

Grain-SA Smallholder Farmer Innovation Programme

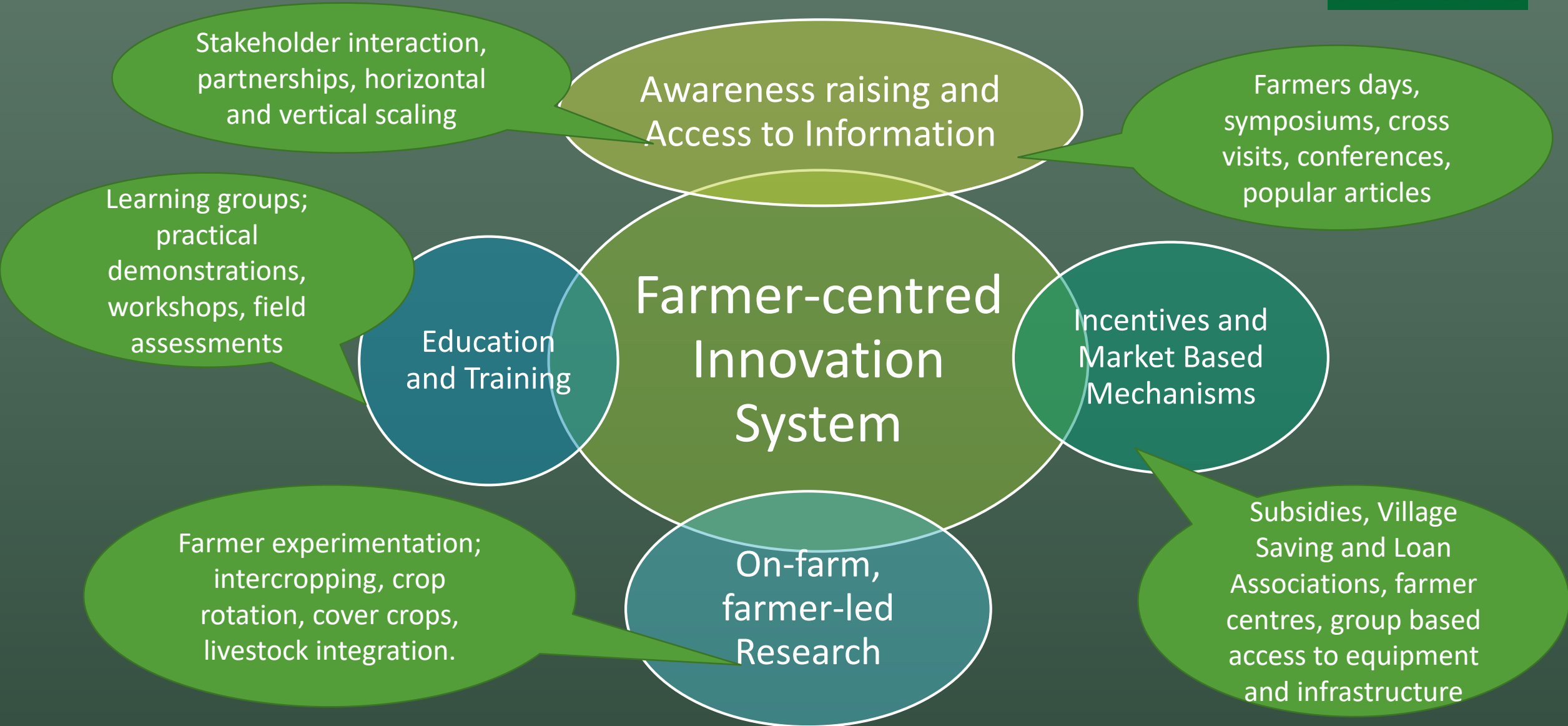


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Learning Conservation Agriculture the Innovation Systems way

CA-Farmer Innovation Programme

Key objectives and activities



Description of IS

- ***Value chain:*** Whole value chain considered
Bulk buying of inputs; Supply options for tools/equipment; Storage options; Local sales arrangements; Diversification e.g poultry feed rations
- ***Increase productivity:*** With a focus on soil health, soil and water conservation, soil fertility, increased production and diversification:
 - - Farmer level experimentation
 - - Researcher managed experimental processes within these; *Run-off plots, infiltration, soil moisture content, local weather station, rain gauges, liming trials*
- ***Social agency:*** Learning groups, VSLAs, Farmer Centres, Open days...



