APPENDIX 3: SOUTHERN KZN AND EASTERN CAPE ANNUAL PROGRESS REPORT

CA Farmer Innovation Programme for smallholders.

Period: March -September 2019

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

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Project implemented by:

Mahlathini Development Foundation

Promoting collaborative, pro-poor agricultural innovation.

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Contents

Executive Summary

Seventy-nine (75) of 110 participants have planted their farmer level trials across 11 villages, with limited support for inputs from the KZN LandCare unit. Summer cover crop and livestock fodder farmer level experimentation have been included for a selection of the villages. Staff and Local Facilitators (8), have received training and mentoring in the new and updated monitoring processes. Local facilitators are taking on much more responsibility and this bodes well for sustainability of this process.

Three awareness days have been run in SKZN; one in Nokweja, in November 2018 with 66 participants, one in Umzumbe (68 participants) and one in Harding (82 participants) in conjunction with LandCare and KZNDARD. In addition, MDF attended stakeholder forum meetings for the Harry Gwala District Extension forum and the Ubuhlebezwe LED forum and ran one introductory workshop for a new group in Springvalley.

Rain-gauges and run-off plots have been installed for a selection of participants in Madzikane and Spring Valley and soil fertility (15 repeat samples and 9 new samples) and soil health (7 participants) samples have been taken and analysed.

The use of the e-survey (Pendragon) for crop growth monitoring has made a huge difference in terms of easier access to monitoring information and along with a good schedule of monitoring, around 22 farmers across 6 of the 13 villages have been included in the monitoring process.

The relationships with KZNDARD and LandCare have been strengthened considerably, to a point where collaborative action is now possible. Donation of a 4 row planter and boom sprayer has recently been made to Madzikane. In addition to the annual LandCare support to this programme, which includes planters and inputs.

Production this season has however been the worst since this site's inception, due to extreme weather variability in this region, with only an average of 39% of participants managing to harvest.

Background and Organisational Information

Mahlathini Development Foundation (2003-2019) is one of the only NGOs in South Africa focussing on promoting collaborative pro-poor agricultural innovation. As such, MDF is a specialist NGO working in the fields of participatory research, training and implementation, focussing on agroecological approaches.

Introduction of CA into any farming system requires the creation of a process and environment of continuous innovation, learning and change in a number of different areas, including social, economic, environmental and agronomic considerations. In the smallholder context it requires the design, introduction and facilitation of a reasonably complex IS (innovation system) approach by the implementers, and of practice, labour and resources (including natural and financial resources) by the farmer that has system wide implications. There is an interplay of a number of different factors, all of which need to be integrated, thus requiring a well-designed and facilitated IS approach.

The IS model applies a family of approaches and methodologies, such as the Farmer Field School (FFS) approach and participatory monitoring & evaluation (PM&E), to facilitate awareness,

learning, implementation and research all together. The key voluntary participants of this process are farmers from a locality or village who should be organised into learning groups (farmers generally are already organised into structures such as savings and credit groups, associations or cooperatives). A number of farmers in that group volunteer to undertake on-farm experimentation, which creates an environment where the whole group learns throughout the season by observations and reflections of the trials' implementation and results. They compare various CA treatments with their standard practices, which are planted as control plots. This provides an opportunity to explore all aspects of the cropping system, its socio-economic context and feasibility, as well as the grain and legume value chain in the area. The whole value chain is considered: input supply, production aspects, harvesting and storage, processing and marketing

Horizontal expansion (scaling out) from village nodes to surrounding farmers and villages in the area, working with organised farmer groups (or IPs) in collaboration with stakeholders in the region has shown great promise for expansion of interest in and longer term sustainability of the implementation of CA practices among smallholders. It means that a number of villages in close proximity become involved and this provides an opportunity for organising farmers around issues in the value chain such as bulk buying, transport, storage and marketing. It creates an option to set up farmer service centres at central nodes that can provide easy access to inputs and services. The model also provides for learning over a period of time, which has proven essential to allow each participant farmer to experiment with and master/adapt the CA principles for at least 4 years. The more experienced farmers become mentors to the new entrants and some undertake the role of local facilitation and support to their villages and groups. It also provides a platform where other farmers and interested parties in the area can engage and become involved

SELECTION AND COMMUNITY LEVEL PROCESS

PRE-CONDITION; Farmers active in maize production with some level of social organisation

1. Entry into community; through word of mouth from community members (individual and group requests), government officials, other service organisations,

2. Set up introductory meetings at community level, including authorities, to introduce CA and the process:

- Set up learning or interest group (20-30 people)

- Members of learning group volunteer for farmer led experimentation (usually 9-12 members in the first year), while the rest of the group learns alongside them

- These members agree to do a CA trial alongside their control (normal way of planting)

- Trials are usually 100,400 or 1000m^2 (*small areas to reduce risk)*

- The programme provides inputs for the trial, the inputs for control and all labour are provided by the farmer (*the risk of implementing the new idea initially sits with the programme not the farmers. From the 2nd year onwards the farmers pay a standard 30% subsidy towards the costs of inputs for their trials)*

- Farmers are trained in the implementation of CA; pre-planting spraying (use of knapsack sprayers) and field preparation, use of herbicides, layout of plots and planting in basins and rows using a range of no-till tools (hand planters, animal drawn planters and or two row tractor-drawn planters). The choice of implements depends on the scale of farming and farmers' choice. Aspects such as top dressing, weeding and pest control are covered during the season as well.

- The first-year trial layout is pre-determined through the programme – to include close spacing, inter cropping and different varieties of maize (choice of traditional OPV or hybrid seed- according to farmer preferences) and legumes (sugar beans, cowpeas)

- From the 2nd year onwards farmers start to add their own elements to the experimentation depending on their learning, questions and preferences. Cover crops (both summer and winter) and crop rotation options are introduced.

- Researcher managed "trials" are also set up at individual homesteads, to work alongside the more enthusiastic and committed participants and to explore issues such as soil health, carbon sequestration soil fertility, water productivity, moisture retention, run-off and specific aspects of the CA system – such as seeding and seeding rates of cover crops etc.

- As a minimum, 2-4 learning sessions per season in the learning group are held each year, building in complexity and content. 1 review session for the season and one planning session to plan experimentation for the upcoming season

- Planters and knapsack sprayers are provided to the learning group to share, manage and maintain

- Setting up of VLSA's (village savings and loan associations), farmer centres and joint harvesting, storage and milling options are promoted

3. Each season farmers days are organised in each area, jointly with the learning groups, CA forums and innovation platforms are promoted where all stakeholders in a region join these forums to share, discuss and plan together. This includes role players such as DARD, Social Development, Land Care, Local and District Municipalities, Agribusiness service providers, NGOs

In this season (2018-2019) 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) 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) Village Savings and Loan Associations, small business training and initiation of marketing cooperatives

Key activities: March-September 2019

Implementation has continued in three areas (Matatiele, Creighton, and Ixopo) in 11 villages. One new village was brought on board this season. Support for the 3 existing VSLAs has continued and included small business development training. The stakeholder forum in Madzikane has been continued and four farmers days have been held. In addition, stakeholder forums have been attended for Harry Gwala DM and Ubuhlebezwe LM and annual review and planning meetings are in progress. One new group has been brought on board in Spring Valley.

Figure 1: Delivery of Lime provided by LandCare (DARD) for the SKZN groups at the Harry Gwala Development Agency, for distribution to the villages in September 2019.

Financial summary

Table 1 below outlines the budget for the SKZN&EC project area.

Table 1: Budget outline for the SKZN&EC project area 2018-2019.

KZN Midlands Milestones: Farmer Centred Innovation in CA. October 2018- September 2019			**BUDGET**
Milestones/ Outputs	**Key activities**	**OUTCOMES/ DELIVERABLES**	
	Capital Equipment		R37 434,00
Farmer experimentation Bergville	Administration and sundries	travel accommodation, admin, publications, monitoring and evaluation	R117 120,00

	Farmer centred innovation systems	farmer experimentation, researcher managed experimentation, savings groups, farmer centres…	R524 548,00
	Innovation platforms	Stakeholder meetings, platform building and events	R16 245,00
Sub - TOTAL: Oct 2018-Sept 2019			**R695 347,00**

For this area, additional financial support was obtained for the KZNDARD LandCare unit. For SKZN&EC the farmer level subsidies were introduced. A small number of longer-term participants did pay in their subsidies. These were combined with the Bergville project farmer subsidies to relieve some of the financial pressure for that site, given the large number of smallholders involved there.

Progress

The project is now operational across 11 villages across Matatiele and SKZN, as shown in the map below, with a total of 110 learning group participants and 75 farmer-level trials.

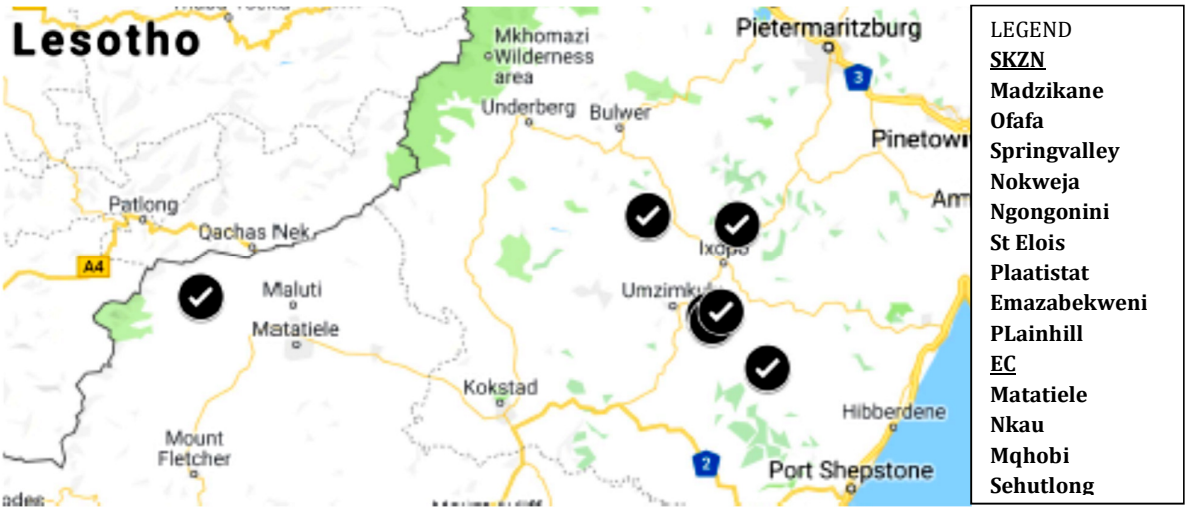


Figure 2: Map of SKZN and EC CA sites

The basic experimental design was followed for all 1st year participants and most of the 2nd year participants as well. Variations for 3rd year participants have included crop rotation, intercropping, summer and winter cover crop mixes, planting of lab-lab beans, fodder crops and late season planting of beans.

The table below outlines activities related to objectives and key indicators for the period of October 2018-September 2019.

Table 2: SUMMARY OF PROGRESS (OCTOBER 2018-SEPTEMBER 2019) 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:*	Farmer Field School methodology and process reports Farmer level learning materials; manuals – isiZulu, English (re-print) Project reports (monthly, 6 monthly and yearly). Articles and promotional material to engage stakeholders in the broader environment. Sharing of information through various innovation platforms and processes; including the internet, social and networking platforms and conferences	- To be done at end of season (100% complete) - in use, but, no reprint done - Monthly reports (March-Sept 2019) and annual report (100% complete) - Not done yet (0% complete) -Nokweja, Umzumbe and Harding farmers day (Oct, Nov 2018 and Jan 2019), MDF Website updated, (100% completion)
	Final report	- 6 monthly interim reports	-. Final report at end of project (100% completion)
2 **Increase focus and efficiency of CA systems, scale out sustainable farming systems scenarios and build social platforms**	*Farmer centred innovations systems research* *Scale out using information systems approach.*	1st , 2nd , 3rd level experimentation Develop and manage PM&E framework; – weekly and monthly M&E visits Innovation platform events- cross visits, conferences, workshops, meetings, farmers' days Action planning with innovation platform events; Major planning event for experiments Bi-annual steering committee meetings	- Undertaken for 13 villages (100% completion) -New VSA methodology, staff training in Quantitative measurements, pendragon e-survey for crop monitoring, annual reviews (100% completion) - Participation in KZN CA Forum (Aug 2019), KZNDEA CC summit (Aug 2019), Harry Gwala District extension forum (June 2019) and Ubuhlebezwe LED forum (May, July 2019), (100% completion) -Yearly reviews and planning (focus groups and individual interviews for all learning groups and Springvalley introductory w/s for new participants (100% completion) -September 2019 (50% completion)

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

Table 3: PERFORMANCE DASHBOARD; SEPTEMBER 2019

Outputs	Proposed (March 2018)	Actual (Sept 2019)
Number of areas of operation	4	4
Number of villages active	13	11
No of 1st level farmer experiments	45	6
No of 2nd level farmer experiments	70	51
No of 3rd level experiments	10	18
No of local facilitators	5	5
No of direct beneficiaries	125	110 (75)
Participatory M&E process	Yes	Yes
Soil samples	43	25

The table below summarises the planned and actual farmer trial implementation for the 2018-2019 planting season. Seventy-five (75) of these farmers, across 11 villages, planted trials (around 75% of participants). The season was quite dry to start with and a number of participants had patchy germination as a result. Of those who planted only 36 managed to harvest maize (48%) and only 25 participants managed to harvest beans (33%). This has been the worst year in terms of production for the SKZN site, since its inception.

