutlong	4	1	1	2	Summer cover crops, crop rotation, OPVs, winter cover crops, intercropping	
	Nkau	8	4	2	1	Summer cover crops, crop rotation, OPVs, winter cover crops, intercropping	
	Mqhobi	8	8			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 Farmers Association	11	11			Intercropping (beans and cowpeas), late season beans and cover crops	Partnership KwaNalu. GM control plots, trials for PANNAR. Local facilitator: Mr CD Xaba
Ixopo	Ofafa	4	4			Intercropping, summer and winter cover crops,	Local facilitator; Mr Ndlovu. Area is hilly and steep with variable to bad soils
	Springvalley	9	9			Intercropping, summer and winter cover crops,	Local Facilitator; Mr B Dlamini. Local homestead based fields. Area is hilly nad steep with variable soils
	Kwa-Thathani	0	0			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.
	Nokweja	9	4			Intercropping, summer and winter cover crops,	Local facilitator, Mr Mkhize. They are also working in larger fields with DARD and grains FDP
Umzimkhulu	Kromhoek	0	0			Intercropping, summer and winter cover crops,	
TOTAL	8	54	41	3	4		Total area planted~ 1,18 ha

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 cover crop mix -relay cropped 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,cow pea	Maize 1,cow pea		Maize 1, Dolicho	Maize 1, dolichos
	Maize 2, Cow pea	Maize 2, Cow pea		Maize 2, Dolicho	Maize 2, Dolichos

Figure 1: Example of plot layouts for the 1st level farmer trails.

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 samples were taken for the new areas in SKZN where the trials have been initiated.

Below are summaries of some of the results

SPRINGVALLEY: Here the general soil fertility status is remarkably good for smallholder fields. pH averages around 5,5. Acid saturation is extremely low at 0,5%, with no K or Lime required. P requirements are reasonably low at 48kg/ha. Soil organic and percentage N in the soil are both reasonable.

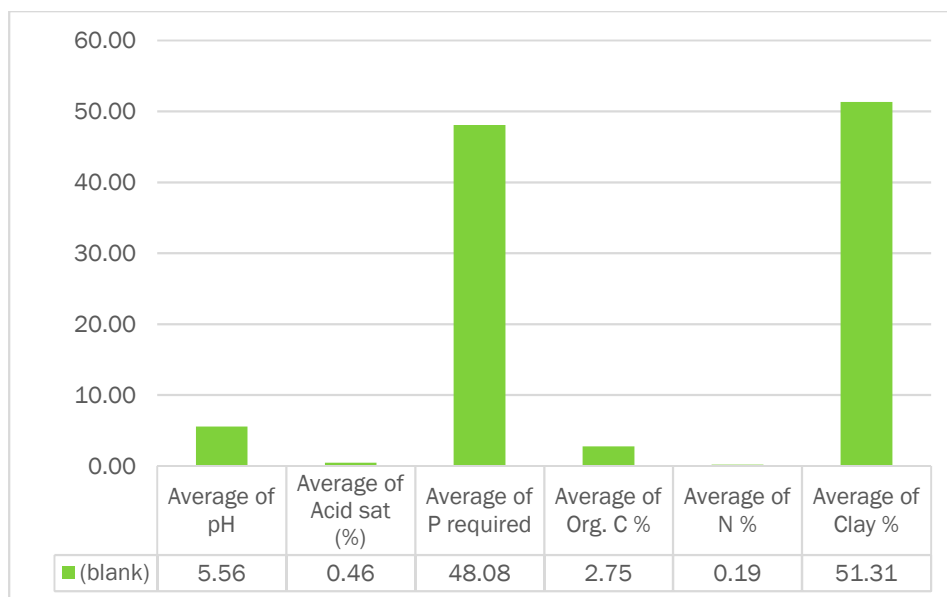


FIGURE 1: SOME SOIL FERTILITY PARAMETERS AVERAGED FOR 12 PARTICIPANTS FROM SPRINGVALLEY

OFAFA: This area is geographically close to Springvalley. The soil fertility results were similar in that the average pH was moderately acid at 5,4 with a very low percentage acid saturation at 0,6%. The average percentage organic matter and nitrogen in their soil was 3,7% and 0,38% respectively, which are quite high.

MADZIKANE: For this area for an average of the 10 participants for whom samples were taken, the pH is more acid at 4,3 and percentage acid saturation was 14,9%. The average percentage organic matter and nitrogen in the soil were quite high at 3,1% and 0,23% respectively.

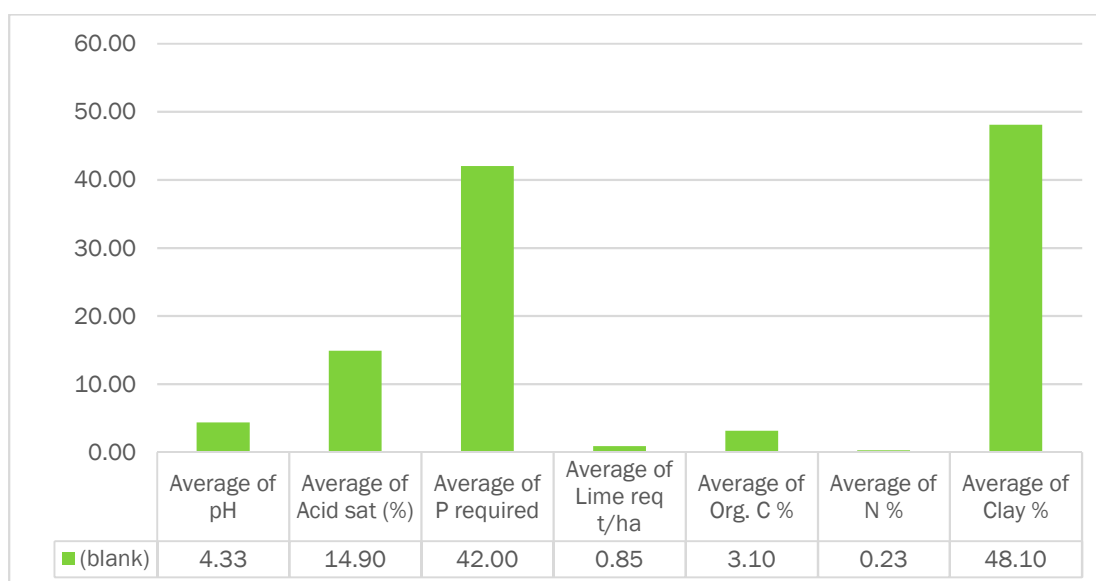


FIGURE 2: SOME SOIL FERTILITY PARAMETERS AVERAGED FOR 10 PARTICIPANTS FROM MADZIKANE

NOKWEJA: In this area, for an average of 10 participants the pH was very acid at 4, and percentage acid saturation 25% - which is quite high. Average percentage organic matter and nitrogen in the soil were high at 4,43% and 0,31% respectively.

Below is a tabular summary of the results combined with the average fertilizer recommendation for each of the areas. KwaThathani and Umzimkhulu have not been included, given the dwindling of the groups later in the season and the likelihood of discontinuation of these groups.

TABLE 4: SUMMARIES FOR SOIL FERTILITY PARAMETERS AND FERTILIZER REQUIREMENTS FOR THE 4 ACTIVE VILLAGES IN SKZN AND MATATIELE

AREA	pH	% Acid sat	%OM	%N	%Clay	MAP	LAN	Lime	
						50kg bags/ha		t/ha	
Springvalley	5,5	0,5	2,76	0,19	51,3	3,8	1,46	0	
Ofafa	5,4	0,6	3,7	0,38	40	1,8	2,1	0	
Nokweja	4,0	25,5	4,43	0,31	49,2	2,7	1,7	4,4	
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	

The generic fertilizer recommendation provided to participants at the start of the trials is 5 50kg bags of MAP, 3 bags of LAN and 1t/ha of 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 and Madzikane will be important,

Soil health test results

Soil health tests were done for 4 participants from Matatiele for a second season and a few more participants have now been included.