Farmer level experimentation

Incremental change in yr 1,2,3+

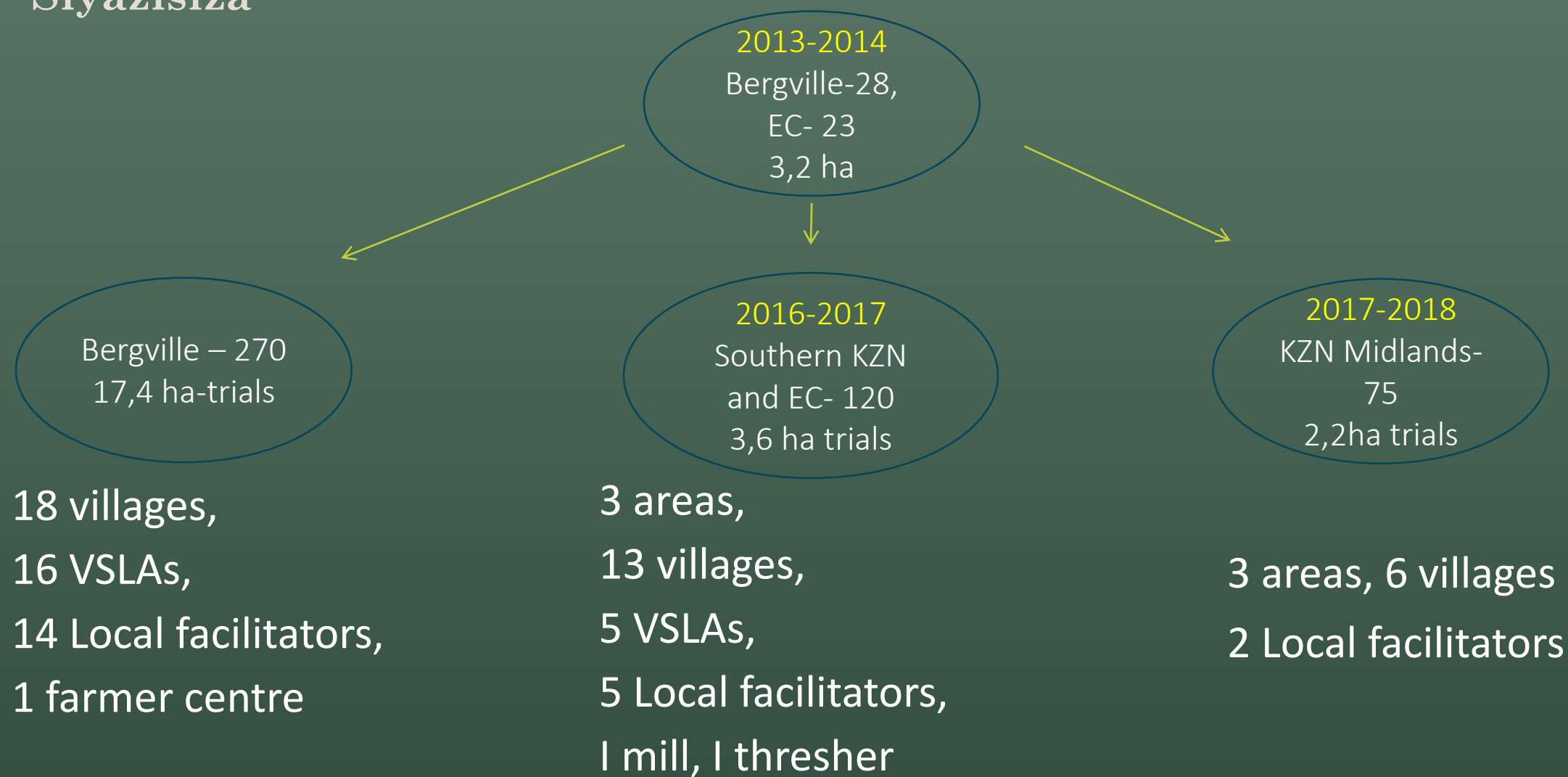
- ***Year 1: Pre-defined with the research team:***
 - Intercropping (maize-legume), close spacing, pre-plant herbicide
 - Choice of planting method; hand hoes, hand planters, animal drawn planters, tractor drawn planters
- ***Year 2: Choices and options within the same overall design:***
 - Different varieties maize (white yellow, OPV, hybrid)
 - Different varieties and types of legumes
 - Summer and winter cover crop combinations
 - Early and late planting
 - Manure and fertilizer combinations
 - Targeted fertility regimes and pest control measures
- ***Year 3 +: Own design of experiments by participants :***
 - Intercropping vs crop rotation options
 - Mulching
 - Organic options
 - Different herbicide and pesticide spray regimes
 - As well as options for year 2.