Table 4: SUMMARY OF FARMER INNOVATION NUMBER AND AREAS PLANTED PER VILLAGE IN THIS CA PROCESS; EASTERN CAPE, 2018-2019

Area	Village	2018 total	2018 1st level	2017 2nd level	2016 3rd level	2015 4th level	Experimentation	Comments; incl planters used.
Matatiele	Sehutlong	4 (3)			1	2	Summer cover crops, crop rotation, OPVs, winter cover crops, intercropping	Bulelwa Dzingwa – local facilitator for Nkau and Sehutlong. She has continued to manage the CA experimentation in Matatiele-continuing with a smaller group of participants
	Nkau	7 (4)		4	2	1	Summer cover crops, crop rotation, OPVs, winter cover crops, intercropping	
	Mqhobi	3 (2)		1	2		Intercropping – new village and group	
	Khutsong	1 (1)				1	Summer cover crops, crop rotation, OPVs, winter cover crops, intercropping	Tsoloane Mapheele Animal drawn planters used here in larger areas
Creighton	Madzikane Farmers Assocation	10 (6)		2	8		Intercropping (beans and cowpeas), late season beans and cover crops	Partnership KwaNalu. Local facilitator: Mr CD Xaba

Ixopo	Ofafa	8 (5)			8		Intercropping, summer and winter cover crops,	Local facilitator; Mr Ndlovu. Area is hilly and steep with variable to bad soils
	Emazabekweni	5 (4)		5				Local Facilitator; Mr B Dlamini. Local homestead based fields.
	Springvalley	6 (5)			6		Intercropping, summer and winter cover crops,	Local Facilitator; Mr B Dlamini. Local homestead based fields. Area is hilly and steep with variable soils
	Plaatistat	15 (6)	3	12			Intercropping, summer and winter cover crops,	Here there are larger fields- need for a tractor drawn planter.
	Nokweja	5(2)	6		4		Intercropping, summer and winter cover crops,	Local facilitator, Mr Mkhize. They are also working in larger fields with DARD and grains FDP
	Nokweja (top)	8 (8)	8				Intercropping, summer and winter cover crops,	Local facilitator, Mr Mkhize. They are also working in larger fields with DARD and grains FDP
	St Elois	15 (4)		12			Intercropping, summer and winter cover crops,	Expansion area from Nokweja supported by Mr Mkhize the LF
	PlainHill	11 (9)		13			Intercropping, summer and winter cover crops,	Expansion area from Nokweja supported by Mr Mkhize the LF
	Ngongonini	16 (16)	3	13			Intercropping, summer and winter cover crops,	Expansion area from Nokweja supported by Mr Mkhize the LF
TOTAL	13	110 (75)	20	62	31	4		**Total area planted to trials~ 4 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 mix in Autumn

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

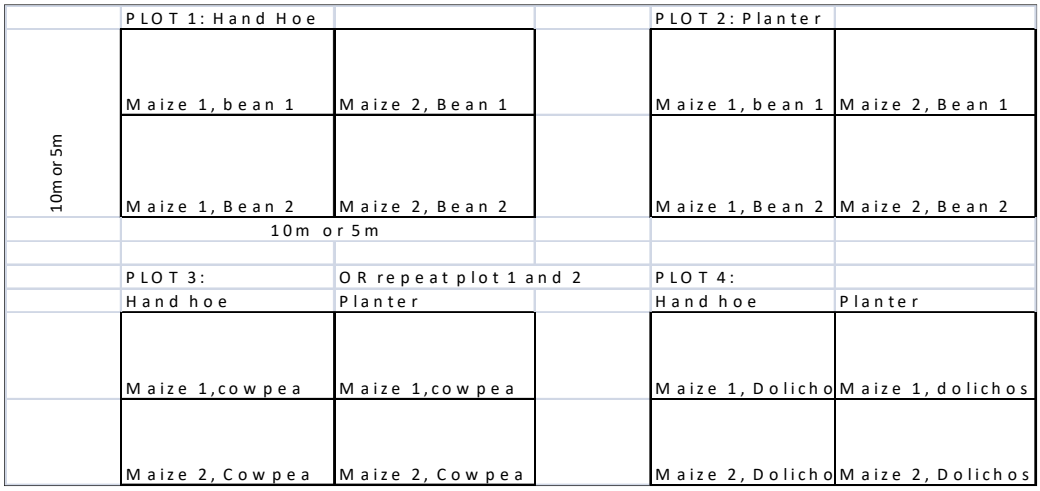


Figure 3:Expample of plot layout for the 1st level farmer trials

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 health

This season's soil health samples were taken for 5 participants, across four villages (Madzikane, Ofafa, Spring Valley and Ngongonini). For the 2 participants for whom SH samples were collected last year as well, care was taken to ensure that samples were taken in the same plots as before.

The intention is to compare the soil health characteristics for a number of cropping options within the CA trials, with conventionally tilled mono-cropped control plots, over time.

The Haney soil health tests (as analysed by Soil Health Solutions in the Western Cape and Ward Laboratories in the USA) provides insight into microbial respiration and populations in the soil, organic and inorganic fractions of the main nutrients N, P and K, and assessment of organic carbon percentage organic matter (%OM). An overall soil health score (SH) is also provided for each sample.

Haney Soil health tests parameters[1]

These analyses are benchmarked against natural veld for each participant, due to high local variation in soil health properties, measured at different times. The veld scores provide for high benchmarks to compare the cropping practices against.

[1] Haney/Soil Health Test Information Rev. 1.0 (2019). Lance Gunderson, Ward Laboratories Inc.

Soil Respiration 1-day CO2-C: This result is one of the most important numbers in this soil test procedure. This number in ppm is the amount of CO2-C released in 24 hours from soil microbes after soil has been dried and rewetted (as occurs naturally in the field). This is a measure of the microbial biomass in the soil and is related to soil fertility and the potential for microbial activity. In most cases, the higher the number, the more fertile the soil.

Microbes exist in soil in great abundance. They are highly adaptable to their environment and their composition, adaptability and structure are a result of the environment they inhabit. They have adapted to the temperature, moisture levels, soil structure, crop and management inputs, as well as soil nutrient content. Since soil microbes are highly adaptive and are driven by their need to reproduce and by their need for acquiring C, N, and P in a ratio of 100: 10: 1 (C:N:P), it is safe to assume that soil microbial activity is a dependable indicator of soil health. Carbon is the driver of the soil nutrient-microbial recycling system.

Water extractable organic C (WEOC): It essentially measures the release of sugars (liquid carbon) from root exudates, plus organic matter degradation. This number (in ppm) is the amount of organic C extracted from the soil with water. This C pool is roughly 80 times smaller than the total soil organic C pool (% Organic Matter) and reflects the energy source feeding soil microbes. A soil with 3% soil organic matter when measured with the same method (combustion) at a 0-3 inch sampling depth produces a 20,000 ppm C concentration. When the water extract from the same soil is analysed, the number typically ranges from 100-300 ppm C. The water extractable organic C reflects the quality of the C in the soil and is highly related to the microbial activity. On the other hand, % SOM is about the quantity of organic C. In other words, soil organic matter is the house that microbes live in, but what is being measured is the food they eat (WEOC and WEON).

If this value is low, it will reflect in the C02 evolution, 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 CO2) 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.

Water extractable organic N (WEON): Consists of Atmospheric N2 sequestration from free living N fixers, plus organic matter degradation. This number is the amount of the total water extractable N minus the inorganic N (NH4-N + NO3-N). This N pool is highly related to the water extractable organic C pool and will be easily broken down by soil microbes and released to the soil in inorganic N forms that are readily plant available.

Organic C:N ratio: This number is the ratio of organic C from the water extract to the amount of organic N in the water extract. This C:N ratio is a critical component of the nutrient cycle. Soil organic C and soil organic N are highly related to each other as well as the water extractable organic C and organic N pools. Therefore, we use the organic C:N ratio of the water extract since this is the ratio the soil microbes have readily available to them and is a more sensitive indicator than the soil C:N ratio. A soil C:N ratio above 20:1 generally indicates that no net N and P mineralization will occur. As the ratio decreases, more N and P are released to the soil solution which can be taken up by growing plants. This same mechanism is applied to the water extract. 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. The most ideal values for this ratio are between 8:1 and 15:1.

Soil Health Calculation: This number is calculated as 1-day CO2-C/10 plus WEOC/50 plus WEON/10 to include a weighted contribution of water extractable organic C and organic N. It represents the overall health of the soil system. It combines 5 independent measurements of the soil's biological properties. The calculation looks at the balance of soil C and N and their relationship to microbial activity. This soil health calculation number can vary from 0 to more than 50. This number should be above 7 and increase over time.

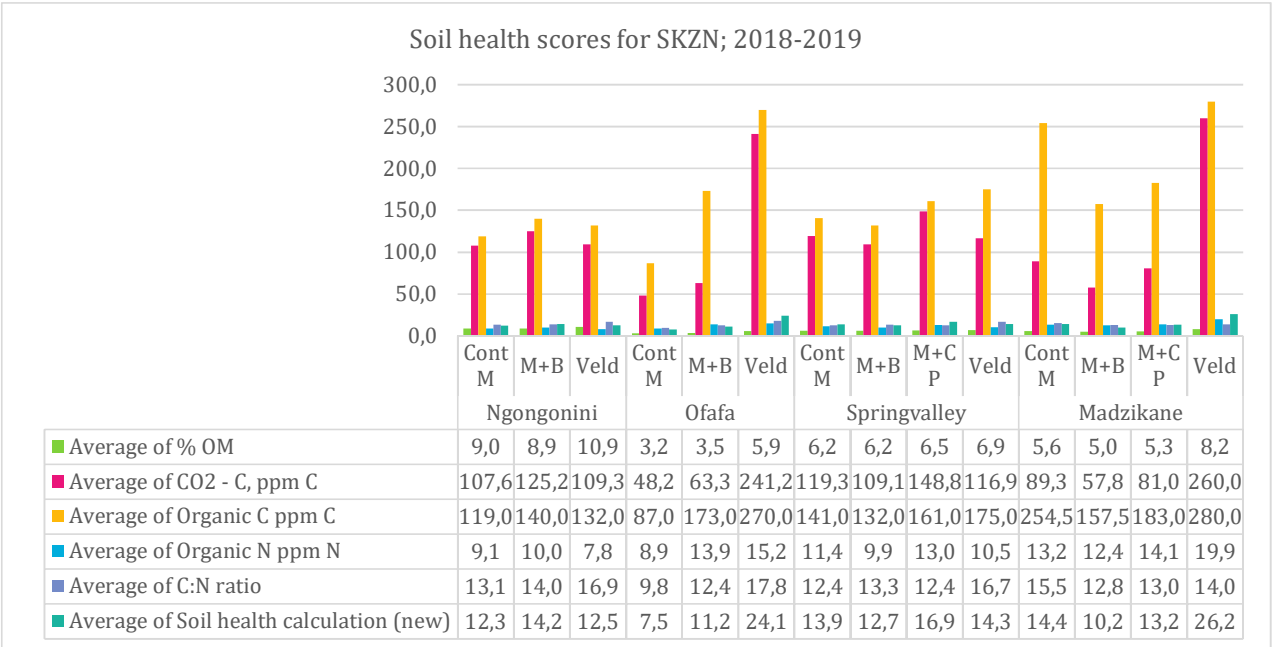
Some of the inter relationships between these variables are explored below

SKZN Soil health results

For this area, the soil quality is generally fair to good, with local variations depending on historical soil management practices and topography, which is hilly with steep slopes in some instances.

Soils in this area have a comparatively high organic matter content and soil health scores are good. This season, due to the prevailing hot and dry conditions for the most of the season microbial activity has been dampened, but soil health scores are still high. Average yields obtained ranging from around 1,2-3,5t/ha do not compare well to the yield potential for these areas, which is much higher

The figure below outlines the soil health parameters and scores for the 4 villages tested.



