

**GRAIN SA**  
**Progress Report for the:**  
**CONSERVATION AGRICULTURE**  
**FARMER INNOVATION PROGRAMME**  
**Submitted to:**  
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## 1. INTRODUCTION

The introduction of Conservation Agriculture (CA) by Grain SA, financially supported by The Maize Trust (MT) and the Winter Cereal Trust (WCT), is seen as one of the key strategic thrusts in sustainable production through improved resource conservation and production efficiency in the grain industry. Research on improved CA and/or crop production systems, improved soil health, integrated pest management, integrated soil nutrient management, integrated weed management and the integration of livestock, are some of the key research focus areas. In 2013 it was decided to create a post within the structures of Grain SA, with the primary purpose to facilitate the promotion of CA among grain producers in South Africa. This post is funded through the MT, with some running costs funding provided by WCT. This report will cover the October 2019 to September 2020 period of business by the CA Facilitator.

## 2. LONG TERM OBJECTIVES

### 2.1. Aim of the Conservation Agriculture (CA) Farmer Innovation Programme (FIP)

The CA FIP concept development confirmed that the model for CA research and development (R&D) that evolved during the last few decades (global and local) does not follow a linear process - the actual change and innovation processes are much more complex and diverse. This revelation means that complex, multi-component technologies such as CA require the development of innovation systems (IS) to adapt technologies to local conditions. Accordingly, and at the very least, the emphasis has to be on various aspects of the system, of which on-farm research and the inescapable experiential, discovery and social learning that this generates are key elements; all of which critically place the farmer in the central role.

Following the above statement, the CA programme established at Grain SA has been designed and described under the paradigm of IS and was named the CA Farmer Innovation Programme (FIP). **The main aim of the CA FIP** is to research, develop and adapt CA by and through grain farmers to ensure sustainable use and management of natural resources while enhancing national and household food security and income in different contexts.

The new emphasis of the FIP has been to channel, facilitate and coordinate funds to active CA farmers and their groups (including technical and agri-business co-workers), who wish to test, adapt, develop, and adopt innovations on practices, topics and issues focused on CA. The idea is that easier access to such funding would allow a wide range of CA innovations to be investigated by farmers in their realities, and with proper technical support and facilitation, may expand awareness and innovation capacity among farmers, other rural stakeholders, and those who support them, ultimately facilitating the mainstreaming of CA within the grain industry.

### 2.2. The long term objectives of the CA FIP

The long term objectives of the CA FIP are:

- a) Increased farming production and profitability (*Financial capital*);
- b) An improvement of the natural resource status and quality allowing sustained production (*Natural capital*);
- c) Empowerment of primary stakeholders with awareness, knowledge and skills allowing them to pursue different livelihood strategies (*Human capital*);
- d) Strengthening of social institutions (innovation platforms & networks, groups, memberships, facilitators, etc.) for sustained collective action (*Social capital*);
- e) Development of appropriate infrastructure (e.g. implements) that enable farmers to pursue with CA technology (*Physical capital*).

## 3. SHORT TERM OBJECTIVES

The new CA FIP concept document (Smith and Visser, 2013), submitted and approved by Grain SA / The Maize Trust / Winter Cereal Trust, proposed the following Key Strategic Objectives (KSO's) for the short term. These KSO's and themes will be reviewed and/or improved on a continuous basis:

- a) Diagnosis and documentation of CA systems
- b) Awareness, Marketing and Access to Information
- c) Farmer-centred Innovation Systems Research
- d) Incentive and Market Based Mechanisms (IMBMs)
- e) Education and Training
- f) Innovation Platforms, Networks, Social learning and Facilitation

The CA FIP was instrumental to establish the core structure and elements, primarily on behalf of and for the effective application of MT funds. In short, FIP facilitation and coordination in CA innovation will be through solicited and non-solicited projects funded by The Maize Trust (MT). Proposals will be invited and submitted in accordance with the MT funding cycle, i.e. by 31 March and 30 September each year. Once they are received by MT, they are directed to Dr Smith, who will coordinate the MT CA panel to assist with the evaluation of the projects according to specific FIP criteria.