For the analysis over two years the following summary figure provides indicative results

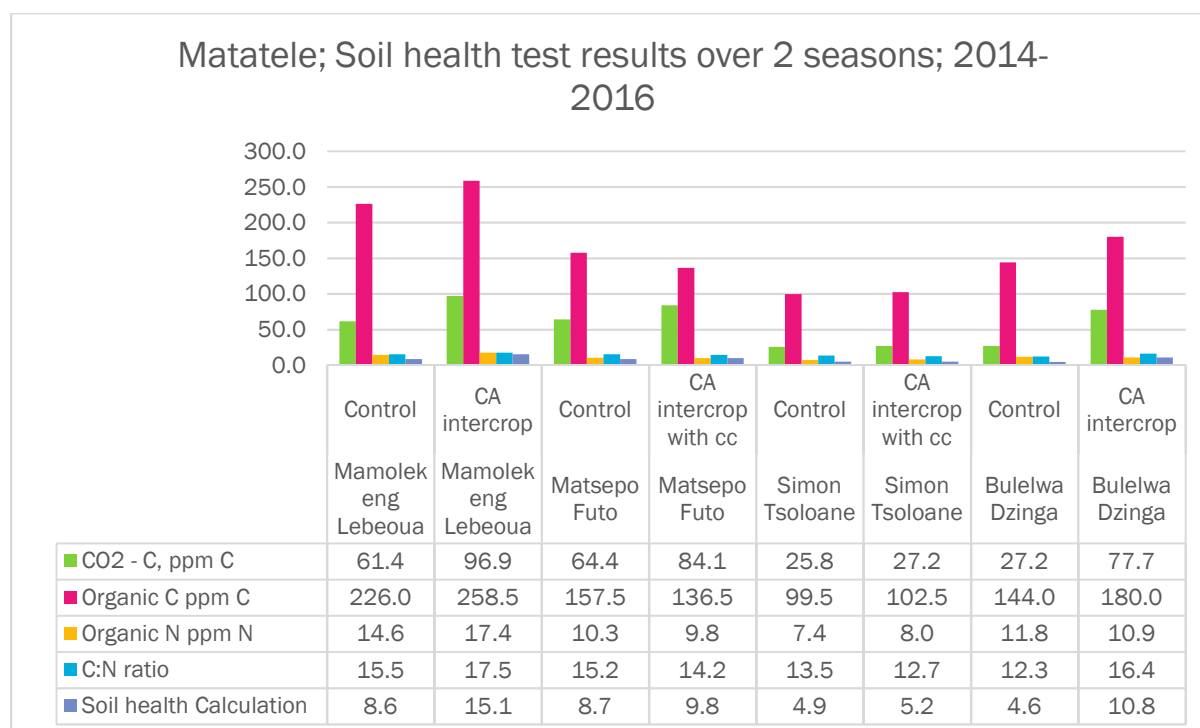


FIGURE 3: SOIL HEALTH TEST PARAMETERS FOR 4 PARTICIPANTS FROM MATATIELE, OVER 2 GROWING SEASONS.

Averages were taken for control and trial plots for the four participants across the two seasons 2014-2015 and 2015-2016. As the second season was substantially drier than the first the values were generally lower, however on average the following trends are clearly visible:

- All the Solivata test results (soil microbial respiration), indicative of microbial activity, are higher for the CA trial plots than the conventional control plots over the two seasons
- All soil health scores for the CA trial plots are higher than for the control plots
- Organic carbon in the soil is also higher for 3 of the 4 participants
- Organic Nitrogen is higher for two of the four participants.
- The C:N ratio for all the participants fall within the ideal range, indicating the availability of more nutrients for immediate uptake by crops in these soils. The two participants with potentially 'healthier' soils Mamelokeng Lebeoua and Bulelwa Dzingwa. However, saw an increase in the C:N ration in their CA trial plots, pointing towards a potential build-up of soil carbon and nutrients in these soils, which in the case of Matatiele with very sandy depleted soils is a very positive result.

In Matatiele soil health test results were compared for 5 participants; 3 of the 5 participants have been doing mulching trials for 2 consecutive seasons and we were interested to see whether this has an effect on the soil health. One new participant was added where we compared her control and trial plots and then Mr Mapheele's plot was tested again.

The figure below shows the outcomes for a number of soil health parameters for these participants

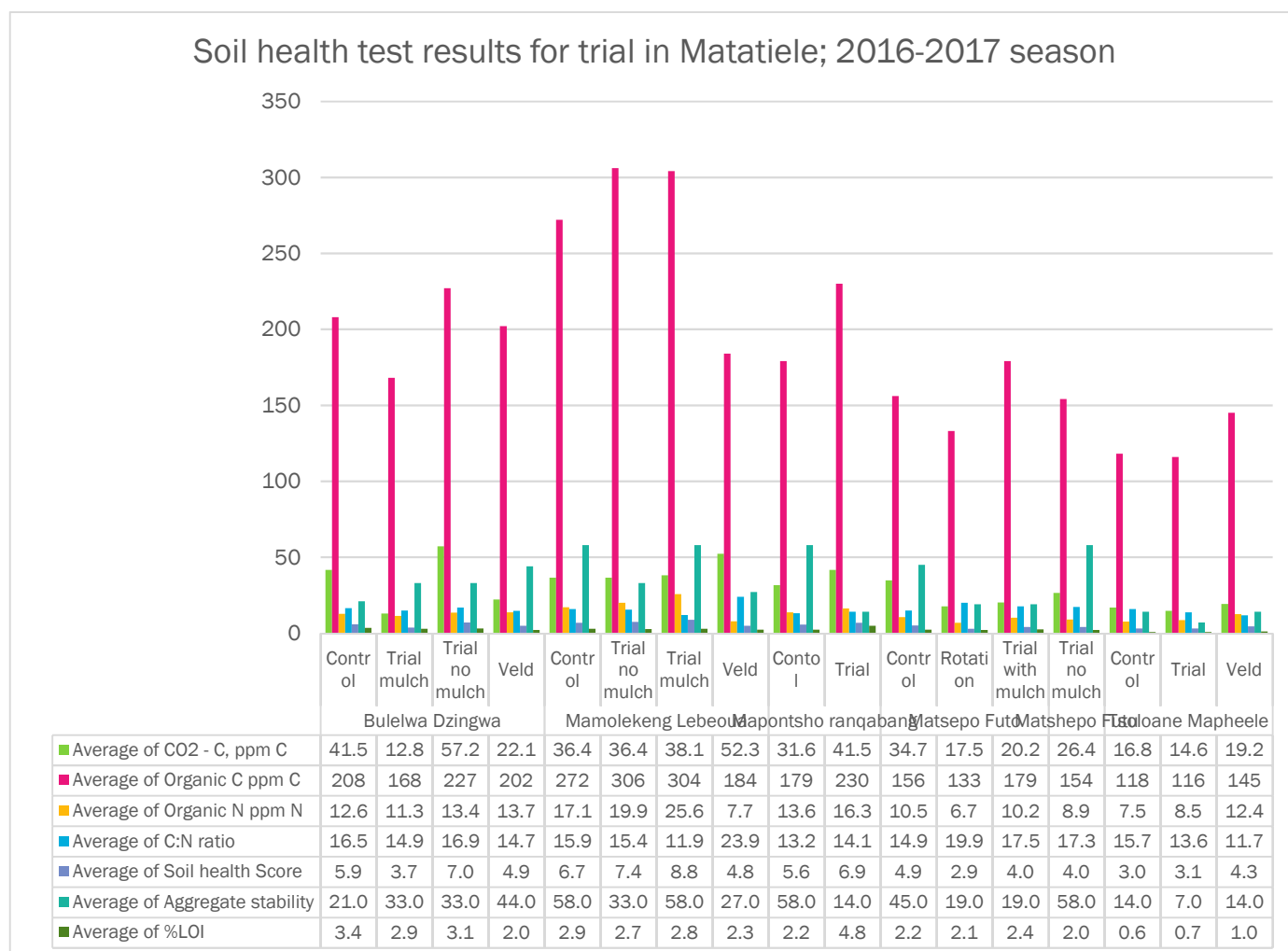


FIGURE 4: SOIL HEALTH TEST RESULTS FOR DIFFERENT TRIALS CONDUCTED IN MATATIELE; 2016-2017 SEASON

The following points can be made:

- Soil health scores in this area are mostly very low. These are sandy, low fertility soils.
- All trial plots show higher soil health scores than the control plots
- Soil health scores for the veld samples are lower than the trials for all participants, but Mr Mapheele. The latter has extremely depleted soils in his plots.
- The percentage organic matter in the soils for the trials are higher than the veld samples. This gives a further indication of the low base fertility of these sandy soils.
- The control plots have lower soil health scores than the trial plots for most of the participants, indicating that soil health has increased in the CA plots.
- The control plots for Bulelwa Dzingwa and Matshepo Futu show higher soil health scores than some of their trial plots, given that they use CA in their control plots as well.
- Generally the CA trial plots without mulch have higher soil health scores than the plots with mulch. The exception here is Mamolekeng Lebeoua. Her soils are well looked after with a much better soil health score than the other participants. Here the

specific effect of mulching is positive for increase soil health. This indicates that the mulching can help to increase the impact of the CA on soil health, but only in soils that are already somewhat stabilised.