	Ngongonini			Ofafa			Springvalley				Madzikane			
	Cont M	M+B	Veld	Cont M	M+B	Veld	Cont M	M+B	M+CP	Veld	Cont M	M+B	M+CP	Veld
Average of % OM	9,0	8,9	10,9	3,2	3,5	5,9	6,2	6,2	6,5	6,9	5,6	5,0	5,3	8,2
Average of CO2 - C, ppm C	107,6	125,2	109,3	48,2	63,3	241,2	119,3	109,1	148,8	116,9	89,3	57,8	81,0	260,0
Average of Organic C ppm C	119,0	140,0	132,0	87,0	173,0	270,0	141,0	132,0	161,0	175,0	254,5	157,5	183,0	280,0
Average of Organic N ppm N	9,1	10,0	7,8	8,9	13,9	15,2	11,4	9,9	13,0	10,5	13,2	12,4	14,1	19,9
Average of C:N ratio	13,1	14,0	16,9	9,8	12,4	17,8	12,4	13,3	12,4	16,7	15,5	12,8	13,0	14,0
Average of Soil health calculation (new)	12,3	14,2	12,5	7,5	11,2	24,1	13,9	12,7	16,9	14,3	14,4	10,2	13,2	26,2

Figure 4: Soil health scores for 4 villages in SKZN; 2018-2019

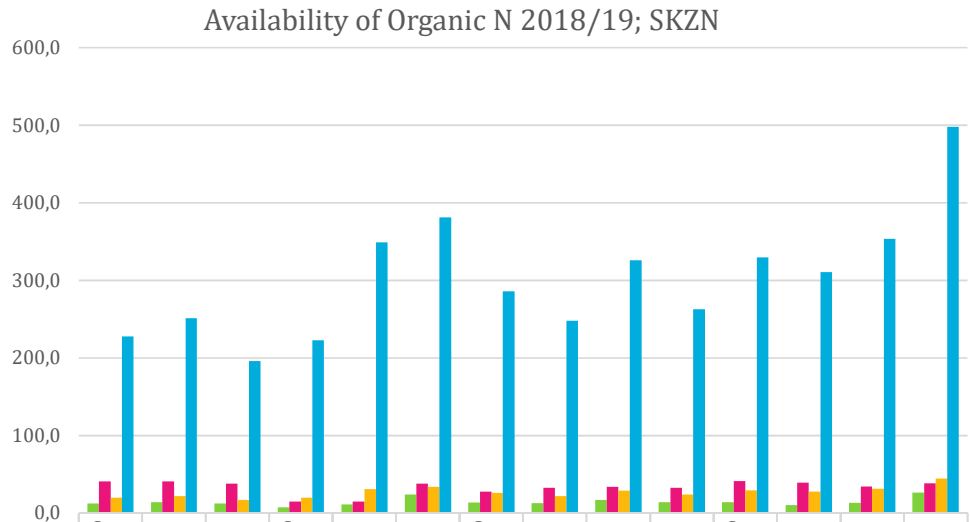
Note: The Conventional control plot for Madzikane was the homestead field for Mr Xaba, which is not indicative of the soil conditions in the fields, quite a distance away and will thus not be included in this analysis

From the figure above the following comments can be made:

- Soil health scores for the CA maize and bean intercropped plots (M+B) are higher than the conventional control plots (Cont M)
- Soil health scores for the CA maize and cowpea intercropped plots (M+CP) are higher than the M+B plots.
- The higher soil health scores are related to higher organic C, Organic N and microbial respiration (CO_2-C) in all cases; which indicates a build-up of organic C, N and micro-organisms in the CA intercropped plots, when compared to conventional tillage.
- For the two villages, heading inland from the Umkomaas river, which were generally drier and hotter than the two villages in the Highflats region (closer to the coast), the microbial respiration was much lower than the organic C in the soil. Thus, the percentage microbially active carbon (%MAC) for these two villages (Ofafa and Madzikane) was between 28-55% as compared to the 82-92% MAC for the Highflats villages (Ngongonini and Springvalley). This dampening effect of heat and dryness of soil on microbial activity has been noticed previously in dry seasons. It is also related to a lower organic matter content in the soil of around 3,5-5% in Ofafa and Madzikane respectively as compared to 6,5-9% in Ngongonin and Springvalley.

In summary, soil health conditions for soils in SKZN are good, with high organic matter content and the CA M+CP intercrop has allowed for the greatest increase in organic C and N and microbial respiration.

If one looks a little more in detail at the availability of N in the soil, it can also be seen that the CA M+CP provides for the highest levels of immediate release N and potential savings in application for inorganic N, as shown in the figure below



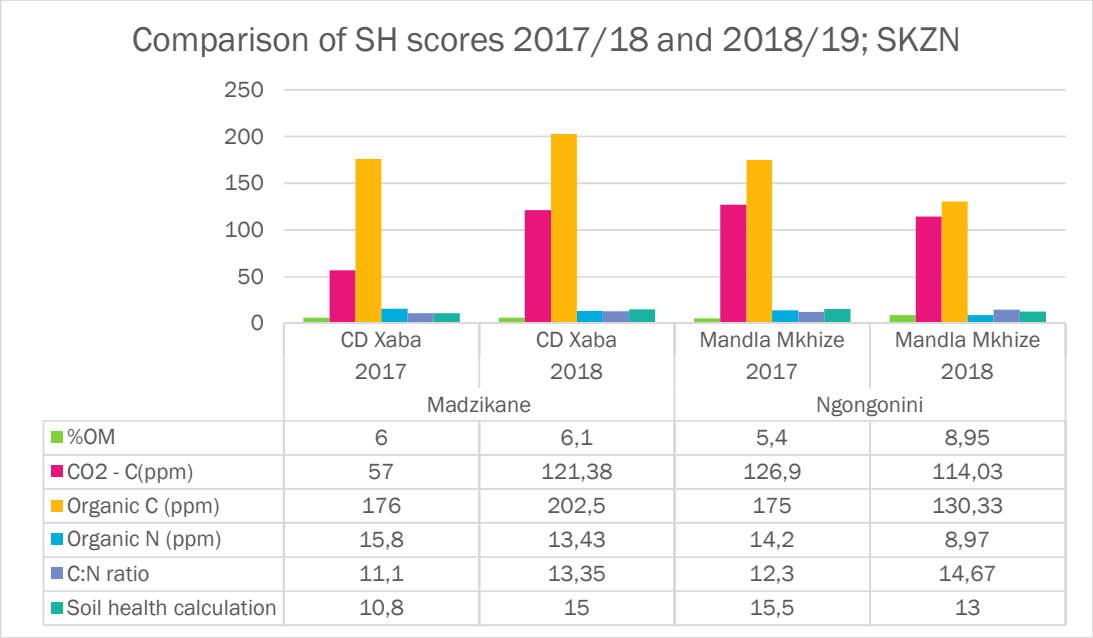
	Cont M	M+B	Veld	Cont M	M+B	Veld	Cont M	M+B	M+CP	Veld	Cont M	M+B	M+CP	Veld
	Ngongonini			Ofafa			Springvalley				Madzikane			
Average of Soil health calculation (new)	12,3	14,2	12,5	7,5	11,2	24,1	13,9	12,7	16,9	14,3	14,4	10,2	13,2	26,2
Average of Soil aggregates	41	41	38	15	15	38	28	33	34	33	42	40	35	39
Average of N Immediate release	20,0	22,0	17,0	20,0	31,0	34,0	26,0	22,0	29,0	24,0	29,5	28,0	31,5	44,5
Average of R value of Org N	228,00	251,00	196,00	223,00	349,00	381,00	286,00	248,00	326,00	263,00	330,00	311,00	353,50	498,00

Figure 5: Availability of organic N and Rand value of inorganic N saved for SKZN; 2018/19

From the figure above the following comments can be made:

- The average Rand value of inorganic N saved for the Cont M plots is R 267/ha (48% saving), for the M+B plots is R289/ha (52%) and for the M+CP plots is R340/ha (60%). N recommendations for these sites is 40-60kgN/ha, (~R560/ha). This indicates a 12% decrease in the need for inorganic N fertilizers for the Ca M+CP intercrops when compares to conventional mono-cropped maize.

When comparing soil health scores for two of the five participants across two seasons, it is expected that soil health scores will increase form year to year, on the basic assumption that the CA cropping system builds up soil organic C and N content. The figure below compares the results for Mr Xaba from Madzikane and Mr Mkhize from Ngongonini



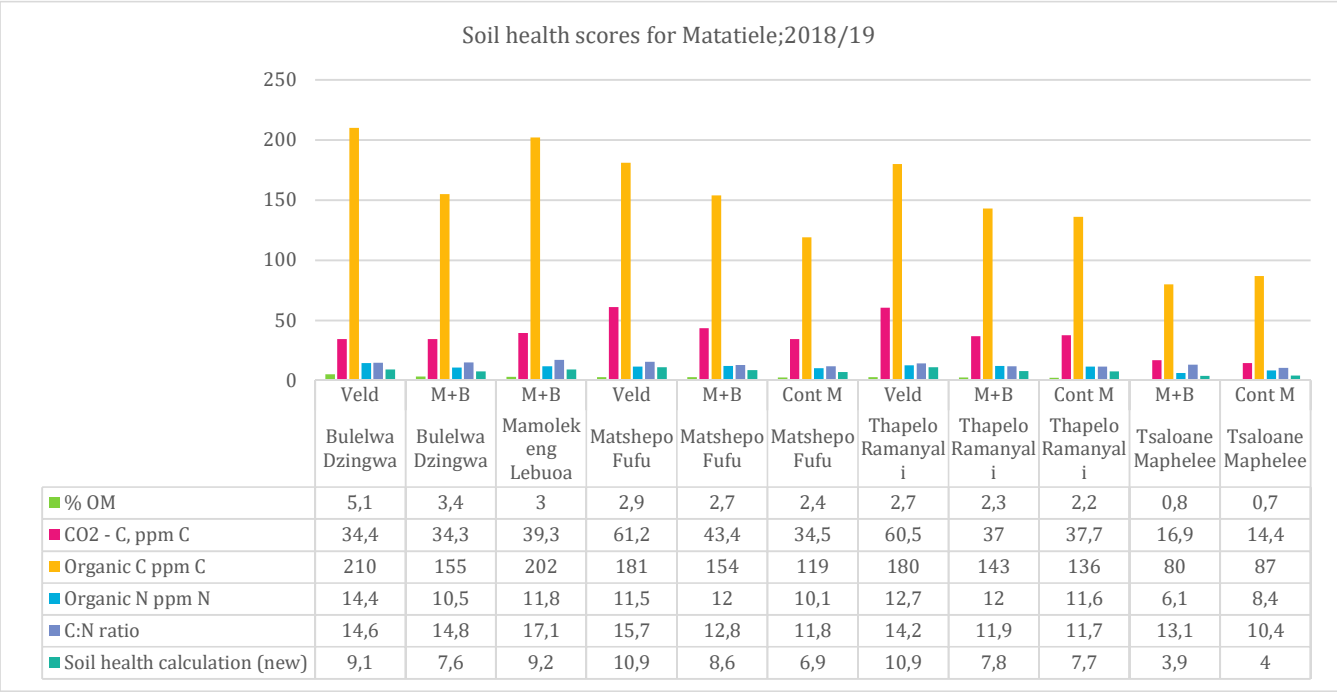
	CD Xaba 2017	CD Xaba 2018	Mandla Mkhize 2017	Mandla Mkhize 2018
%OM	6	6,1	5,4	8,95
CO2 - C(ppm)	57	121,38	126,9	114,03
Organic C (ppm)	176	202,5	175	130,33
Organic N (ppm)	15,8	13,43	14,2	8,97
C:N ratio	11,1	13,35	12,3	14,67
Soil health calculation	10,8	15	15,5	13

Figure 6: Comparison of soil health scores in SKZN foe 2017/18 and 2018/19

From this figure it can be seen that the expected increase in organic C and N has indeed been achieved for Mr Xaba, indicating an incremental build-up of soil health for his CA implementation. The same is however not the case for Mr Mkhize from Ngongonini, where a definite decrease in organic C and N was noted. It is assumed that these differences are due to livestock grazing on residue; which is uncontrolled for Mr Mkhize, but is manged by Mr Xaba to ensure some residue cover remains post grazing.

Soil health scores for Matatiele

SH parameters for Matatiele were taken for 5 participants across four villages, all of whom have been involved in the CA experimentation process for a minimum of 3 years.