*Compare CA practices to present practices
* Use and improve farmers' observations and analysis



Results-CA study areas

Partners: KZNDARD, LandCare, LMs; Umshwati, Ubuhlebezwe, Okhahlamba, DMs; Umgungundlovu, KwaNalu, StratAct, AWARD, Philakahle, Lima RDF, Siyazisiza



Trial summaries over 5 seasons; Bergville,SKZN and EC

CA Farmer led Trial summaries											
	Midlands	Bergville					EC, SKZN				
<i>Season</i>	2017	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
<i>No of villages</i>	6	3	9	11	17	18	4	10	8	8	13
<i>No of trial participants</i>	42	28	83	73	212	259	23	16	43	54	93
<i>Area planted (trials) - ha</i>	1,36	2,8	7,2	5,9	13,5	17,4	0,36	0,3	0,37	1,18	3,58
<i>Average yield maize (t/ha)</i>	2,04	3,74	3,63	4,12	5,03	5,7	0,95	0,7	1,37	2,52	2,17
<i>Min and max yield maize (t/ha)</i>	0,4-7,1	2-4,3	1-6,7	0,6-7,4	0,3-11,7	0,5-12,2	0,3-1,7	0,3-1,8	0,5-4,4	1,1-5,2	0,2-6,7
<i>Average yield beans (t/ha)</i>	0,62	1,24	0,26	0,79	1,05	1,22	1,26	0,34	0,69	1,28	0,35

Participatory Monitoring & Evaluation

Social, economic, environmental, production

Farmer involvement contracts and baselines, production monitoring forms, yield measurements, focus groups- review, learning, planning, open days, reports

- ***Social indicators:***

- No of learning groups, VSLAs, farmer experiments, involvement in open days, forums, cooperatives etc, learning, knowledge, changes

- ***Economic indicators:***

- Food security, livelihoods diversification, incomes, cost of input supplies, cost-benefit analyses(qualitative)

- ***Production indicators:***

- Yields, germination, growth, fertilizer and agrochemical use, weed and pest incidence, crop diversification, soil fertility

- ***Environmental indicators:***

- Soil health indicators, organic matter, % carbon and nitrogen, water holding capacity and water balances, run-off



Summary of IS indicators after 4 seasons – all areas

Social agency		Value chain		Productivity	
No of female farmers	83%	Saving for inputs	28%	Intercropping – maize and beans	92%
Learning groups	36	Reduced labour in CA plots	78%	Intercropping maize and legumes (cowpeas, lab-lab, velvet bean	17%
VSLAs - % of participants involved	79%	Reduced weeding in CA plots	39%	Crop rotation	20%
Months of food provisioning through small CA plots				Cover crops; summer mix – sunflower, millet, sunn hemp, sorghum	26%
10-12	15%	Use of planters			
7-9	38%	Hand hoes	26%		
4-6	39%	Hand planters	69%		
1-3	8%	Animal drawn planters	5%		
		Tractor drawn planters	0,5%		
Sale of crops locally (maize, beans, cowpeas, sunflowers)	10%	Local financing of infrastructure		Cover crops; winter mix relay cropping – Saia oats, fodder sorghum, fodder radish	31%
		Threshers	1		
		Mills	1		
Innovation platforms; including external stakeholders	5	Farmer centres	1	Fodder; provisioning of livestock through cut and carry	5%
				Seed saving	11%