- The aggregate stability is generally higher in the cultivated plots than in the veld. Additionally, aggregate stability of the CA plots are generally higher than the control plots. The two exceptions here are Mr Mapheele where continuous low input cultivation has seriously damaged his soil and the new participant Mapontsho Ranqabang. This could also partially be the effect of quite 'invasive' weeding practices using hand hoes that continually disturb large portions of the upper layers of the soil. See pictures below
- Generally the Solvita tests, indicating microbial activity in the soils are higher in the trial plots than the control plots. For two of the three participants who did mulching trials, the Solvita tests for the non-mulched pots are higher than their mulched plots. Mamolekeng Lebeoua, with her already more fertile soils shows an upswing in microbial activity in her mulched CA plots.

Generally, CA improved the soil health, but mulching only has an immediate positive effect on soil health for those soils which already have a reasonable soil health score.



Above left: Mr Mapheele's trial plot with maize on the left hand side and beans in the centre. Growth of crops in the trial plots are visually better than for the control plot which is indicated above right. For both plots soil capping and lack of soil structure is evident. There is increased organic matter and organic Nitrogen in the trial plot.

Right: Mrs Mapontsho Ranqabang weeding her plot. Due to low germination and high weed pressure, the weeding is 'invasive' and disturbs soil to a large extent.



Below: Mrs Mamolelekeng Lebeoua has a beautiful trial plot. In the foreground are her beans, and behind that the maize and bean intercrops. On the right is the mulched portion of her trial. For her, mulching of her CA plots has had a marked beneficial effect on soil health, increasing organic matter, microbial activity and aggregate stability.



With a closer examination of the availability of Nitrogen in the soil, further clarification of the soil health test results is possible. The total releasable N over time can be analysed for the samples using the Solvita labile ammonium nitrogen analysis (SLAN) test. This gives indications of longer term, short term and immediate nitrogen fractions in terms of release. It is further possible to put a monetary value on the organic N that has been contributed to the soil, which now would not be required to be augmented as inorganic N in fertilizers. The results are shown in the figure below.

Total releasable N over time for the Matatiele participants;2016-2017

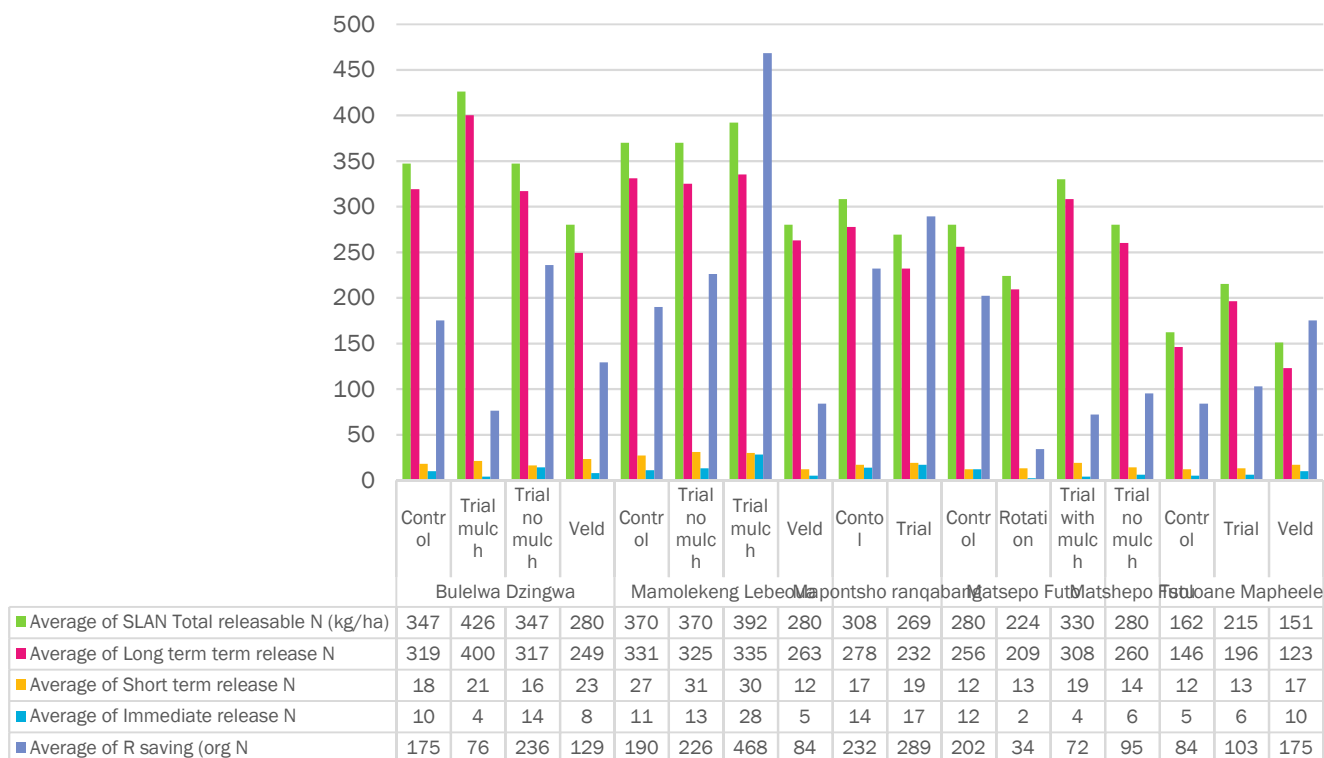


FIGURE 5: ANALYSIS OF N AVAILABILITY FOR THE MATATIELE PARTICIPANTS' SOIL HEALTH TESTS

From the figure above the following comments can be made:

- Available N is highest for Mrs Mamolelekeng Lebeoua. This has been most dramatic for her mulched trial plots where N (long, medium and short term) is much higher than for her trial and control plots. Short and immediate term releasable N are significantly higher than the veld sample. She is a very good example of what it is possible to achieve in these soils with good soil management practices over a period of time.
- For the two participants where the soil health scores were lower in their trials with mulch than with no mulch (Bulelwa and Matshepo), it is evident from this test that the short term and immediate release N is lower in the mulched plots than the non-mulched plots. The long term release N is higher in the mulched plots. This indicates a short term use of available N by the mulch – an effect which is well known and obviously much more evident in low fertility soils.
- Mr Mapheele is losing short and immediate term release N in his cultivated plots, both the control and the trial when compared to the veld sample. This indicates that he has in fact not managed to build up fertility in his soil, but is in fact not being able to build-up his soil. The trial results are however better than the control plots, showing that the CA system is helping, albeit slowly, the soils to recover.
- Mrs Matshepo Futu is in a similar position. Her results indicate that the intercropping trials have the best chance of helping her to build-up her soils and that presently crop rotation is having a definite adverse effect on soil health.

Overall, these results indicate that intercropping on the CA trial plots (with close spacing) is the best option for slowly increasing soil health status in these soils in Matatiele. It also indicates that mulching is only likely to have a positive effect in the short term once the soil health status has already been somewhat improved.

Nokweja two-row, tractor-drawn no-till planter demonstration

Tractor-drawn two-row planters have been procured to assist with the expansion of the programme and to be able to work with smallholder farmers active on larger plots of land; 1ha and up.

The ability to support mechanised planting in this programme adds a new element to the research process.



Introduction

The demonstration took place on the 25th of May at Nokweja; the implement is currently kept at Mr Mandla

Mkhize's home. Mr Mkhize is a member of the Grain SA SF?? programme. The Nokweja learning group has been exposed to tractor drawn implements through the local Department of Agriculture. They are ploughing and planting hectares of maize and beans for both eating and selling. They mainly grow yellow maize for selling and grow a bit of white maize that they eat green. They also work with Eric Wiggle from Grain SA FDP whom helps them source seed and fertilizer through the smallholder subsidy program running the area. Mahlathini's approach to maize and bean production is a bit different; the model is based on a farmer-level around on-farm trials, where learning group members learn and work together mostly using handheld implements. Participants in this group were overwhelmed by the amount of work involved in planting one plot; this was evident in the demonstration planting session held at Sbongiseni Mtshali's plot. Individuals were peeling off one by one and the planting was never finished, but they did manage to plough and have controls planted afterwards. Of the few people who planted, they did so independently of the group making use of available home labour.