	Veld Bulelwa Dzingwa	M+B Bulelwa Dzingwa	M+B Mamolekeng Lebuoa	Veld Matshepo Fufu	M+B Matshepo Fufu	Cont M Matshepo Fufu	Veld Thapelo Ramanyali	M+B Thapelo Ramanyali	Cont M Thapelo Ramanyali	M+B Tsaloane Maphelee	Cont M Tsaloane Maphelee
% OM	5,1	3,4	3	2,9	2,7	2,4	2,7	2,3	2,2	0,8	0,7
CO2 - C, ppm C	34,4	34,3	39,3	61,2	43,4	34,5	60,5	37	37,7	16,9	14,4
Organic C ppm C	210	155	202	181	154	119	180	143	136	80	87
Organic N ppm N	14,4	10,5	11,8	11,5	12	10,1	12,7	12	11,6	6,1	8,4
C:N ratio	14,6	14,8	17,1	15,7	12,8	11,8	14,2	11,9	11,7	13,1	10,4
Soil health calculation (new)	9,1	7,6	9,2	10,9	8,6	6,9	10,9	7,8	7,7	3,9	4

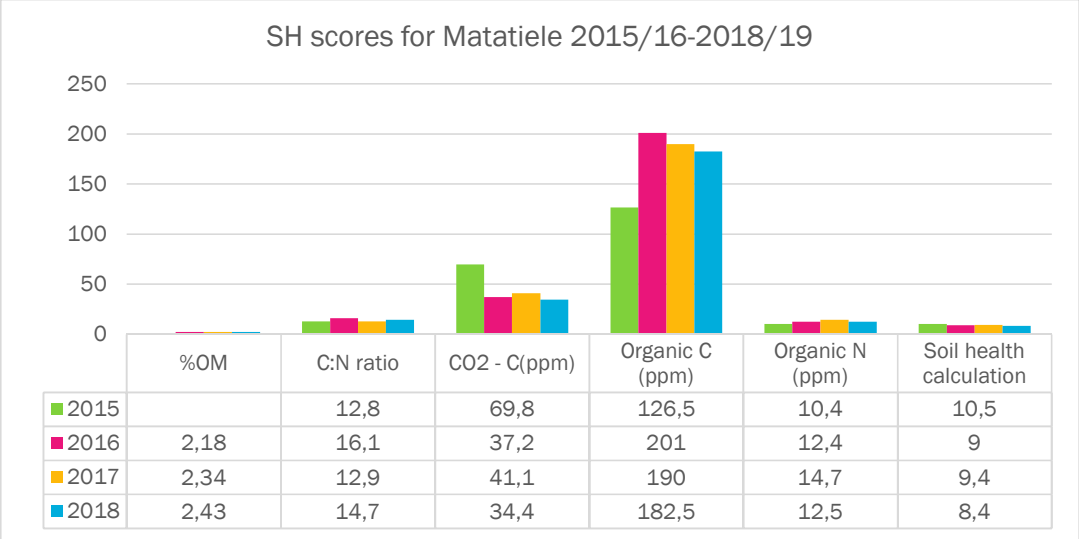
Figure 7: Soil health scores for Matatiele participants; 2018/19

For Matatiele the soil health scores are generally substantially lower than for SKZN, indicative of both the sandy infertile soils (low % OM, low microbial respiration) in the area and the high weather variability.

From the figure above, the following comments can be made:

- The soil health scores for the CA maize and bean (M+B) intercropped plots are higher than the conventionally cropped maize (Cont M), linked to higher microbial respiration (CO_2-C), organic C and organic N content. Despite a high level of variation between the sites, this trend is now clear throughout the sites where this process is being implemented (SKZN, Bergville and Midlands)

Comparison of SH scores across seasons for Matatiele is expected to reveal an incremental trend of increase of soil health scores, or at least a stabilisation of the scores. Soil health scores for 3 participants have been compared across four seasons.

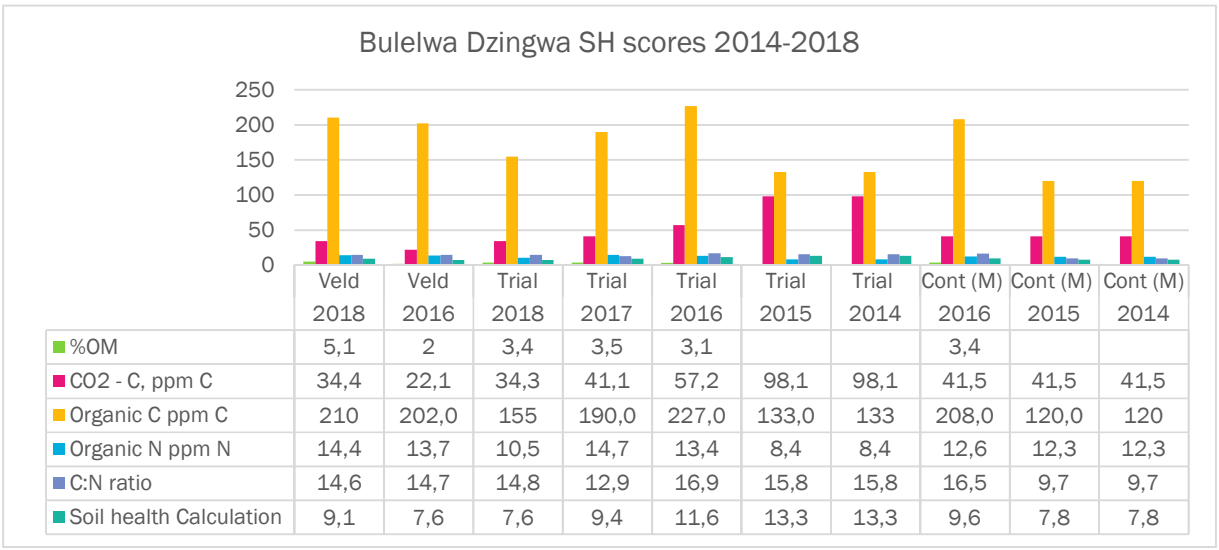


	%OM	C:N ratio	CO2 - C(ppm)	Organic C (ppm)	Organic N (ppm)	Soil health calculation
2015		12,8	69,8	126,5	10,4	10,5
2016	2,18	16,1	37,2	201	12,4	9
2017	2,34	12,9	41,1	190	14,7	9,4
2018	2,43	14,7	34,4	182,5	12,5	8,4

Figure 8: Soil health scores for Matatiele; 2015/16 to 2018/19

What can however be seen from this comparison is a slow decline in soil health scores over the 4 years of comparison. This does follow the trend that has become apparent in SKZN and Bergville- where microbial respiration is dependent on the weather and is reduced under hot, dry conditions. If, however one compares the values from 2015/16 to the latest values of 2018/19, it can be seen that the organic C and organic N have in fact increased somewhat over this period, but the microbial respiration (CO_2-C) has decreased, to a very low level, compared to the other sites. The % OM has increased incrementally over the three seasons where it was recorded.

If one now compares the SH scores for one of the 5 individuals, using Bulelwa Dzingwa as an example, the same trends can be seen



	Veld 2018	Veld 2016	Trial 2018	Trial 2017	Trial 2016	Trial 2015	Trial 2014	Cont (M) 2016	Cont (M) 2015	Cont (M) 2014
%OM	5,1	2	3,4	3,5	3,1			3,4		
CO2 - C, ppm C	34,4	22,1	34,3	41,1	57,2	98,1	98,1	41,5	41,5	41,5
Organic C ppm C	210	202,0	155	190,0	227,0	133,0	133	208,0	120,0	120
Organic N ppm N	14,4	13,7	10,5	14,7	13,4	8,4	8,4	12,6	12,3	12,3
C:N ratio	14,6	14,7	14,8	12,9	16,9	15,8	15,8	16,5	9,7	9,7
Soil health Calculation	9,1	7,6	7,6	9,4	11,6	13,3	13,3	9,6	7,8	7,8

Figure 9: Soil health scores for Bulelwa Dzingwa from Matatiele; 2014-2018

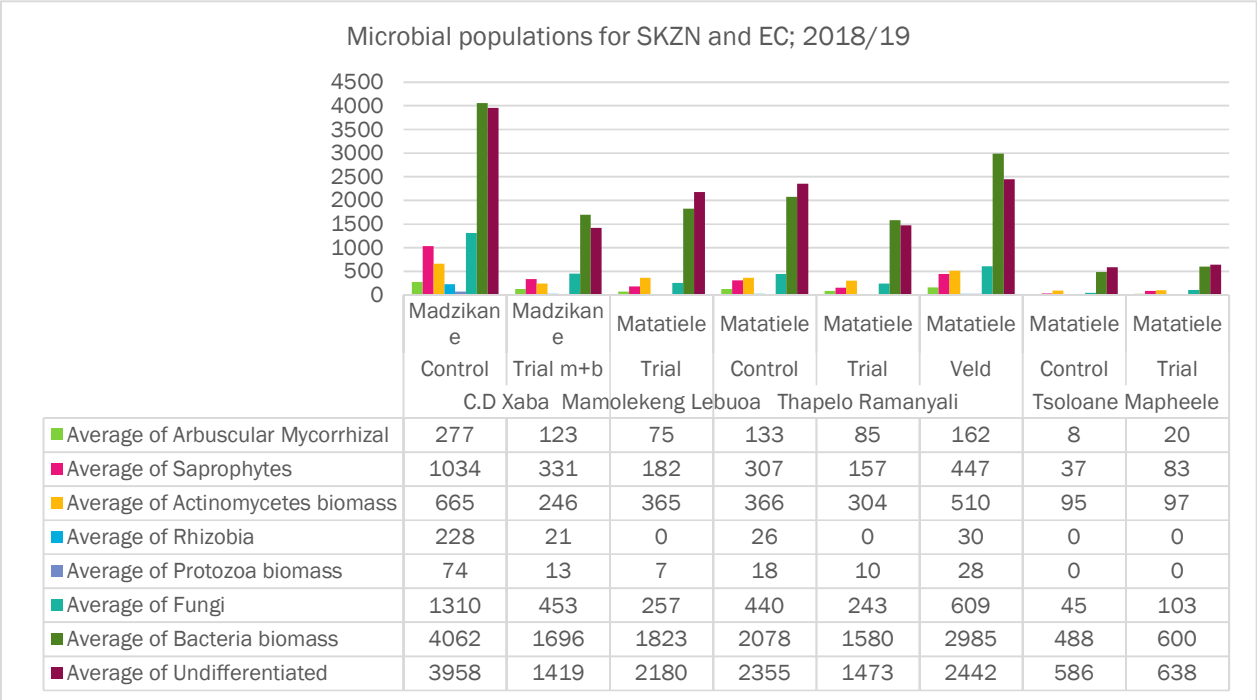
From this figure it can be seen that the soil health scores for Bulelwa's CA trail plots are higher than her controls, mostly due to higher Organic C values in the trial plots. The soil health scores do however decrease each season.

The CA process in Matatiele is succeeding in maintaining soil health and soil fertility at a reasonably stable, albeit low, value. It is not clear whether remedial strategies related to cropping options (diversification, rotation and intercropping) can effect a major change in the short and medium term in this site. It is suggested that an injection of large volumes of organic matter would in fact be the only way to effect a noticeable change in the short terms.

PLFA results for SZN and EC

The interplay between different types of microorganisms in the soil provide a further indication of soil health and can pinpoint issues.