Trends for 4th and 5th year participants

- All these participants are:
 - Implementing all three principles of CA,
 - Involved in intercropping
 - Improving yields
 - Including CA into their overall farming practices.
 - Saving money and increasing food security considerably
 - Involved in local VSLAs (Village savings and loan associations)
 - Using traditional seed varieties alongside the more modern OPVs, hybrids and GM varieties promoted.

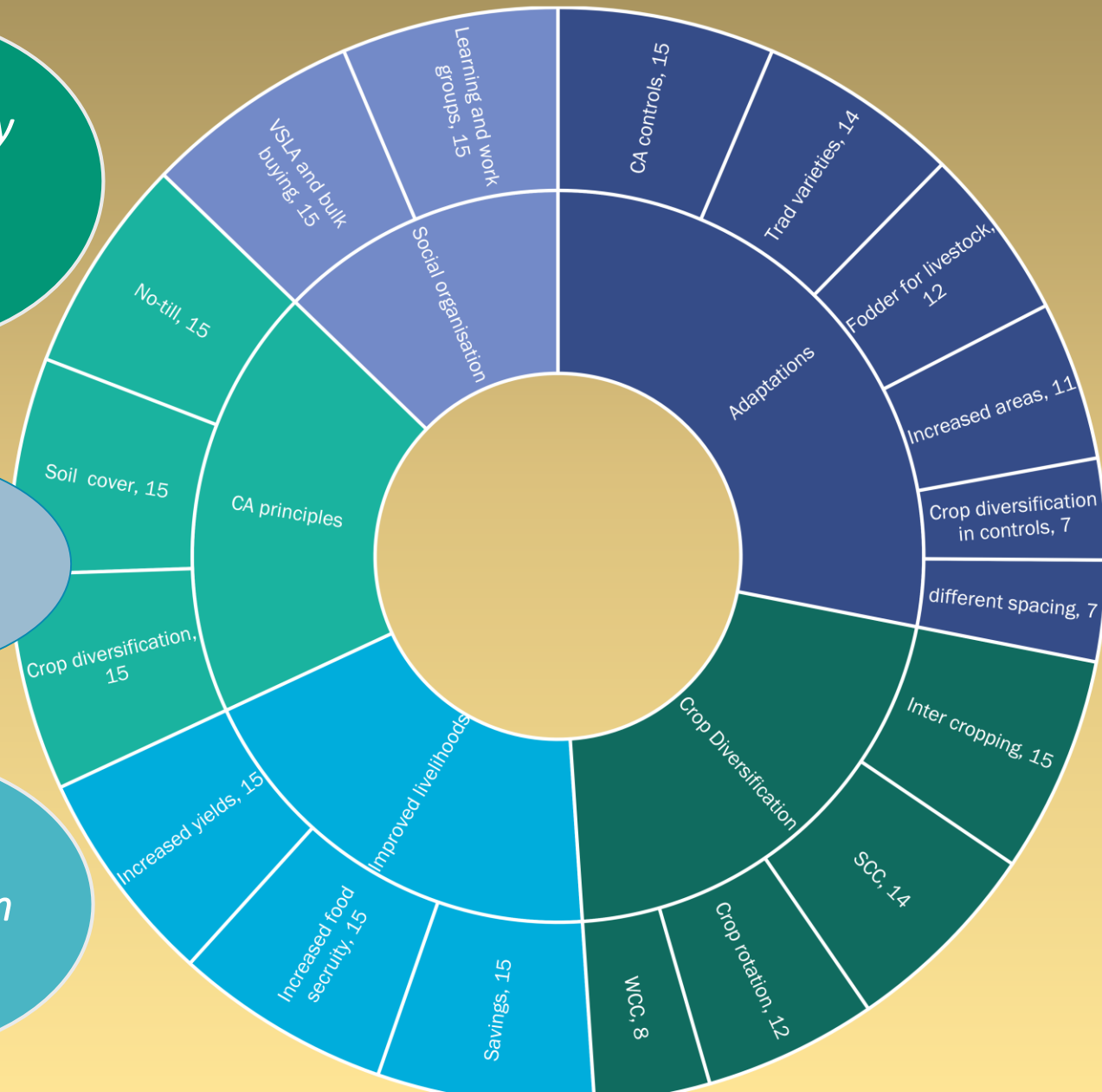
*Sustainability
has been
achieved*

*73% have
increased
their field
sizes*

*2-3,5t/ha
Carbon
sequestered in
CA plots
(2016-2017)*

Summary of CA adoption for 4th and 5th season participants in the Smallholder Farmer Innovation Programme; Bergville, July 2018

■ CA principles ■ Social organisation ■ Improved livelihoods ■ Crop Diversification ■ Adaptations



Growing of Cover Crops

For soil health and fodder

- Both summer (SCC) and winter cover (WCC) crop mixes are grown
- SCC; are generally grown as a combination in rotation with other crops- so in 10x10m plots in the trials
- WCC- are generally relay-cropped into the rows between maize once beans have been harvested
- Total land area under cover crops is till quite low; ~1ha respectively
- Progress:
 - Significant improvement in soil health in rotations that include cover crops
 - Keeping of cover crop residues for feeding cattle- both cut and carry and leaving the cover crops in the field for grazing into winter
 - A few individuals – around 10 in total - have managed to harvest and keep seed from the cover crops, both for purposes of livestock feed (for sunflowers) and for re-planting the following season.