Mahlathini was able to source a two-row no-till planter, suited for the needs and preferences of the Nokweja smallholders. Following a demonstration in Bergville by the suppliers (i.e. EdenEquip), field staff organized a day to showcase the implement in Nokweja in the Ixopo area. The local department was invited as well as the general public; the learning group was well represented and the Grain SA study group was also represented. Mr Mkhize was able to source a tractor through Mr Mdletshe; the Umzikhulu agricultural official also availed himself for the day.

Discussion

The demonstration was held on one of Mr Mkhize's plots where he had planted beans the previous season. Copies of the planter manual were printed out and were used to inform sections to be covered during the demonstration. The group started off looking at the implement, noting similarities and differences to normal no-till planters. The group was shown how to offload the planter and the experiences of learning group members came in handy when the planter was attached to the tractor. The group showed each other how the seed and fertilizer bins worked noting that fertilizer went beneath the seed. There are gears fitted on the planter that control the speed at which seed is deposited; these were important to take note of. Fertilizer from the bin is controlled using spacers placed underneath the bin to open-up or close down spaces to the bins. Farmers would put the spacers, turn the wheel and catch fertilizer and measure that to determine if the right amount was being deposited.

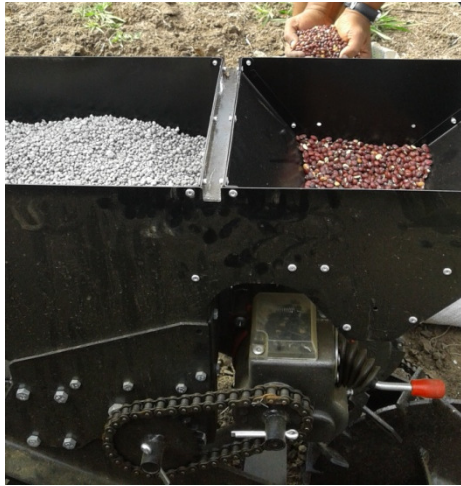


Figure above: Seed and fertilizer compartments

After that, a general safety and maintenance session followed using the manual as the guideline. The session covered safety when using the planter where a lot of mistakes tend to happen. The driving speed was emphasized as pulling the planter at a speed more than 5km/hr could damage the planter. Driving faster than this could cause the planter to bump up and down where seed and fertilizer placement can be compromised. Whilst the tractor was pulling the planter up and down the field, farmers went behind the digging up seed and fertilizer. They were satisfied with the amount and depth at which they were placed. We did have the clay soil blocking the seed and fertilizer openings. A quick sausage test of the soil was done to determine the clay content; the soil was exceptionally clayey.



Figure : Left, picture of the sausage test. Middle, group looking in the fertilizer and seed bins. Rights, clay soils blocking the fertilizer opening



Conclusion

The group was delighted that they could still do no-till using tractors more especially in big fields. It is still possible to do intercropping using this planter where one compartment would be maize and the other beans. The group has to be well organized as this planter will be shared with other areas.

Yield results for the 2016-2017 season

The growth and yields for CA trial plots, although more promising than in previous years, was still somewhat disappointing, with around 41% of participants not having any harvests. Yields for beans were reasonable for those who managed to harvest. Only around 3 participants managed to harvest any cowpeas.

TABLE 5: YIELDS FOR CA TRIAL AND CONTROL PLOTS FOR THE EC AND SKZN PARTICIPANTS; 2016-2017

Area	Name and surname	Yield (t/ha)			
		Maize (C)	Maize (T)	Beans (T)	Cowpea (T)
Nkau	Bulelwa Dzingwa			2	0
	Noluthando Philli		2,3	1,16	0
	Paseka Mahase	1,47	2	1	0
Mqhobi	Thapelo Ramanyali	1,1	2,7	1,4	0
	Ocean Kokhoto	0,1	3,5	1	0
Sehutlong	Matshepo Futu	0	2,87	1	0
	Mamolelekeng Lebeoua			2	0
	Malterato Lebeoua	0	1,74	1,4	0
Khutsong	Tsoloane Mapheele		1,4	0,13	
Ofafa	Velephi Radebe	0	0	0,35	0
	Thandiwe Radebe	0	0	1,2	0,12
Sprinvalley	Bonginhlanhla Dlamini		7,5	0	0
	Mzikayifani Sobiso	1,26	1,1	0	0
Nokweja	Nokuthula Dweku	0	0,9	1,75	0
Madzikane	Nombuyiselo Shozi		5,2	3,5	0
	Cosmos Xaba			1,9	0
	Vakushile Gambu		4,07	2,6	
	Claremisia Xaba			0,1	0,09
	Msizakali Dlamini			1,8	
AVERAGE YIELD (t/ha)		0,44	2,52	1,28	0,01

*Note: Empty cells in the table indicate yield data that is unavailable. And the zeros indicate no harvests.

From the yield data above it can be seen that the CA trial maize generally yielded a lot better than the control treatments. Bean yields in the CA intercropped plots were surprisingly high this season. Conversely, cowpea yields were very low.

These yields were compared to previous seasons for the 4 participants who have been involved in the programme now for 4 seasons. The figure below summarises this result.

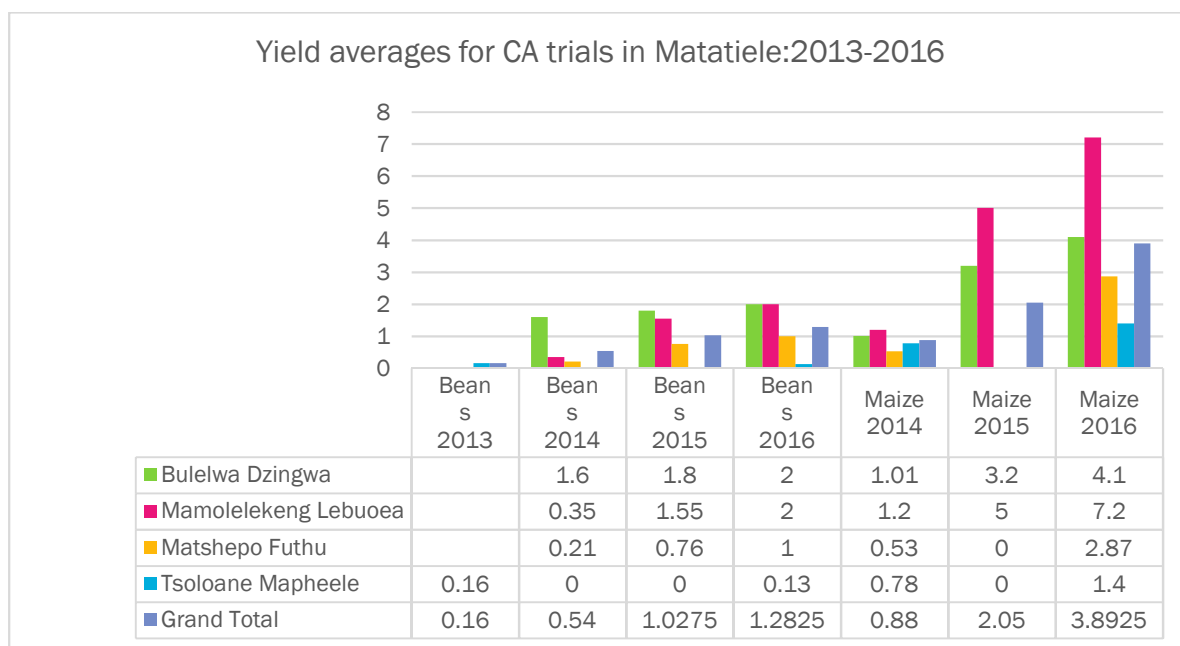


FIGURE 6: YIELD AVERAGES FOR MATATIELE PARTICIPANTS OVER FOUR SEASONS.

From this figure it can be seen that yields have steadily increased for all four participants for both maize and beans in the CA plots.