PLFA (Phospholipid fatty acid) analysis of the microbial populations in the samples provides a breakdown of the type of organisms present; bacteria, fungi and protozoa, as well as their relative abundance. This is based on the different and distinguishable biochemical structures and processes for these organisms



	Madzikane Control C.D	Madzikane Trial m+b Xaba	Matatiele Trial Mamolekeng	Matatiele Control Lebuoa	Matatiele Trial Thapelo	Matatiele Veld Ramanyali	Matatiele Control Tsoloane	Matatiele Trial Mapheele
Average of Arbuscular Mycorrhizal	277	123	75	133	85	162	8	20
Average of Saprophytes	1034	331	182	307	157	447	37	83
Average of Actinomycetes biomass	665	246	365	366	304	510	95	97
Average of Rhizobia	228	21	0	26	0	30	0	0
Average of Protozoa biomass	74	13	7	18	10	28	0	0
Average of Fungi	1310	453	257	440	243	609	45	103
Average of Bacteria biomass	4062	1696	1823	2078	1580	2985	488	600
Average of Undifferentiated	3958	1419	2180	2355	1473	2442	586	638

Figure 10: Microbial populations from PLFA analysis for SKZN and EC; 2018-2019

	Soil Health Index SHI	CO2-C Respiration ppm over 24 hours	Water Extractable Organic Carbon (WEOC) ppm	Soil Organic Matter %	Total Microbial Biomass	Total Fungal Biomass	Microbial Active Carbon MAC %	Saprophytic Fungi Biomass	Mycorrhiza e (VAM) Biomass	Water Extractable Organic N WEON ppm	Protozoa Biomass	Rhizobia Biomass	Diversity Index
Survival mode	<4	<20	<80	<1	<1000	<50	<15	<50	<20	<8	<10	<20	<1
Progression mode	4 - 7	20 - 50	80 - 150	1 - 2	1000 - 2000	50 - 100	15 - 30	50 - 100	20 - 80	8 - 15	10 - 20	20 - 80	1 -1.2
Stable mode	7 - 10	50 - 100	150 - 280	2 - 5	2000 - 4000	100 - 300	30 - 70	100 - 300	80 - 150	15 - 20	20 - 50	80 - 120	1.2 - 1.6
Regenerative mode	>10	>100	>280	>5	>4000	>300	>70	>300	>150	>20	>50	>120	>1.6

Figure 11: reference table for values of microbial populations to determine an overall mode for the soils in question (pc soilhealthsolutions.com)

Looking at the figure above and the reference table of values the following can statements can be made:

- **Arbuscular Mycorrhiza:** These fungi live in a synergistic relationship with plant roots and are the main organisms facilitating the liquid carbon and nutrient flow between the soil and the plants.
    - ***Madzikane:*** The soils for Mr Xaba, fall within the stable to regenerative modes, which indicate good soil health. His control sample this year was taken from his homestead plot and as is generally the case soil health of plots closer to the homestead are considerably higher than for fields further away. His trial plot results (123ppm) are thus lower than his control results (277ppm).
    - ***Matatiele:*** CA trial plots for Mrs Lebueoa (75ppm) and Mr Ramanyali (85ppm) fall within the progression and stable modes of soil health respectively. Mrs Lebueoa's crop growth and yields have been substantially higher than Mr Rmanayali's , but her general soil health is lower. Mycorrhiza populations for her control plots (123ppm) are significantly higher than those for her trial plot. Mr zmapheele from Khutsong is farming on extremely infertile soils, as indicated by the generally low microbial values in his control plot and the very low presence of Mycorrhiza (8ppm). Here is CA trial plot shows a significant improvement (20ppm), although the value is still low and indicates a slow improvement in the quality of his soil through his persistent efforts over the last 5 years
- In general, the microbial populations are highest for Mx Xaba (Madzikane) and Mrs Lebueoa (Matatiele), also indicated through their higher yields and is a result of longer term good soil management practices, rather than an outcome of CA.
- Rhizobial and Actinomycete populations are low throughout the CA trial plots and the ratio of bacteria to fungi is high- indication that most of these soils fall in the progression mode and still lean towards a low microbial diversity and a system that promotes the growth of bacteria over fungi

This is discussed in a little more depth below.

In analysis of the microbial populations there is an expectation of increase in the fungal biomass when compared to bacteria, gram positive bacteria when compared to gram negative and predator species when compared to prey.

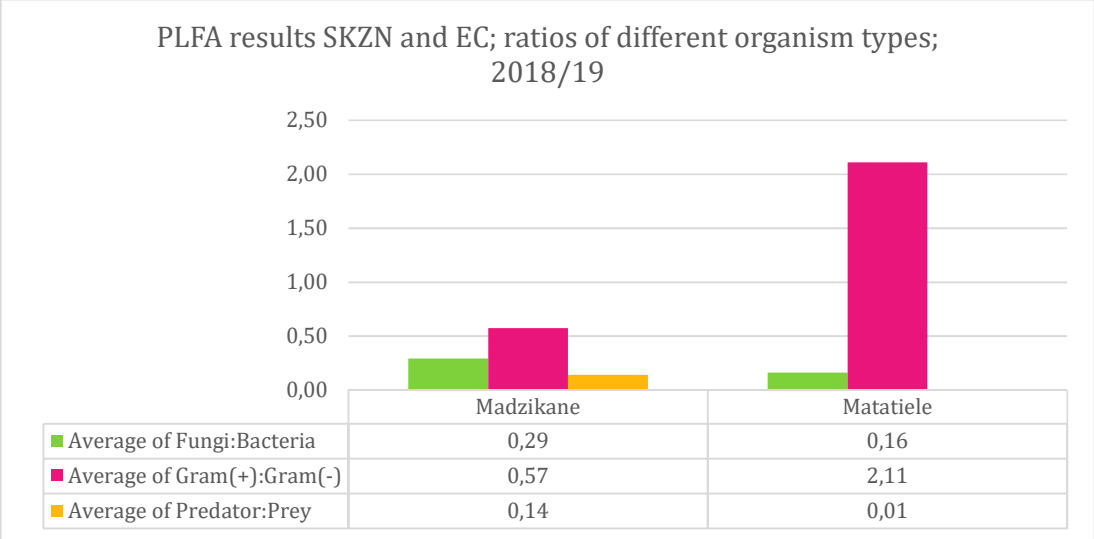


Figure 12: ratios of different organism types for SKZN and EC; 2018-2019

From the figure above it can be seen that the ratios of fungi to bacteria are generally quite low for both Madzikane (SKZN) and Matatiele (EC), but is very low for the latter. The only way to improve these conditions in the short term would be to substantially increase the amount of organic matter in the soil. Both areas will require an injection of either compost and or manure as the build up of organic matter and microbial populations through the cropping system and diversification of crops is a rather slow process. The very high ratio of gram +ve to gram -ve bacteria in Matatiele is a matter for concern as the gram-ve bacteria are more likely to be disease causing organisms and linked to the extremely low ratio of predators vs prey in these soils indicate a high load of disease causing organisms in these soils.

A remedial strategy using large quantities of composted chicken litter is being explored as an option

Progress per area of implementation

Introduction

Planting for the 2018/19 growing season commenced in the last week of November 2018 and inputs were delivered to the nine villages in Southern KZN; Nokweja, St Elios, eMazabekweni, Plainhill, Ngongonini, Spring Valley, Plaatistat, Ofafa and Madzikane as well as Matatiele (Nkau, Sehutlong, and Khutsong). Due to late rains and extreme heat, planting began very late this season – mid December-mid January. The Local Facilitators have played an important role in ensuring that participants were ready, with inputs provided and assisted in the spraying and layout of trials.

As planting was late, monitoring of crop growth was also delayed. Some monitoring, using the newly set up e-survey format (Pendragon) has been undertaken for a selection of participants and below some of the late season monitoring and yields are reported upon

SKZN and EC late season monitoring and yields.

The table below summarises the yields for the CA trial and control plots.

Table 5: SKZN yields for CA trial and control plots; 2018/19

Village, area	Maize Yield ave (t/ha)		Bean yield ave (t/ha)	Cowpea yield ave (t/ha)
	CA trial	**Control**	**CA trial**	**CA trial**
Madzikane	2,9	4,2	0,4	0,2
Plainhill	2,2	1,1	0,6	0,5
Ngongonini	2,9		0,8	0
St Elois	2,3		0,6	0
Emazabekweni	2,7	4,0	0,5	0
Springvalley	5,0	5,9	0,7	0,5
Ofafa	3,3	1,8	0,3	1,0
Matatiele	3,6		0	1,0
Average	**2,6**	**3,4**	**0,6**	**0,6**

This season yields have been quite low, with the CA trial plots offering lower yields than the conventional control plots for maize. Bean and cowpea yields were also quite low at around 0,6t/ha respectively.

Maize varieties planted include Sahara, PAN 53 and SC701. Bean and cowpea varieties were Gadra and mixed brown respectively.

Continuously changing weather patterns present bigger challenges each year. It's proving a more and more difficult task to pinpoint the exact planting date and farmers are opting to plant twice or more in a season to increase chances of yield. The late start of rains either saw poor germination and growth of crops and/or rot, mainly legumes intercropped with the maize. Maize is the most important crop in the areas we work with, it is an important staple that is used as a basis for almost all daily meals, drinks and brews. It also serves as livestock and chicken feed in the continuously degrading and limited grazing areas with poor to no animal control.

Below is a chart indicating the overall production of maize across the villages, for the 2017/18 and 2018/19 seasons. Madzikane and Painhill specifically, saw a drop in total production of around 50%, which has been attributed to lower rainfall in this area. For the villages situated around Highflats, closer to the coast an increase in overall production has been noted; namely St Elois, Ngongonini, Spring Valley and Ofafa

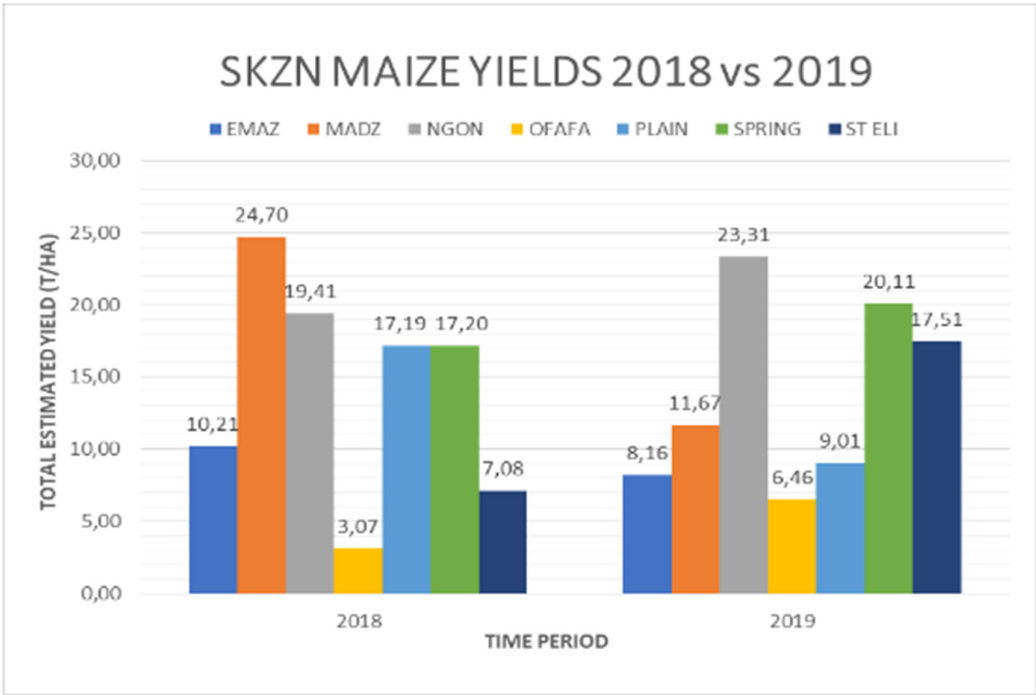


Figure 13: Maize yields in SKZN and EC for the 2017-2018 and 2018-2019 seasons.

In addition, yields in the villages are also highly variable, as depicted in the figure below for both seasons. For each season, there are those who obtain extremely low yields, or none at all and then some people in the same village who manage to obtain high yields (between 4-8t/ha). This has to do with the specific land use management and physical conditions for each farmer and will be discussed in a little more detail in the following sections.