Sunflowers planted in rotation



SCC – sunflower, millet and sunn hemp planted together in one plot, in rotation



Winter cover crop mix: Saia oats, fodder rye, fodder radish



Livestock grazing crop residue into winter

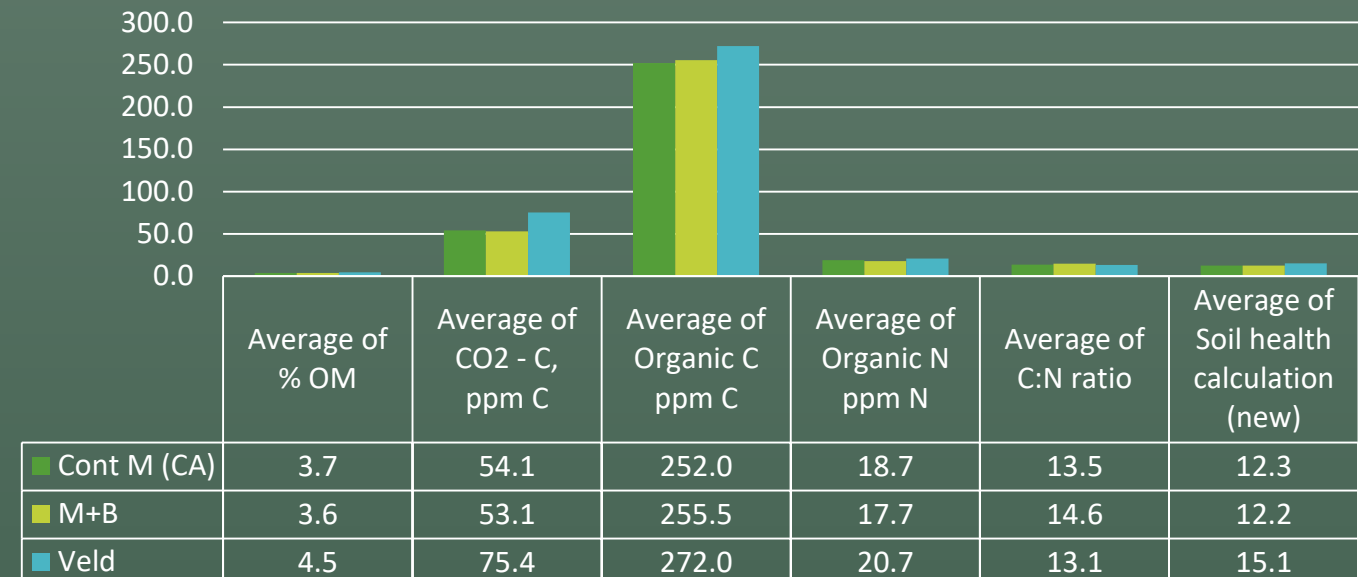


Sunflower seed harvested for poultry feed and re planting

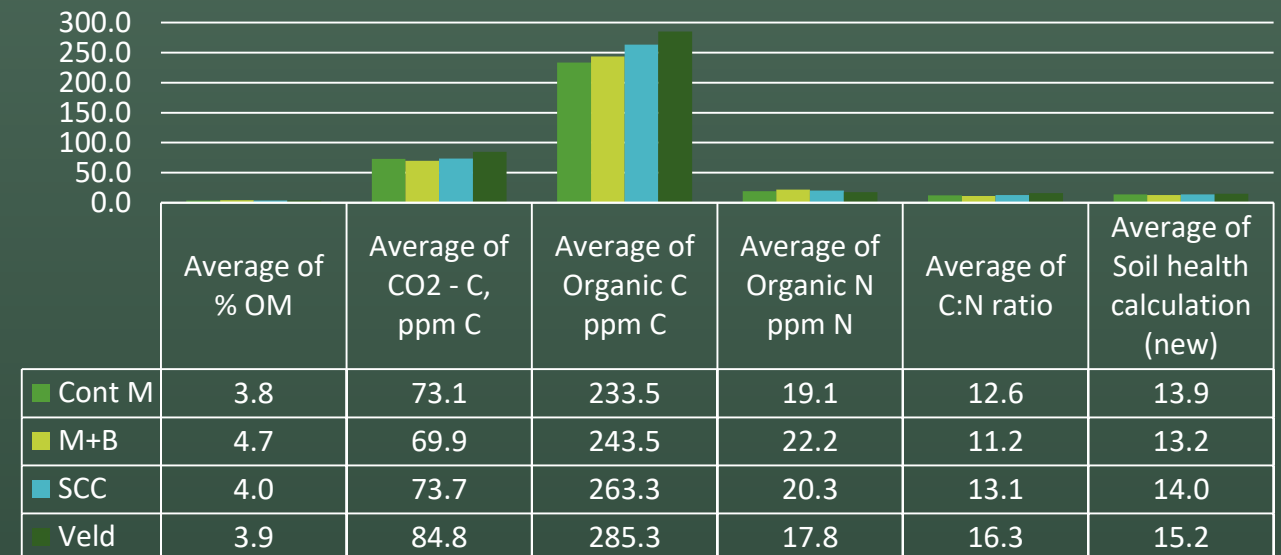
Soil health comparison for 2nd and 4th year participants

- % OM is higher than veld benchmark after 4 years, but not 2 years for intercrops and cover crop rotations but not maize only plots
- % Organic C increases; from single crop, through intercrop to cover crops for both 2nd and 4th years
- % Organic N, is higher than veld benchmark after 4 years, but not 2 years
- C:N ratio is lower than the veld benchmark after 4 years
- Soil health scores are higher for 4th year participants
- Savings of around R440/ha after 4 years and R375 after 2 years; 14% and 12% of overall fertilizer costs saved

Soil health Mhlwazini; 2nd yr (N=2)



Soil health Ezibomvini; 4th yr (N=3)



Soil Health Summary

Crop diversity is crucial

Crop rotation in combination with crop diversity supports this process

Lab-Lab and SCC provide for very high organic C and N values

Lower C:N ratios are found in crop mixes that contain legumes – cowpeas, Lab-Lab

- Intercropping and use of cover crops is very important for building soil fertility and soil health
- Crop rotation aids in stabilising high soil health scores over time
- The more crops you use and rotate the better
- Having legumes in the mix speeds up the process





In summary: CA is increasing yields, improving livelihoods and improving soil quality for around 550 smallholder farmers in KZN & EC