Progress per area of implementation

Madzikane (Creighton)

The Madzikane learning group has done well this season and has been very active. They have initiated a savings group, where members actively save for production inputs. A stakeholder forum has been set up for Madzikane, including representatives from KwaNalu, Grain SA, DARD, the Farming Systems Research Unit at Cedara and PANNAR, as well as the Local Municipality (LM) (now renamed as the Dr Nkosazna Dlamini Zuma LM). Farmers from the Nokweja Cooperative have joined in these meetings.

The learning group members have access to a small local mill through Mr Xaba the coordinator for the cooperative and also the Grain SA local facilitator. He also managed to borrow a maize sheller from the ARC, based at Cedara. We are in the process of assisting the group to acquire a maize sheller of their own.

Savings Group progress

Masibambane savings group based in Creighton started saving in March 2017 and has a total of 15 members. The group meets monthly for savings and the share value is R200. The group met for their first savings meeting without MDF in June and reported that the meeting went smoothly. More than 50% of the group members borrow money for agricultural production. The rest of the group borrows money for household consumption.



FIGURE 7: MADZIKANE, MASIBAMBANE SAVINGS GROUP DURING THEIR MONTHLY SAVINGS MEETING

The small table below summarises the savings information for the Masibambane VSLA in Madzikane between March-June 2017.

No	Name of Village	Name of Group	No. Of Members	Years active	Total monthly saving	Total Monthly Repayments	Total monthly loans	Cumulative No. of shares
	CREIGHTON							
1	Madzikane	Masibambane	15	1	R5,000	R10,280	R4,440	R18,800

Case study: Mr Cosmos Xaba



FIGURE 7: MR XABA STANDING BY HIS MAIZE AND BEAN INTERCROP TRIAL

Mr Cosmas Dumezweni Xaba (50) is a family man with a wife and 7 children and a grandchild. He retired from the mines in 2008 to come and farm growing crops and rearing livestock. He strongly believes in doing things for himself for the wellbeing of his family. He is a preacher at a local church that he built with his own money from the mines. He is also quite influential in community development programs and takes particular interest in agricultural, specifically crop production interventions.

Mr Xaba keeps 10 cattle, 53 sheep and uses 3 ha for crop production; spinach, potatoes, beans as well as maize.

He mills and sells the maize locally. He sells a 50 kg maize bag for R150, or when sold in bulk from ten bags the bag is reduced to R120. In the 2015/2016 he made a turnover of R8050 from his potatoes. Here he works with Lima RDF staff (another NGO active in the area) that source seed for him. Through the Lima Jobs Fund programme he was loaned R39 000 for broilers. Currently he is left with R2000 to pay off. Lima also assisted him with financing inputs for his maize production through an R8800 loan for fertilizers and herbicide that has also been paid off. He pioneered the initiation of the VSLA through the Grain SA CA SFIP programme. He recently took a loan from the group to source a maize sheller.

There is great need for a sheller given the amount maize he produces from his fields. In the meantime he has been borrowing a sheller from the Agricultural Research Council at Cedara, but he opted to buy his own to take advantage of the local need for shelling maize.



Left, electric maize sheller lent from the ARC, rondavel full of maize in the background. Right, maize harvested waiting to be shelled in addition to already shelled maize in the rondavel and bags on the left.

Maize storage is also an issue for Mr Xaba. Keeping the maize in bags in a rondavel means that the quality of the maize reduces over time due to mould. There is also not enough space, given his increasing production. If he were able to store his maize efficiently, he could sell it when there is a greater demand.

The scale of his production has grown to a point where he provides temporary work as he hires extra labour to assist his family members.

Mr Xaba is working with a number of agricultural stakeholders in the area. He is currently the chairperson of a farmer association through the KwaZulu-Natal Agricultural Union (KWANALU) and a local facilitator for Grain SA / Mahlathini's newly established CA SFIP in the area through collaboration with KWANALU. His work with KWANALU saw them awarded a Knapic planter

through Landcare. Mr Xaba is also the local chairperson of the newly established stakeholder forum.

He has been exposed to practices such as minimum tillage, advanced seeds through collaborative work with PANNAR, a range of herbicides and pesticides. He has tried CA for a couple of years and has witnessed increased land production potential and efficient use of inputs and he saves both labour and monies spent. He was not however familiar with the concepts of intercropping and permanent soil cover. He was eager to try these out with both hand hoes and hand held implements offered through the CA SFIP and compared this to his normal mono cropping practice.

Trial

Mr Xaba's 400m² plot was the very first planted in the area; on 22nd November 2016 using Sahara maize, Gandra beans and mixed brown cowpea seed varieties. The group worked together in planting this plot as a learning exercise and demonstration for planting the other members' trials. They worked together throughout. Germination was patchy but subsequent growth was good, giving the desired effect of early canopy cover by the beans and a consequent reduction in the need for weeding. Mr Xaba obtained 15.86 kg beans (equivalent to ~1,9 tons/ha) from the intercrop trial plot and 98.489 kg maize (equivalent to ~4,1 t/ha) from the trial.



Left: the learning group members preparing the plot together and Right: The 400m² intercrop plot with maize and cowpea intercrop. Patchy germination of maize is evident as is the good subsequent growth of cowpeas and reasonable canopy cover

A mix of summer and winter cover crops were relay planted into the fields when beans were harvested. Neither germination nor growth of the cover crops was good in our estimations due to moisture competition with maize still actively growing. The learning group however found this idea interesting and decided that they would also try this in the coming season, trying to get the crucial factor of planting date right into the future

Right and far right: Patchy germination and growth of the late season cover crop mix relay cropped into the maturing maize.

On the 1st of February four further plots (13mx5m) were planted; one of late season beans only, one of the summer and winter cover crop mix only and two plots with a mixture of beans and cover crops (planted in 10m wide blocks). The cover crops were planted using the haraka wheel planter.

Right: Mr Xaba with the haraka planter planting cover crops and other learning group members planting beans alongside.

The cover crops and late season beans grew well.

Right: A view of the late season cover crop plot. Sunflower and sunn hemp predominate in this mixture.

Conclusion

Yield data for Mr Xaba's trial is summarised in the small table below.

Plot	Maize (t/ha)	Early beans (t/ha)	Late beans (t/ha)
Trial	4,1	1,9	0,65
Control	2,5		

For Mr Xaba, planting by hand is not an issue as he is used to planting and harvesting manually, especially if this happens in a group. He appreciates the intercropping because of crop diversity, efficient land use and reduced use of herbicides and weeding due to close spacing. However, he felt that the two crops may compete for nutrients particularly in patches where soil quality is less than optimal. Maize tends to suffer in this case much more than beans.



The table below outlines a selection of the monitoring information for the Madzikane learning group

TABLE 6: SUMMARY OF TRIAL AND YIELD INFORMATION FOR THE MADZIKANE LEARNING GROUP

Madzikane-Creighton																						
Personal information										Before Planting				At planting (24Nov- 2 Dec 2016)								
										%Soil Cover after Planting				%Germination			Soils		Trial yields			
Name	Age	No.of people in homestead	Employment status	Type of grants	Other farming activities	Savings group/ bulk buying	Savings for input	Avialable area (m²)	Trial size	%weeds before applying the herbicide	Types of weeds	Residue	Weeds	Maize	Beans	Cowpeas	Runoff	Cover crops	Maize t/ha	Beans (t/ha)	Cowpea	
1 Nombuyiselo Shoji	54	16	Unemployed	6 Child support	maize +potatoes	Yes	Yes	1600	400m²	35	Black jack, broad leaves	15	5	45	92	88	No	Yes	8,1	3,5	No harvest	
2 Cosmas Dumezweni Xaba	50	11	Unemployed	1 Child support	maize, sweet potatoes, chicken, beans	Yes	Yes	10 000	400m²	55	black jack,couch grass	20	2	32	48	73	No	Yes	4,1	1,9	No harvest	
3 Andrina Dladla						No	No	836	Never planted	nm		n/a		Never planted			n/a	n/a	No harvest	No harvest	No harvest	
4 Vakushile Gambu	60		1son is working			Yes	Yes	1350	400m²	56	leafy broad weeds	10	12	34	49	42	No	Yes	6,3	5,2	No harvest	
5 Zamekile Zungu	72	35	4sons,1daughter,1 wife working	7 Child support, 1 old age		No	No	2640	400m²	65	nut grass	2	17	67	49	60	Yes	Yes	No harvest	No harvest	No harvest	
6 ND Mkhwane						No	No		Never planted	nm	nm			Never planted								
7 Mhlabunzima Mbhele						No	No	800	Never planted	nm	nm			Never planted								
8 Claremesia Xaba	40		1 son is working			Yes	Yes	1400	400m²	45	Grassed weeds	7	2	38	31	50	Yes	Yes	5,3	1	0,1	
9 Euphrosina Bethulile Miya						No	No		400m²					No germination					No harvest	No harvest	No harvest	
10 Godfrid Kumakwakhe Miya						No	No	1000	400m²	66	Grassed weeds	4	1	Exceptionally poor germination			No	No	No harvest	No harvest	No harvest	
11 Msizakali Simon Dlamini	58		Retired			No	Yes	5000	400m²	55	Nutsedge, black jack	15	2	59	40	56	No	No	To be collected	1,8		
AVERAGE	56					4/11	5/11			54		10	6	46	51	62	2/7	5/7	5,9	2,6	0,1	