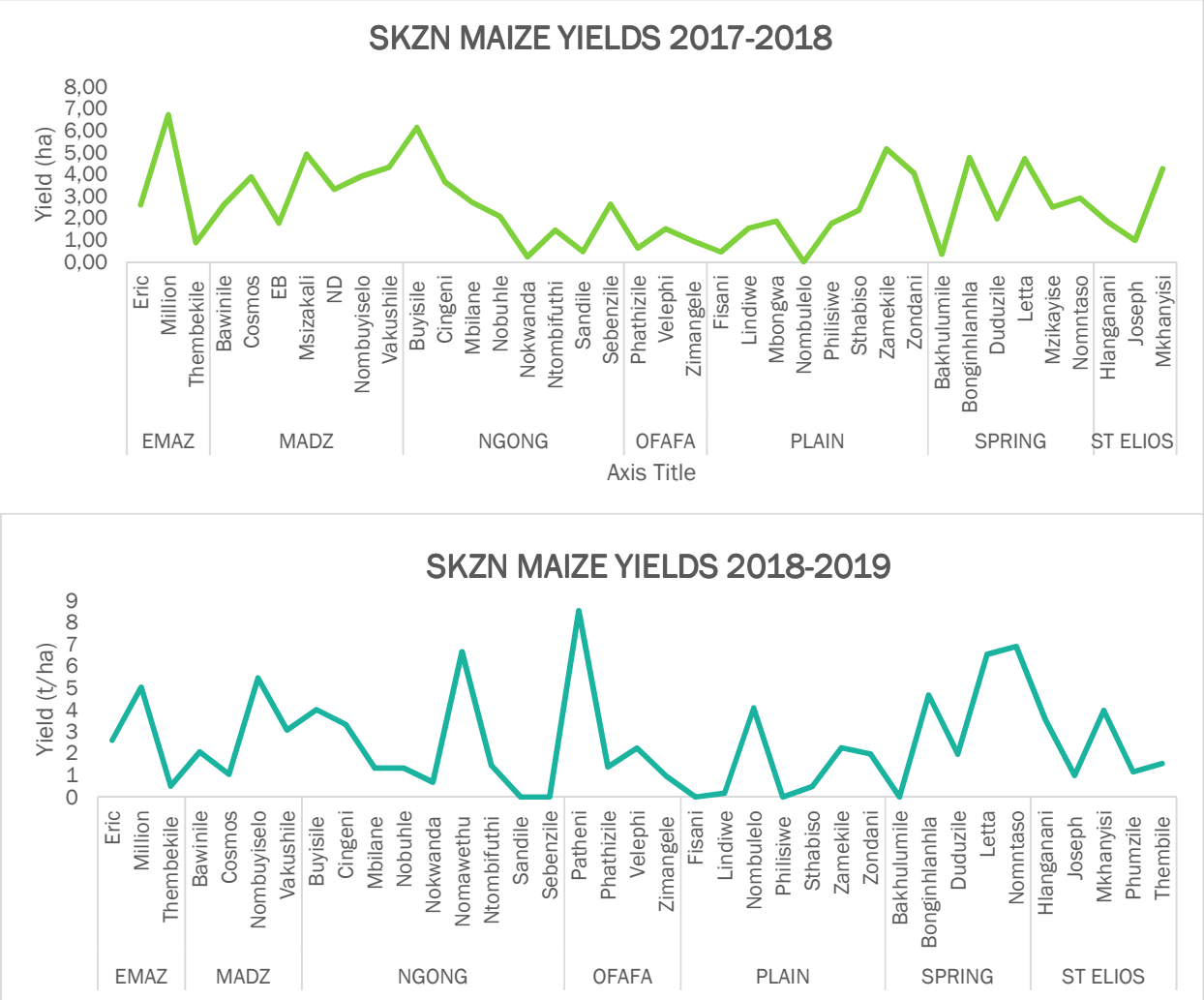


Figure 13: Individual participant yields in the SKZN villages for the 2018/18 and 2018/19 seasons.

Ofafa

This area has shallow and hard soils with signs of organic matter depletion in certain areas, given the hilly nature of the terrain and obvious signs of erosion on the slopes, making it hard for crops to grow well. For the past two years however, things seem to be changing for the

Figure14: Left, Phatheleni Ndlovu's tall maize and right, Velephi Hadebe's maize-cowpea intercrop plot

better with crops showing improved responses to the micro dosing of fertilizer and surface maintenance application of lime as well as the crop diversification, linked to CA. Specifically, Velephi Hadebe and Phathisile Ndlovu have their hopes renewed in the CA process as they saw taller maize with stronger roots with both legume yields in beans and cowpeas.

The CA process has now influenced their control plots which are now another version of CA and no longer the traditional version. When asked why this is, Phatheleni Nldovu responded “it’s been since childhood since I last saw maize this tall, neighbours couldn’t tell if I was home or not and I’d be in my maize plot.” She arguably is the participant with the greatest improvements, across the southern KZN region.

This positive response of soils to the CA process has sparked the interests of a youthful lady who represents her mother Zimangele Thusi. This young lady is unemployed with a young child to take care of as her mother is at work during the week. Her involvement is proving beneficial to the group as she keeps records for the group; planting dates, weather events and helps them separate yields. She is intending to be more involved in the process assuming the role of the local facilitator, taking over from Mandla Ndlovu who has since withdrawn. The pensioners have held on to the process and things seem to be lightening up and they think they can still produce maize despite the roller-coaster ride in weather patterns with temperature rises and shortened, intense rainy seasons.

Ofafa is mountainous with steep slopes, which can have devastating effects on the top soil (by erosion) and crop germination, and Phatheleni Ngcobo certainly experience this. Mrs Ngcobo is below the compacted communal access road, that sees water running straight into her fenced household creating small channels cutting down her field. This continues to be a problem every summer with flash foods and intense rains washing her seed, fertilizer and lime to the bottom of the field. This has led to very patchy germination of both maize and legumes and poor growth of whatever manages to survive. Her soils cannot hold any water as there is almost no residue cover, low organic matter and cover crops with poor performance.

Figure 15: Phathisile Ngcobo's steep slope field

Ofafa Annaul group review; 13 August 2019

Information for the section below comes from the discussion with the Ofafa participants and indicates their assessment of their farming conditions.

Introduction

The shallow soils of the area, characterized by fairly poor organic content in crop fields, have made it hard for crops to prosper. Experience has clearly indicated that ploughing further degrades soils as opposed to rebuilding it and this was evident in exceptionally poor germination and stunted growth. In their first year in the process, trials in Ofafa did not perform well at all but farmers were willing to give it another try as conventional tillage has left them with exceptionally poor to no yields at all. The second season was better than the first with crops showing responses to fertility and acidity amendments. Their crops grew taller, healthier and stronger and participants had much improved yields. The 2018/2019 season was even better with Phatheleni Ndlovu exceeding her expectations at 8,5t/ha of maize. Generally, the area did very well this year, doubling maize yields from 3,07 in 2017/2018 to 6,46 in the 2018/2019 season.

2018/19 Season

Feedback from the farmers revealed that crops did well with maize and cowpeas having good yields. The exception was with beans mainly due to unfavourable weather conditions, beans had good initial growth and experienced too much rains later in the season which led to a lot of rot. Farmers are concerned with the poor performance of beans, especially as a protein source that is rather expensive at the shops.

Cover crops

The cover crops were planted very late in Ofafa and farmers associate the poor seasonal performance of cover crops to lack or rains after planting. Participants were supplied with a winter master mix for relay planting in their maize plots. The cover crops did not thrive, but some growth of the fodder radish was achieved. Zimangele Thusi and Phatheleni Ndlovu cooked and ate the green broadleaves of the raddish and fed watery tubers to their goats and cattle. The rest of the group is aware of the role these crops can play in their soils; replenishing fertility reducing erosion.

Storage

Participants are in desperate need of storage drums to keep their yields away from rats eating their stored maize.

Labour

Planting is manageable; participant's plant individually and feel that group planting causes conflict and problems. A number of youth are interested in joining the process. Most of them are unemployed with a lot of time on their hands and interests in taking up agricultural related work as both means to an end and career. The inclusion of young people has potential for establishing a local farmer centre which was explained to the group sparking interest. This centre however, will be linked to one of the existing learning group members as this serves to provide knowledge and experience as well as affordable inputs. Currently there is no access to

inputs other than the nearest town, Ixopo. Locally seed is sold between farmers at R30 and R20 for two mugs of beans and maize seed respectively. Farmers in general do not buy any fertilizer and use kraal manure from their kraals and from neighbours, for those who do have livestock.

Savings
Farmers do not save for farming; they only struggle for cash when the time for planting comes. Again, the growth of the learning group may well echo the need for collective saving and buying of inputs. Savings groups could do a lot for agriculture in the area as well as general household needs. The idea of stokvels is not foreign in the area and the culture of saving and collective efforts could be resuscitated for the benefit of both the old and young.

Discussion on fertilizer use, cover crops and general observations.

The farmers have observed major differences since they started farming with CA. They recall that in their first year they had very poor yields and the yields have been improving year after a year. They observed that the use of fertilizer as well as LAN has led to the provision of essential nutrients available to the crops hence the increasing yields they are having. They also observed faster growth in maize in the past season. Farmers are aware that there are different types of fertilizer and appreciate the importance of having soils tested. They are however of the view that Gramoxone promotes growth of weeds that compete with their food crops. It is rather a case of using this herbicide so as to plant as soon as possible; after rains weeds grow fast and then Gramoxone is applied as a contact herbicide, immediately before planting. With Roundup there is a waiting period. Some participating farmers saved cover crop seed and will be replanting them. Stray livestock however continues to be a threat as they invade fields with cover crops still growing.

Table 6. Comparison between the control and experiment fields

Controls	Trials
Drier soils	Moist soils
Light reddish soils	Darker soils
Pale stalk and leaves	Dark green stalk and leaves
Poor yields	Better yields
Less residue	More residue

Thandiwe Hadebe, who uses kraal manure on her control plot, reckons that her yields are almost the same between her trial and control due to the consistent organic matter with nutrients that she pumps into her soils. Here she was attesting to the crucial role manure plays in soil fertility enhancement. In the meeting we had a new participant who will be planting this coming season. Sayinile Nsindane also grows maize for her households and keeps pigs that she feeds maize that she mills at the Amble Inn Hotel in Ixopo, costing her R20 per 20L. She is hoping the CA process will improve her yields and will help her sustain and grow her piggery.

Madzikane

Madzikane is one of the few areas with organized farmers. This year however, saw a significant decrease in yields of both the maize and legume crops. Mrs Vakashile Gambu and Cosmas Xaba managed good looking maize for both their trial and control plots and are selling their maize to local community members. To date Mr Xaba has sold over 40 bags (50kg) of maize from his

harvest. He is selling his bags at R140 each, meaning thus far he has made about R6000 already. He adds an additional R10 to deliver bags to his customers and issues discounts with big orders. He still has quite a lot of maize left to thresh on his recently purchased thresher; he reckons he can still sell close to 50 bags of maize. But for the season, he only managed just over 1t/ha, which was one of the lowest yileds for the area, with Mrs Shozi getting the highest yield at close to 6t/ha.

Figure 16: CD Xaba's maize in traditional storage

The Madzikane Farmers Association members all sell their maize locally and at the same price as Mr Xaba. The prices they sell at are agreed upon in their famer's association after having researched local maize and tonnage prices. They also keep some of their harvest for their sheep, cattle and traditional chickens. As part of the diversification of his livelihood, Xaba is now looking to buy a mill to process maize into maize meal. The idea here is that people will bring their own maize for milling at a fee as well as milling his own maize and selling it off as maize meal. They are very much confident in the quality of their maize and do not doubt that it will fly off the shelves as maize is an important part of people's daily lives; food, feed, making amagewu, traditional beer and so on.

Alongside is a chart showing maize yields for the association members.

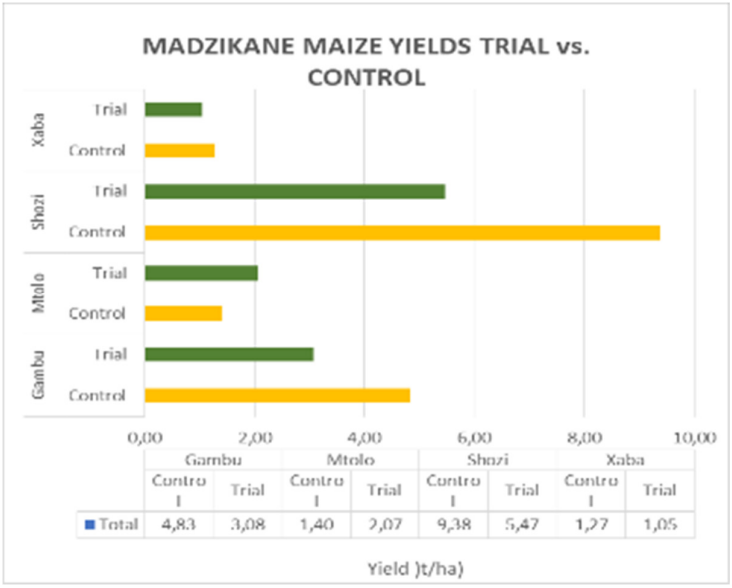


Figure 17: Madzikane Farmers Association maize yield distribution 2018/2019 season

The high yileds for the control plots for Mrs gambu and Mr Xaba this season, will need to be discounted, as they are not a direct comparison. As mentioned, it has been difficult to find appropriate control plots for farmers, as they do not practices conventional tillage in their fields alongside the CA, having chosen to use CA throughout. The control plots this season were homestead plots, a distance away from the fields that were ploughed, but in hind sight this option does not work well either – as the fertility management in the homestead plots appears to be obviously better than that in the fields and can not be directly compared.

Ngongonini

Ngongonini was no exception to the dry start and heavy rains towards the end of the season. This saw poor germination of crops with beans and cowpea suffering the most. Despite an unfavourable start to the season the Ngongonini area still managed to increase yields to just short of 4 t/ha (3,9ha) from 2018 to the 2019 season.

Generally beans grew well initially, but then either did not pod, or rotted on the vines towards the end of the season. A number of participants including Sebenzile Mthethwa, Cingeni Kheswa and Velani Mthethwa, did not see any legume harvests this year and very poor maize harvests...