From the above table the following comments can be made:

- The average age of the 11 participants in Madzikane is around 56 years, of whom around 72% are female
- 4 of 11 participants joined the Masibambane savings VSLA and 5 of 11 participants save for inputs
- Soil cover after planting was reasonable at about 10%
- Germination was generally quite patchy with around 46% germination average for maize, 52% for beans and 62% for cowpeas
- Mazie yields, for those who obtained yields were high for the trials with an average of 5,9t/ha. Bean yields similarly, were good at an average of 2,6t/ha. Only one person harvested cowpeas (0,1t/ha)

Ixopo

Through links supported by Mr Nqe Dlamini from StratAct and the Ubuhlebezwe LM agricultural forum, learning groups were initiated in four villages in the area; Ofafa, Springvalley - close to the Umkomaas river, kwaNokweja and kwaThathani – closer to Highflats and Umzimkhulu.

The intention of the LM is to draw community members into more productive and commercial field crop production and to support the whole value chain in an attempt to increase the income potential for these smallholders. Agriculture is considered the main economic opportunity for community members in the area. Agriparks are meant to be supported through the DM (Harry Gwala) and its development agencies, along with DRDLR. A recent launch of the RASED programme in the district is also to be spearheaded by the DRDLR. This programme aims to support secondary cooperatives in the area to supply fresh produce, grains and meat directly into a government supply chain.

Implementation for this programme through the learning groups and farmer experimentation process has not taken hold in kwaThathani and Umzimkhulu, both due to a mismatch between expectations raised by government initiatives in the area and the low external support offered by this programme. Basically, farmers were needing inputs and ploughing services for larger fields.

Implementation in Springvalley, Ofafa and Nokweja have been very promising.

The standard intercropping, close spaced trial plots of maize (Borderking) x beans (Gadra) and maize x cowpea intercrops have been planted in these areas.

Springvalley

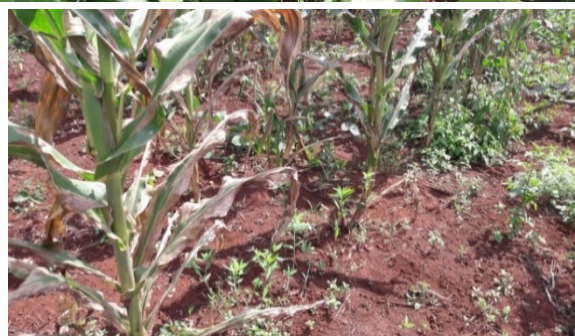
Bonginhlanhla Dlamini, the local facilitator for the area has this group well coordinated. He is also a member of the Vukuzenzele primary cooperative under the DARD and has been the coordinator there for 4 years. He has seen to it that all planted cover crops. Due to participants doing trials in their small homestead plots, it was advised they plant the ccs' in rows, as chickens would feed on the broadcasted seed.



Four of the trials, Sibonelo Zondi, Diyo Dlamini, Mfanyana Mkhize and Bhekinkosi Sindane's, were extremely weedy and they could not plant cover crops (See picture on the right). Of those who planted, the scc and wcc mix germinated and grew fairly well.



Clockwise from Top Left: Bonginhlanhla Dlamini's maize and cowpea intercropped plots during monitoring at the end of January 2017. Maize germination was a bit patchy, but subsequent growth was satisfactory. The same plot at the end of March, providing good late season cover and weed control. The cover crops germinated and grew reasonably well, but were a bit shaded out by the maize.



Above Left and Right; Letta Ngubo's intercropped plots at the end of January showing good germination and growth and her sunn hemp showing poor germination.

The table below outlines a selection of the monitoring information for the Springvalley learning group

TABLE 7: SUMMARY OF TRIAL AND YIELD INFORMATION FOR THE SPRINGVALLEY LEARNING GROUP

Springvalley																			
Personal information								Trial description (Planted 5-12 Dec 2016)											
								Herbicide (Round Up and Dual Gold)					% Germination				Yields		
								b4 herbicide appl	Types of weeds	Soil cover-residue (%)	Residue%	Weeds%				Runoff	Maize (kg)	Beans (kg)	Cowpea
Name	Age	people in homestead	Employment status	Type of grants	Other farming activities	Avialable area (m²)	Trial size						Maize	Beans	Cowpeas				
Bonginhlanhla Dlamini	42	6	Unemployed	1 child support	Coop sells chickens	600	400m²	95	couch grass	10	45	0-5	47	74	73	No	154kg (~6,4t/ha)		0
Sibonelo Zondi	36	2	Unemployed	1 pension		800	566m²	60	Black jack and grasses	0	2	50-55	44	59	31	No	0		0
Letta Ngubo	69	2	Unemployed	1 child support	maize, sweet potatoes, potatoes	1250	400m²	65	Black jack , cosmos	10	10	5	51	59	71	Yes	0		0
Bakhulumile Dlamini	69	10	Unemployed	1 child support		800	150m²	75	nutsedge,c osmos,black jack	0	0	5	83	35	33	Slightly	0		0
Mzikayifani Sosibo	60	4	Unemployed	1 child support, 1 pension		2500	400m²	70	Black jack, a bit of nutsedge, couch grass	0	55	25	61	47	64	No	37,5kg (~1,6t/ha)		n/a
Bhekinkosi Sindane	73	3	Unemployed	1 child support		800	400m²	96	Black jack and couch grass		72	9	73	45	50	No	4.146kg (~0,5t/ha)		n/a
Dudzile Dlamini	65	11	Unemployed	1 pension, 3 child support	8 cattle,6 chicken	1000	100m²	67	Black jack and grassed weeds	7	65	70	37	23	No	0	n/a		n/a
Diyo Dlamini	70	4	Unemployed	1 child support, 1 pension	beans, butternut	1000	100m²	70	Black Jack, couch	2	10	42	27,5	16	No	0			n/a
Mfanyana Mkhize	75	3	Unemployed	2 child support	10 cows, 10 goat	1000	100m²	85	Black jack and kikuyu	0	82	68	32	53	No	243 cobs (~3,2t/ha)	5kg (~1,3t/ha)		0
AVERAGE	62	5	9					75,9		4,0	21,4	28,7	59,9	48,5	46,0		3,7t/ha	0,9t/ha	0t/ha

From the above table the following comments can be made:

- Of the 9 participants 7 are men and most (78%) are pensioners.
- Percentage soil cover for the plots was very low and averaged 4%. Most of this cover (around 30-50%) was growing weeds prior to herbicide application.
- Germination for maize averaged 60%, for beans 49% and for cowpeas 46%.
- Average trial yields were 3,7 t/ha for maize, 0,9 t/ha for beans and 0 t/ha for cowpeas. As for many of the 1st year trial participants around 67% did not have any yields (poor growth and cattle invasions) and a few more did not remember to record their yields. Only 2 participants planted control plots as requested and no yield data was obtained for these.

Generally, interest in this area was weak at the beginning of the season but increased significantly as the season progressed. A positive start of the CA-SFIP process in Springvalley has made it possible for neighboring villages to ask questions with regards to CA in the area. For most people sowing seed in undisturbed land is unheard of and people were eager to see if anything would be harvested from the weeds and “compacted” soil. Bonginhlanhla Dlamini, our local facilitator, has been instrumental in sharing information about CA, allowing people around his community to walk in his trial asking questions. Frequent questions asked were around inputs and tools used to implement such a system; major worries were around dealing with weeds with ploughing omitted in the process. Individuals then started asking about possibilities of the program being introduced in their areas. The learning group in Springvalley has been expanded (23 participants) and Plasistate and KoShange (neighbouring villages) have been brought on board for the 2017-2018 planting season.

Springvalley yearly review session

Below is a summary of some of the comments from the group:

- Most group members felt that although they planted late and germination was patchy that subsequent growth of the CA plots was better than their control plots.
- Many farmers here use kraal manure in their fields, finding that buying fertilizers is unaffordable for them.
- There were issues with stalk borer in maize damaging crops, as well as CMR beetle in beans. Cowpeas did not pod at all due to CMR beetles.
- Participants appreciate the provision of the subsidy, explaining that as maize is for household consumption, they cannot afford to pay the full input prices for maize production. With the subsidies, they intend to increase the sizes of their trial plots. Members felt that saving around R3000 for their maize production is affordable- but do recognise that this limits the amount of maize they are able to grow for themselves.
- Having a local farmer centre would assist with buying inputs also for their control plots, as most participants can only afford small quantities, which are difficult to find in the shops and proportionally much more expensive.
- Relay intercropping of the winter cover crops was disappointing with little to no germination and very little subsequent growth.
- They would be very interested in having a local mill in the area

Ofafa

The group consists of eight members: five women in their late 50's and early 60's and three men, with one in his 60's and two in their 50's. Most of them are household heads looking after grandchildren and holding temporary work. They currently grow maize and beans using tractors to plough, but plant and weed by hand. They have shallow soils with little to no organic matter and do not often use fertilizers. The group worked well together. Overall germination of crops was poor due to dry, hot conditions exacerbating issues with poor soils. Only one of the initial 9 participants had some germination and growth.

Right: Mrs Velephi Hadebe was the only person who saw some growth in her initial trial planting – germination and growth here was patchy and sparse.



Undeterred, the group then requested that we plant late season beans in which cover crops were introduced by MDF as a means of pumping life into the soil. These germinated and grew surprisingly well; Four blocks were planted – one with beans only, another two blocks consisting of cover crop and bean intercrops and one with cover crops alone. Beans formed pods fairly quickly while sunn hemp, sunflower and oats grew big and tall. A few rows of maize were also planted just to assess if time was a limiting factor in terms of germination. Maize planted a bit later did germinate and grew better, although the colour was still a bit off (yellow). Maize with cowpeas was a bit darker than that of beans.



Above left and right: Mrs Thandiwe Hadebe's plot -showing the late season bean planting on the left and the beans and cover crop intercrop on the right.



Above Left and Right: Phatheleni Ndlovu's plot – the bean and cc intercrop growing exceptionally well and a maize and cc intercrop also growing well – but maize is a bit yellow.

Left to Right: Patheleni Ndlovu kept seed of sunflowers, sunn hemp and saia oats and managed to get a bit of a beans harvest as well



Above Left and Right, Phathisile Ngcobo's CC and bean intercrop plot growing well and her sunflowers and sunn hemp seedling slightly later in the season.



Above Left and Right, Velephi Hadebe's late season beans growing very well and getting ready to seed. The maize intercrop germinated and grew reasonably well. And her ban and cc intercrop plot.

Conclusion

Participants appreciate cover crops for livestock feed supplement potential for dry winters and as a weed control strategy through soil cover. Weeds have been a major constraint for years, which is why they have always opted to plough soils. They have realized that reducing weed seed stock is the way to slowly get rid of weeds in their plots. However, this will take a few seasons and it requires them to take weeds out before flowering.

Nokweja

In this area smallholders have become accustomed to the support from DARD in their fields which includes inputs and ploughing services, a trend which has also been supported by the Grain SA FDP active in the area. Participants thus underestimated the amount of work required and 4 of the 9 participants did not even plant. A few others attempted to use herbicides mid-season, but managed only to kill off their beans. Cover crops planted into the bare patches left by this injudicious herbicide use, did not germinate well and were out-competed by the maize.

Some time was spent on stakeholder engagement and building relationships with existing programmes. We joined the DARD, through the extension officer Sindi NZimande at a farmer development meeting and further presented at a Grain SA FDP mechanisation workshop, having been invited by Mr Eric Wiggle. The intention is to set up a forum for regular interactions (i.e. a stakeholder forum) to take the process forward. It was agreed that the organisations would work together in terms of information sharing, providing mutual support in terms of our respective programmes and in dealing with community dynamics. Eric Wiggle offered to share the Grain SA training manual in order to familiarise the team with the Grain SA FDP. Nokweja expansion into the neighbouring village of KwDladla has been planned as well as into the villages Ngongonini and St Elois.

In addition, a demonstration workshop was held for the new mechanised two-row planter being promoted through the CA SFIP.

Matatiele

Here the local facilitator, Bulelwa Dzingwa, has taken on the task of setting up and working with the learning groups in the area. She has established one learning group (8 participants) in Nkau and another in a neighbouring village Mqhobi (8 Participants). She is an enthusiastic experimenter and has again tried a number of different experiments.

Nkau and Mqhobi

Bulelwa Dzingwa

She has been part of the trials since 2014. There has been some improvement in her crop growth, but not as much as expected. She has some acidity problems in her soil and very low levels of organic matter. Clay content is around 20%, but there is a lot of surface erosion in the plots during heavy rainstorms.



This year her mulched trial plots again fared a lot better than the un-mulched plots, both in terms of germination and growth. She tried both the intercropping and crop rotation trials and also planted summer cover crops (sunflower and a combination of millet and sunn hemp). Her bean yields were good this year at around 2 tons/ha. Maize yields were again a little disappointing in the area of 1,8t/ha (See picture on the right).



Above left and right: The maize and bean intercrop plot during monitoring at the ned of January 2017. Sunflowers, intercropped with maize were growing enthusiastically.

Bulelwa has worked tirelessly with the VSLAs and with promoting CA and farmer experimentation ideas in the villages where she is active. She was also instrumental again this year in setting up and running the farmers' day in the area.

This day was well represented by the local traditional authority and community members and people came from a number of other villages in the area, as well as from the grazing management and donga rehabilitation programme supported through the INR, with around 56 people present. Stakeholder representatives did not arrive (SaveAct, Lima, DARD, LM). The programme followed the same basic structure as other farmers' days, with presentations by stakeholders, testimonies given by farmers, and then smaller groups visiting trials and watching the newly produced promotional DVD on CA in smallholder farming.



Above left and right: Tema from MDF making a list of interested participants for the next season towards the ned of the session and the tent with participants at the farmer's day getting ready for their field visits.

The group voiced concerns in terms of labour, but testimonies from participating volunteers put them at ease. They mentioned that planting a trial is a lot of work but that is well worth it in terms of crop quality. Broadcasting seed and ploughing it in is minimum effort but so are your crops- minimal quality and quantity. Noluthando Pili, a first year volunteer, addressed the crowd adding on that this way of growing food is precise, cheaper and rewarding. Mr Thapelo Ramanyali from Mqhobi, a neighboring village where the CA SFIP also just started, echoed Mrs Pili's words adding on that saving for inputs and teamwork is crucial, especially on bigger fields

Below are a few snapshots of the trial plots of participants from Nkau and Mqhobi. Generally the beans and cowpeas have germinated and grown better than the maize which has again shown quite patchy germination. A few participants are following the instructions of mulching with the weeds they are removing.



Above left and right: NKAU: Mamorema Libuke's plot showing reasonable germination and growth of beans, but rather patchy maize germination in January 2017 And Noluthando Pili's well kept plot.



Above left and right: Paseka Mahase planted her trial and a sizeable plot of traditional maize as a control. The harvested maize showing the larger more even cobs of the OPV (Borderking) from the trial compared to the mixed colour cobs of her traditional maize.



Above left: Thapela Rhamanyali's plot in Mqhobi. And Right: Ocean Khokhoto's plot. They both managed to harvest reasonable yields considering the below average growth of the crops. They both planted control plots using traditional seed.

Below is a table summarising the monitoring results for Mqhobi.