Nokwanda Mthethwa didn't get a good yield this year with most of her maize in very small cobs which she was forced to harvest before drying out due to livestock set free to roam fields for stover. These rotted and germinated in the bags they were stored in.

Figure 18: Mrs Sebenzile Mthethwa's maize, mostly rotten

Table 7: Yields for individual Ngongonini participants 2018-2019

NGONGONINI BEANS AND COWPEA YIELDS 2018-2019										
			Trial Bean Yield				**Cowpeas**			
	Name	**Surname**	**Area (m2)**	**weight (kg)**	**t**	**t/ha**	**Area**	**weight (kg)**	**t**	**t/ha**
1	Nokwanda	Mthethwa	100	0	0,000	0,000	100	0	0	0
2	Sebenzile	Mthethwa	100	0	0,000	0,000	100	0	0	0
3	Eunice	Nkabini	100	4,5	0,005	0,450	100	0	00	0
4	Ntombifuthi	Phungula	100	0	0,000	0,000	100	0	0	0
5	Buyisile	Kheswa	100	0	0,000	0,000	100	0	0	0
6	Sandile	Mncwabe	100	0	0,000	0,000	100	0	0	0
7	Cingeni	Kheswa	100	0	0,000	0,000	100	0	0	0
8	Thokozani	Kheswa	100	0	0,000	0,000	100	0	0	0
9	Learnard	Gamede	100	10,4561	0,010	1,046	100	0	0	0
10	Letheni	Mkhize	100	4,568	0,005	0,457	100	0	0	0
11	Mandla	Mkhize	300	49,402	0,049	1,647	100	0	0	0
12	Mambili	Kheswa	100	3	0,003	0,300	100	0	0	0
13	Mbilane	Mthethwa	100	0	0,000	0,000	100	0	0	0
14	Noma	Shezi	100	10	0,010	1,000				
	Total					**4,899**				**0,00**

	NGONGONINI MAIZE YIELDS 2018-2019							
No	**Name**	**Surname**	**Experiment**	**Number of bags**	**Grain weight (kg)**	**area (m2)**	**Weight (t)**	**weight (t/ha)**
1	Nokwanda	Mthethwa	Trial	1	20,480	300	0,020	0,683
2	Nobuhle	Nkabane	Trial (decobbed)	1	40,000	300	0,040	1,333
3	Ntombifuthi	Phungula	Trial (decobbed)	1	43,664	300	0,044	1,455
4	Sebenzile	Mthethwa	Trial (decobbed)	0	0,000	200	0,000	0,000
5	Mbilane	Mthethwa	Trial (decobbed)	1	40,000	300	0,040	1,333
6	Cingeni	Kheswa	Trial (decobbed)	2	100,000	300	0,100	3,333
7	Sandile	Mncwabe	Trial (decobbed)	0	0,000	300	0,000	0,000
8	Buyisile	Kheswa	Trial (decobbed)	3	120,299	300	0,120	4,010
9	Nomawethu	Shezi	Trial (decobbed)	1	200,000	300	0,200	6,667
10			Control decobbed	1	100,000	300	0,100	3,333
11	Mandla	Mkhize	Trial	5	134,720	300	0,135	4,491
Average Yield								**2,913**

Figure 159: Mandla Mkhize's maize and bean yields. The maize was mouldy and continued to rot in storage

Emazabekweni

Emazabekweni is one area where MDF has had a bit of a challenge gaining traction for a number of reasons. Firstly, some participants dropped out of the programme after being told that MDF does not plough or plant for them but they would have to do the work. Secondly, some people did not have fencing and feared livestock would damage their crops, hence they withdrew. Thirdly, involvement in agriculture has seen a gradual decline over time. This season has been quite a challenging one for the community, with the unpredictable weather patterns making it tricky deciding on the planting time, which many conceding that deciding on when to plant is becoming more of a gamble. Nonetheless, out of eight participants, five received inputs and four people planted.

Million Ngubane is a very hard working farmer who has definitely seen things change for the better. Mr Ngubane is retired and now lives with his wife and children. He decided to go into farming full time after he stopped working and has not looked back since. When harvesting, he counted 28x 20 litre buckets of maize cobs which consisted of 40 cobs each. The average

weight/bucket was 12.350 kg for his trial. For the control (PAN 6479 seed saved from last season), Mr Ngubane said he got 35 x 20 litre buckets with an average weight of 11 kg. For beans he obtained a yield of 22 kg, which was very impressive considering the fact it was a hot season and the rains came later than usual.

Table 8: Emazabekweni individual participants yields; 2018-2019

EMAZABEKWENI YIELDS 2018-2019								
Name	**Surname**	**Plot**	**Maize yields (t/ha)**					**Bean yields (t/ha)**
			No of bags	**Grain weight (kg)**	**area (m2)**	**Weight (t)**	**weight (t/ha)**	
Million	Ngubane	Trial	30	252,413	500	0,252	5,048	0,631
Million	Ngubane	Control	40	322,011	800	0,322	4,025	
Qiniso	Mchunu	Trial	1	10,008	200	0,010	0,500	0,426
Eric	Latha	Trial	0	52,197	200	0,052	2,610	0,518
Average Yield Trial							**2,720**	**0,525**

Figure 20: Mr Million Ngubane from Emazabekweni

Plainhill

Plainhill is one of the four new groups established in 2017. The group started with nine members but now has twelve as three new participants have joined. The group's response to experimenting with CA has been positive with all members having planted in 2017/18 as well as in the current growing season. There is an improvement in the appearance of both maize and legumes this season and the farmers believe this is due to the application of dolomitic lime.

PLAINHILL YIELDS 2018-2019								
			Maize yields (t/ah)					Bean yields (t/ha)
Name	**Surname**	**Experiment**	**Number of bags**	**Grain weight (kg)**	**area (m2)**	**Weight (t)**	**weight (t/ha)**	
Philisiwe	Sosibo	Trial	0	0,000	300	0,000	0,000	0,54
Sthabiso	Dlamini	Trial	1	14,420	300	0,014	0,481	0
Zamekile	Dalmini	Trial	6	67,925	300	0,068	2,264	0,75
Nombulelo	Ndlovu	Trial	8	122,858	300	0,123	4,095	1,5
Zondani	Chonco	Trial	0	59,612	300	0,060	1,987	0,41
		Control	0	62,391	400	0,062	2,080	
Lindiwe	Chonco	Trial (decobbed)	0	0,000	300	0,000	0,000	0,92
			1	5,452	300	0,005	0,182	
Fisani	Ndlovu	Trial (decobbed)		0,000	300	0,000	0,000	
Average Yield control						**1,131**		
Average Yield trial						**2,207**		**0,58**

Figure 21:Fisani Ndlovu, oOndani Chonco and Khonzeni Chonco with their bean and cowpea harvests

Matatiele

Sekhutlong

This season was once again a difficult one for Matatiele. This has had a negative impact on the growth and expansion of CA in the area as we haven't managed to get that 'wow' effect for people to be drawn into the process. The late start of rains saw very poor germination of crops which resulted in very poor yields with Matsepo Futhu in Sekhutlong getting absolutely no yield whatsoever. On the contrary, her neighbour Mamolelekeng Lebeuoa saw good growth of crops and a very promising yield for the season despite her maize suffering a bacterial infection. Mamolelekeng's field has been suffering from cob or tassel smut, that is both soil and wind borne.

Figure 22: Mamolelekeng's CA maize plot with cob smut in evidence.

This disease spreads rapidly in the area once spotted and can compromise the entire crop. Crops such as cover crops and beans can break the cycle of this disease. We are in the process of sourcing chicken manure which has been suggested as another option to look at.

Malerato Lebueoa is directly opposite to Mamolelekeng and is very much concerned that her crops may well get this disease potentially compromising her maize production livelihood and income generation. Malerato grows maize for both eating and selling to those who do not have maize, she also uses her yellow maize to make traditional brews that she sells at her house among other cold beverages. These are the only three remaining participants in Sekhutlong villages as others eventually gave up the process due to extremely poor results.

Malerato has been doing well for the past two seasons but she has also seen a decline in her maize this year and foresees a lower yield. Malerato hired out labour to cut and pile her maize and consequently her trial and control maize was mixed together. making it difficult to work out yields for the season.

Figure 23: Malerato standing next to her pile of maize

Khutsong

Simon Tsoloane Mapheele is the one long standing participant still hoping that the CA process will eventually see improvement in his soils and crops. He has tried different planters, different planting times, rotations and intercrops but he is yet to see good yields.

Figure 24: Clockwise from top left; stand and growth of maize was patchy and disappointing. The cover crop mixes grew better and provided some cover

The 'beach-sand' for soil that he plants on needs a lot more time and consistent effort to pump in organic matter and foster some life into the soils. This year, unfortunately, he did not see any yields of both maize and beans. His cover crops only made it through his irrigation efforts. He is however still able to generate some income from milling local maize that people bring in bags.

Matatiele review session, 8th August 2019

The meeting was held at Nompumelelo Mbhobo's home. She is a 1st year participant who spontaneously adopted CA asking for leftover seed from the facilitator Bulelwa Dzingwa.

Highlights

Generally, the season was not good, on the basis of late onset of rains, resulting in poor germination. Crops that germinated had very little rains and thus growth was not the best either. Noluthando Pili definitely feels that lack of rains were responsible for the bad performance of the trials this season. Upon receiving rain, legumes quickly grew big and bushy with cowpeas growing very well but never forming pods while beans rotted. Noluthando only managed a 5kg bean yield from her 100m^2 plot.

Participants have tried both yellow and white maize varieties in the past and have observed that yellow maize does not grow as well as white maize and is more susceptible to rot. Some participants however still would prefer to plant yellow maize as there is a better local market in the area.

Participants have found using Gramoxone as a herbicide prior to planting to be much less effective than the Round-up/ Dual gold mix used in the first few seasons. On average,

participants weeded two and a half times this season. Blackjack dominates the field making it a very hard task to harvest even. The weeds were strongly rooted and competed heavily with crops. Generally, control plots did not have as much of a weed problem as trials and here participants think that the application of fertilizer and intercropping increases fertility and weed growth. They have now recognised that waiting until the weeds seed prior to weeding has increased weed problems in their fields.

Participants present, all belong to Village Savings and Loan Association (VSLAs), but only one member occasionally takes out loans to purchase seed and pay labour to clear weeds, sow seed or harvest. The maize she harvests in her plots is milled in town costing R90 per 80kg bag. This lasts the family for at least a month, as they send some for herders in the mountains.

Changes in weather conditions

The harsh weather conditions have had a negative impact on the availability of food. Increased variability of rains has seen poor germination and crop growth coupled with washing away of seed in some instances. As a result of this, they would like to try planting beans two to three times in a season i.e. late September, early in November and also late in January, to spread the risk. Planting of the maize-bean, maize-cowpea intercrops will commence on November 15th, ending on the last day of the month of November. Farmer participants also want to try out hybrids as they say that hybrids are the way to go and have proven to be able to withstand high temperatures, stalk borer and diseases.

A cropping calendar was designed with participants to explore different planting times and crops depending on the weather conditions. It was a little difficult to do, as participants do not keep records and already some have stopped growing a range of crops due to dry conditions.

Table 9:Crop calendar for wet, dry and normal seasons as understood by the Matatiele participants

Month	Wet season	Dry season	Normal season
January	Cabbage, spinach, mustard	Beans, Cabbage, spinach, mustard, rappa	Cabbage, spinach, mustard
February	Cabbage, spinach, mustard	Cabbage, spinach, mustard	Cabbage, spinach, mustard
March	Cabbage, spinach, mustard		Cabbage, spinach, mustard
April	Cabbage, spinach, mustard		Cabbage, spinach, mustard
May	Cabbage, spinach, mustard		Peas
June	Peas		Peas
July	Peas		Peas
August	Peas, potatoes, sweet potatoes		Peas, green beans, potatoes, sweet potatoes
September	Potatoes	Potatoes	Potatoes, green beans
October	Maize, beans	Potatoes	Potatoes, rappa, tomatoes, brinjals, green pepper, green beans

November	Maize, beans	Maize, beans	Maize, beans, rappa, butternuts
December	Maize, beans	Maize, beans Cabbage, spinach, mustard	Maize, beans, butternuts

Farmer centre

Sourcing of inputs is a yearly struggle where farmers travel to town buying seed and fertilizer on the streets. Although the participants recognise the value of having a local farmer centre, not just for access to inputs, but also as a place where newcomers could be provided with advice and mentoring, they do not feel motivated to start one themselves. They fear that they will become a target for theft.