TABLE 8: SUMMARY OF TRIAL AND YIELD INFORMATION FOR THE MQHOBI (MATATIELE) LEARNING GROUP

Planting Monitoring data: Mqhobi (Matatiele)												Crop quality Monitoring data												
Personal information												Before Planting				At Planting (11-12 Dec 2016)								
				TRIAL				%Soil cover				%Germination			Yields (t/ha)			Cover crops			CONTROL			
	Name	Age	No.of people in homestead	Employment status	Types of grants	Other farming activities	Avialable area (m²)	Trial size	%weeds before applying	Types of weeds	Residue	Weeds	Maize	Beans	Cowpeas	Maize	Beans	Cowpea	Sunflower	Millet	Sunn hemp	Plot size	Seed used	Yield
1	Morena Khokhotho	38	6	Unemployed	4 child support	potatoes, maize, 13donkey, 3 cattle, 8 goats	2500	100m²	76	Nut grass +water grass	2	0	87	52	57	No Harvest	No Harvest	No Harvest	No Harvest	No Harvest	No Harvest	No control	n/a	n/a
2	Zwelonke Siphamla	64	1	Unemployed	1 pension		1000	100m²	65	nut grass + Kukur	2	0	0	5	6	No harvest	No harvest	No Harvest	No Harvest	No Harvest	No Harvest	No control	n/a	n/a
3	Tsatsi Motsapi	68	13	One son working	6 child support, 1 pension	2 horses(sold), 3 horses remaining, 15 goats, 5 cattle sold	1000	100m²	95	nut grass + Kukur	2	90	0	0	0	No harvest	No harvest	No harvest	No harvest	No harvest	No harvest	No control	n/a	n/a
4	Thapelo Ramanyali	73	4	Unemployed	1 child support, 2 pension	maize, butternut, cabbage, onions	988	100m²	99	65%nut sedge+35%Black jack	5	0	76	65	34	2,7	1,4	No harvest	No harvest	No harvest	0.813kg	200m²	Traditional seed	1,1
5	Sam Siphamala			Retired	1 pension		2862	100m²	86	nut grass + Kukur	1	85	50	50	25	No harvest	No harvest	No harvest	No harvest	No harvest	No harvest		Traditional seed	To collect
6	Teboho Lecheko	68		Employed	1 pension		2625	100m²	95	nut sedge, black jack and broad leaf weeds.	1	92	62	79	36	No harvest	No harvest	No harvest	No harvest	No harvest	No harvest	No control	No control	No control
7	Enock Mthimde			Unemployed			1080	100m²								Never planted	Never planted	Never planted				n/a	n/a	n/a
8	Ocean Khokhotho	63	8	Unemployed	6 child support, 2 pension	maize, beans , potatoes, chicken	1100	100m²	82	Black jack, nut grass and kukuyu	3	3	76	56	37	1,2	0,5	No harvest	0.813kg			800m²	Traditional	0,2
AVERAGE		62	6						85		2	38	50	44	28	1,95	0,65	0						0,65

The followings comments can be made for the group:

- Of the 8 participants who planted their 1st year trials only 3 managed to produce a harvest.
- Weed pressure prior to planting was very high, as is typical for this area, unused plots with a lot of grass cover and moribund weeds.
- This means that the potential efficacy of the pre-planting herbicides used (RoundUp and Dual Gold) are substantially reduced.
- Soil cover (% residues at planting) is very low at around 2% average for the participants
- The two participants who harvested maize also managed to keep a little seed for the summer cover crops grown (sunflower and sunn hemp).

Mqhobi yearly review session

Every learning group goes through a review and planning session at the end of each season. Below some of the interesting points raised by the Mqhobi learning group in their review, 27 July 2017, are summarised:

- Initially, when starting farmers thought this was a bit of a joke, but found that the increased growth spoke volumes. Initial germination and growth for both trial and control plots were more or less the same, but as the season went on maize under CA showed a lot more growth.
- CMR beetles in beans was an issue during flowering and affected the yields of this crop
- The group was interested in a farmer centre which could supply input packages locally, as town trips are expensive and generally inputs are supplied in larger quantities, which are difficult in terms of farmers' budgets and lack of access to transport
- Farmers are aware that presently they spend more on producing maize than they get out. Buying inputs at normal retail pricess is not affordable, more especially as they don't produce much as well.
- The group is interested in setting up a VSLA to augment their bulk buying process and feel that these initiatives will assist in the sustainability of their maize production.
- The group has agreed to pay the input subsidies and feel that they can afford around R300 for inputs.
- Yield results are not conclusive after this first season, except for a few participants who have noticed a definite upswing in yields, but because of better growth farmers are keen to continue experimenting with CA.
- Farmers are interested in focussing on beans as this a good staple crop for food security and fetches a high price locally. They are interested to try and plant Gadra twice per season as it is quick maturing.
- Although it was their first time planting cover crops, farmers appreciate the purpose of cover crops to keep the soil covered, providing feed for livestock in winter and putting in organic matter into the soil.
- The later onset of the rainy season and unpredictable rain is a major challenge for farmers. This now means that they need to be working in their fields over the festive season, as sometimes planting happens as late as early December. There are severe labour challenges over this time.

Khutsong – Mr Tsoloane Mapheele

Mr Mapheele is still struggling to maintain and increase the soil fertility and soil health status in his fields. This year, for the first time (after 4 years of implementation) showed some improvement in growth of his maize and beans in his trial plots. In addition, he managed to maintain a planting of Lucerne that was planted last year, despite the fact that he no longer has access to water for irrigation. This plot is grazed from time to time by his horses.

One of the contributing factors has been achievement of better germination, given that the calibration of the animal drawn planter was finally sorted out. Our fieldworker, Mazwi Dlamini assisted during planting.



Above left: Mr Mapheele during planting, using his animal drawn planter. Above right: His maize stand and growth this year was substantially better than in previous seasons.

Right: Mr Mapheele's Lucerne field after grazing by his horses, around April 2017.



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.
- Because the CA SFIP trials are hand-planted, farmers see this as a system to be used in small areas only. The idea that farmers would try this out in their homestead plots and then apply this farming system in their larger fields is not really happening as yet.
- Soil and weather conditions in the different areas of the Harry Gwala DM – Creighton, Ixopo, Umkomaas and Highflats, are quite variable. For some areas this would mean that maize production is mostly limited to their homestead plots and fields (specifically Ofafa and Springvalley)
- Working with other role players in the area, notably KwaNalu and the LM's has been very positive and has brought this process closer to the other maize production service providers.
- Working through the Farmers Cooperatives has assisted in providing an organised farmers' base, but has also meant that in these organisation only the members are favoured and they tend to be small with 4-10 members per cooperative. A conscious effort is needed to draw other community members in and specifically those interested in homestead level production.
- Participants need a lot more information and input around different herbicides, their functions and dangers.
- The distinctions between OPV's, hybrids and GM seed varieties are not well understood.
- Diseases in the bean plantings have been quite common in southern KZN – due in part to the cooler moist conditions prevalent in this area. Both *Pseudomonas* and *Aschochyta* bacterial blights have been observed.
- Some successes with late season plantings of beans and cover crops has offered this as a real alternative in a few of the areas- specifically Ofafa.
- Stakeholder interactions have been positive in Southern KZN.
- Given the results of the soil fertility tests, the fertilizer applications in most of these areas can be reduced. Some attention needs to be given to those individuals needing liming.
- Yield analysis over time and the soil health test results show quite clearly the positive effects of CA and specifically the intercropping and use of cover crops in CA as beneficial.

Problems encountered, milestones not achieved and reasons for that

There are a few larger conceptual issues that may need some consideration going into the future of this programme

1. One fieldworker can only manage to support a certain number of villages and farmers. The higher number of participants and spread of villages this season has meant that further intensive interventions with farmers have been limited.
2. There is a high level of skill required from the facilitators/fieldworkers to deal with issues throughout the value chain and deal with on the ground problems such as soil borne diseases at the same time. It may mean that introduction of fieldworkers into the team with speciality focus areas are required. Examples could include stakeholders' relationship building and management of stakeholder forums, researcher-managed experimentation and dealing with specialist input requirements in trials.

3. There is still a mismatch in terms of profitability of maize production at a small scale and the cost of inputs required for good cropping practices – even with CA which is somewhat cheaper than conventional tillage.
4. Subsidies will have to be included in this programme in the future
5. The researcher-managed aspects of monitoring and benchmarking have not really happened for this project as only one fieldworker has been employed to fulfil this role across all three smallholder project sites. Given the intensification presently in the Bergville site, he has not managed to spend the required time and effort in the SKZN and Midlands sites.
6. Interns employed to assist with monitoring often do not have drivers' licences and if they do, the additional need for vehicles further complicates the process. It means that they generally can only go to the field when the fieldworker is going and restricts their access to farmers somewhat. They also need to be provided with office space and computers and tablets for recording monitoring processes.

Budget statement by August 2017

Project	Total Actual YTD Aug 17	Total Budget YTD Sept17	Available to use
Eastern Cape & S-KZN	549 511	605 200	55 689