Conclusion

The small group of women are still keen on trying ways to stand up against changing weather conditions as their families depend on farming for food, feed and income generation. They still are not prepared to plant bigger fields due to the high risks of crop failure, but want to try any means necessary to maintain this livelihood; trying new varieties and different planting times and designs.

Cover crops

Cover crops were distributed to most participants, in the form of sunflower for summer over crops and the winter cover crops mix, for both SKZN and Matatiele. Only a small proportion of the participants actually planted the cover crops, given the adverse weather conditions and even fewer harvested seed from these crops. Below are a few examples where the cover crops did well.

Nompumelelo Mbhobho (Matatiele)

*Figure25: **Mrs Mbhobho with her 25kg sunflower harvest and Bulelwa Dzingwa the local facilitator***

Mrs Mbhobho is a 53 year old unemployed woman who attended the open day held in Moqhobi last year. She then started her CA experimentation process this season. Early on in December, Mrs Mbhobho planted a five plot trial (5m x 5m); sunflower sole plot, maize-sunflower, two maize-cowpea plots and a maize only plot.

Her maize germinated and grew well, but she received no harvests form beans or cowpeas. Mrs Mbhobho has harvested a 25kg bag of sunflowers from her sunflower and maize-sunflower plots. She plans to mix this with yellow maize and sell it locally to those who keep traditional chickens.

Figure26: Nompumelelo's plots

She also planted a control alongside the trial where she has 30m x fourteen lines of traditional maize with 20m of maize-cowpea making her total control size 50m x 10m (500m^2). From this plot she harvested 7,45kg of cowpea that she plans to keep for the family seeing they did not get any beans. This plot was planted beginning of November with horse manure worked into the soil before planting.

Ocean Khokhotho

This gentleman is the only one who managed to plant in Mqhobi (Matatiele) this season. His trial didn't germinate well, but grew well thereafter with nice strong tall maize. Sunflowers did not do well and Mr Khokhotho doesn't have any yields for beans and cowpea for the season. On a small plot by the fence, his black oats and radishes grew very well. He will be cutting this and carrying to where he keeps his sheep.

Figure 27: Left and centre, cover crops struggling with weeds and right, cover crop by the fence doing very well

Simon Tsolaone Mapheelle's never ending efforts

Mr Tsoloane has been with the program since its very first year of introduction in 2013 in the north eastern part of Eastern Cape, Matatiele. When he returned from work in the mines, agriculture presented a good opportunity to be self-employed. Maize production would see him generate an income from selling the staple maize in his local area of Khauoe. However, sandy

soils with little to no organic matter coupled with erratic rains and high temperatures proved to be a big problem. CA has not had the expected effect for this gentleman but promises enough future in farming for him to continuously look at different options within his farming system. Mr Tsoloane has tried both minimum tillage and conventional tillage alongside each other to see what promises a better future for him and he has opted for CA going into the future.

In recent years he has been using the animal drawn minimum tillage planter allowing him to do bigger plots a lot faster than before. The issue of residue retention and or cover is still a big issue, as there is just never close to enough. After two years of doing this and with his maize not showing much improvement, he began doubting the planter, voicing concerns of fertilizer and seed depths and whether the planter was really planting.

2018/2019 season

On the 28th of December 2018, Mr Tsoloane decided to go back to basics using hoes to open up basins, adding lime and micro-dosing with fertilizer. He hired local labour in two young men that were helping him work his plot.

*Figure 28: **Tsoloane's plot marked with lime where basins were dug***

His plot was visited on the 4th of March 2019, about three months after planting; showing poor germination and growth for most of the plot. The section on the side of his field, next to the peach trees has always performed a lot better. This is due to a different management strategy for this plot historically, as it as used for vegetable production and received much higher levels of manure and organic matter.

Tsoloane then decided to put in beans where there were spaces in an attempt to provide cover but his beans didn't do any better.

Figure 28: Tsoloane maize germination and growth; showing good growth next to the fence and bad germination and growth for the rest of his plot.

When beans failed to cover the bare soils, he then sowed in winter cover crops as a relay. His cover crops germinated and grew well and help provide cover for the soil. Tsoloane frequently waters his cover crops through a pipe diverted from the municipal water mainline. Watering his plot has proved very beneficial for his cover crops

Figure 29: Tsoloane's winter cover crops

Tsoloane has been also experimenting with Teff in a plot adjacent to the CA trial plot and this plot also sees some watering from time to time. This plot has been planted in an attempt to regenerate his soils and also provide more nutritious feed for his cattle. Tsoloane has cut about nine bags of Teff and this will be fed to cattle and calves.

Figure 30: Teff cut and bagged

Conclusion

CA, as a farming system has opened up more livelihood opportunities for Tsoloane; he is now able to grow and harvest a range of fodder for his livestock. He also now plans to meticulously harvest manure; specifically urine, from his livestock for increasing organic matter and nutrient content in his soils. In combination, increased levels of manure application and cover crops, have the potential to regenerate his soils, that will help to establish cash crops more successfully.

VSLAs (Village Savings and Loan Associations)

The new VSLA in Ngongonini did their first yearly share out session towards the end of January 2019, and the Madzikane group, also in their 2nd year did their share out towards the end of March 2019. The new group in Mazikane also conducted their first share out (Senzokuhle)

The section below outlines their savings, the share-out process and also the operation and intentions of the group.

Introduction

This group was formed back in the year 2017 with the aim of saving for inputs and implements. The group was already working together prior Mahlathini Development Foundation's introduction. This collection of farmers jumped at the opportunity to meet monthly and save what they can afford so when the time comes for the growing season, they are ready. For this thirteen member group, crop production is for earning income once the immediate needs of the family are met. They grow a range of crops with maize being a staple; beans, potatoes, cabbages, carrots and other vegetables. These monies saved also allow them to purchase vaccines for their cattle, sheep and chickens which are seldom sold. Typical of rural areas, livestock are a local bank, so to speak; when a sudden need arises; are converted to cash.

Second share out and growing strong

The 13th of March 2019 was the group's end of the cycle and second share out. Some members celebrate increased livelihood opportunities realized through the savings group where the savings and small loans help to purchase implements and inputs. These are used to generate income that farmers invest back into the savings group.

Now, bulk buying and farmer organization has never been easier, especially with their share out well before the growing season. Farmers are able to put in their seed and fertilizer orders well before planting, getting cheaper transport and planting on time.

Furthermore, these individuals are more like family now as they plant, work and save together. The group has now decided that they wish to include funeral insurance as part of the group's constitution; where they will be able to assist each other in difficult times. This a good sign in growing collective action among individuals of different backgrounds caring about each other through the "institution".

The share out

There were, however, members with outstanding loans on the day of the share out, totalling R34 100 between the six members and these were settled before the share out. Upon settling all outstanding loans, money in the box is than packed into one thousand Rand piles across the table for all to see, depicted in the picture below. The total sum is worked out, counting each thousand rand after the other.

The total number of shares for the thirteen member group for the year was 547 with a value of R109 400.

Together with loans repaid with interest, the money counted on the day was R142 493.50, meaning the group made R33 093.50 interest, divided by the number of share (547) giving

R60.50/ share. This than means the newly calculated share value with interest is now R260.50 as captured in the picture below. Each member's shares for the year are than multiplied by the new share value and members receive their savings inclusive of interest accumulated.

Figure 31: Calculation of outstanding loans and then laying out of share out monies.

Conclusion

The group is still keen to carry on having seen the important role savings play in their livelihoods. This group of farmers has their own "bank" where they source money for investing in enterprises with great potential to yield profits in acceptable turnaround time. The also saved on the day of the share out as well, this is their third cycle now.

Senzokuhle share out meeting (Madzikane); 20 June 2019

Introduction

Senzokuhle Savings Group was the last of the new groups to share out for their first cycle of savings. The group worked quite well considering the challenges they faced, with some members skipping meetings or leaving the group all together. The reason for this was that the group members who started the group did not know each other previously and lived far apart hence it was not easy for them to build trust in the beginning. Nonetheless, the members that remained showed unwavering dedication and persevered until the end as they were curious to see whether there is really anything to savings.

Figure 32: The Senzokuhle group share out

Distribution of Funds

The meeting went very well except some members were concerned that the people who received the most money, did not take out any loans but benefited the most. The team then explained that the group should always keep in mind that savings is not necessarily a money

making scheme ,but a vehicle to promote financial planning and more responsible spending towards constructive things such as farming inputs.

Table 10: Share out summary for the Senzokuhle VSLA, June 2019

No	Surname	Name	Total Shares	New Share Value	Total Income received
1	Shozi	Mrs	58	R121	R7,018.00
2	Mncwane	Mrs	4	R121	R484.00
3	Gazu	CA	4	R121	R484.00
4	Mbwanja	NA	25	R121	R3,025.00
5	Mbanjwa	S	27	R121	R3,267.00
6	Xaba	Sbu	17	R121	R2,057.00
7	Zulu	NA	26	R121	R3,146.00
8	Mtolo	Mrs	24	R121	R2,904.00
9	Maduna	NA	24	R121	R2,904.00
10	Sosibo	BA	36	R121	R4,356.00
TOTAL					**R29,645.00**

Stakeholder interaction- Innovation platforms

Given the difficulties of the season, late planting and disruption of the timing in terms of harvesting, open days were not held in this area, during this 6 month period. Some attention was given to interactions with Government based stakeholders and the following meetings were attended:

- Harry Gwala District Extension forum (DARD) – 6 June 2019
- Ubuhlebezwe LED forum meeting (24 June 2019), as well as an Agricultural forum w/s (25 July 2019).

In addition, meetings have been held with the Umngeni Resilience Programme (UKZN and Umngungundlovu DM) to explore collaborative options. This resulted in a presentation by MDF at the Ukulinga Howard Davis Memorial Symposium 19 August 2019, hosted by UKZN entitled "A smallholder level decision support system improves resilience to climate change", where some of our work in CA was presented.

A relationship has been set up with the Umvoti LM in Greytown. It is expected that we may assist with the introduction of CA to more maize growing communities in the region.

Funding has been obtained from Nedbank to assist all MDF staff, interns and lead farmers to attend the No-Till Club's annual conference at Drakensville (3-5 September 2019) entitled" *Getting conservation agriculture working for your farm"*.

Work has commenced, assisted by Mr Nqe Dlamini from StratAct, to initiate three agricultural cooperatives for the programme (Madzikane, Swayimane and Bergville).

A CA introductory meeting was held for a new interest group in Spring Valley (202 July 2019).

In addition, three research partnerships have been put in place for the coming season:

- ARC Potchefstroom; Dr Belinda Janse van Rensburg – *"The impact of conservation agriculture on maize ear rots and resultant mycotoxin production in commercial and smallholder farming systems"* and
- Cedara, Agricultural crop Research Services; Dr Alan Manson – *"Strip cropping options for introduction of fodder crops into CA farming systems for smallholders"* and
- AGT Foods; Mr Simon Hodgson – *"Introduction of new cover crops into smallholder CA farming systems"*.

Issues, successes and recommendations

1. Options for increased diversification with crops that are drought tolerant and able to survive in low fertility soils need to be aggressively pursued, as are options of soil erosion control to curtail run-off.
2. Work with short season maize varieties that are resistant to the common soil fungal pathogens and cob rots needs to be tried out.
3. Options for adding substantial quantities of organic matter, through manure and large-scale composting need to be considered.
4. Livestock integration through fodder production options, supplementation and diversification of cover crops planted is seen as an important component of the CA system, specifically in the light of continued and worsening climate variability.
5. Setting up or marketing cooperatives for those learning groups that are ready for this step has been initiated for Madzikane and Swayimane. This is seen as an important step in the commercialisation process.
6. Those villages and learning groups where little traction has been achieved will be provided with minimal support in the coming season to enable the consolidation of this research process in more active communities.
7. There is an interest in these areas to also invest in locally run and managed micro-maize milling operations.
8. Those participants involved in the small business development training are mostly interested in expanding their very small- scale poultry production – given that more maize, sunflower, millet, sorghum and Sunnhemp seed for example is now available locally though their CA production processes.

Budget summary by August 2019

Date of transaction	Type of transaction	Amount (R)
2018/10/26	Monthly expenses	57 629,03
2019/01/22	Monthly expenses	54 720,77
2019/02/28	Monthly expenses	68 516,48
2019/03/29	Monthly expenses	39 896,19
2019/04/30	Monthly expenses	60 708,63
2019/05/31	Monthly expenses	59 855,08
2019/06/30	Monthly expenses	42 884,45
2019/07/01	Monthly expenses	57 507,40
2019/07/01	Monthly expenses	2 070,00
2019/07/31	Monthly expenses	47 493,76
TOTAL AUG 2019		**491 281,79**