#### 4. SHORT TERM OBJECTIVES – PROGRESS AND DELIVERABLES FOR 2020

##### 4.1. Description of CA systems in various Agro-ecological Regions

The main expected outcome of this process, is a clear and ‘pure’ description of the CA farming systems (or CA agro-ecosystems) practiced by farmers in specific areas or agro-ecological zones (AEZ). In this respect various popular magazines, such as *SA Grain/Graan*, *Landbouweekblad*, *Farmers Weekly* and the KZN No-till Club newsletter, have been documenting and publishing as many of these successful ‘case studies’ as possible. A number of articles have been published already.

The articles on CA published in the SA Grain magazine are all available from the Grain SA website (which include a new site specifically for CA accessible at <http://www.grainsa.co.za/grain-research/conservation-agriculture>). Furthermore, the publication of the CA series on Integrated Crop-Livestock Systems in web-based Volumes has been funded by The Maize Trust and were also made available on the website and can be accessed here <http://www.grainsa.co.za/sa-graan-grain-article-series/conservation-agriculture>. A range of different institutions (e.g. the ARC and Universities) are also publishing increasing numbers of articles on CA in SA Grain and other journals/magazines. Many of these articles flow from the CA FIP projects, which have been generating a wealth of very appropriate information for producers and other practitioners. A number of *peer-reviewed articles* and book chapters on CA FIP results have also been published in the last couple of years; below are some recent publications:

Haarhoff, S.J. and Swanepoel, P.A., 2020. Narrow rows and high maize plant population improve water use and grain yield under conservation agriculture. *Agronomy Journal* 112, 921-931.

Haarhoff, S.J. and Swanepoel, P.A., 2020. Geil mielieplante te danke aan sterk wortelgroei. *Arena Mei/Junie* 2020, 29-32.

Kruger, E., Smith, H.J., Ngcobo, P, Dlamini, M. and Mathebula, T. *Book chapter, in press*. CA innovation systems build climate resilience for smallholder farmers in South Africa.

Smith, H.J., Kruger, E., Knot, J. and Blignaut, J.N., 2017. Chapter 12: Conservation Agriculture in South Africa: Lessons from Case Studies. *In: Conservation Agriculture for Africa: Building resilient farming systems in a changing climate.* [ed.] Kassam H.A et al.: CAB International, 2017.

##### 4.2. Raising awareness on CA

General awareness (or sensitisation) has been experienced as particularly important to stimulate farmers getting involved with further learning activities, such as study groups, experimentation and field days. The whole CA farmer innovation process needs this ‘impulse’ or injection of energy (interest or motivation) to start or to speed-up the momentum and specific awareness or sensitisation events are employed in this regard. During this period almost all CA information days were cancelled due to the Covid19 epidemic. The following few events took place:

### Smallholder farmers' days:

- Ozwathini, Cover crops focus, 27 Sept 2019 (115 farmers)
- Thabamhlophe, joint MDF and LandCare Open day, 10 October 2019 (50 farmers)
- Madzikane, 11 December 2019 (65 farmers)



**Figure 1a to d:** Ozwathini farmers' day, focussing on cover crops with seed demonstrations with a handout and poster developed



**Figure 2 a to c:** Snapshots from the visit at Xaba's homestead, Madzikane, 11 December 2019



**Figure 3a & b:** Xaba addressing farmers on his trials and the importance of spacing and intercropping

#### **Commercial farmers' awareness events:**

- Ottosdal CA stakeholder feedback meeting, 10 October 2019 (50+ participants)
- Outreach event for black commercial farmers in the North West Province on 12 March 2020.
- The Ottosdal no-till club held an informal trial visit event with a few speakers and discussions on the 18 March 2020.

See photos below.



**Photos 4a to d:** Participants at the CA outreach day at Ottosdal, 12 March 2020



**Photos 5a to d:** Participants and activities at the CA field day at Ottosdal, 18 March 2020



**Photos 6a to d:** Activities during the project visits Vrede, Reitz and Ottosdal (January 2020).

### CA video series

A new awareness initiative funded by The Maize Trust, **the development of a series of CA videos**, has been launched in November 2016, called *“The shepherds of the soil”*. These videos are available on the Grain SA CA website and cover successful CA farmers and practices among commercial and smallholder CA systems. The idea is to widely use these videos to increase the awareness on CA experiences in the country. A third phase of videos were completed in 2019 season in cooperation with *no-line* productions with funding from The Maize Trust; the following five videos were completed and are available on *youtube* with links to the Grain SA CA website:

FARMER: COCKY MOKOKA  
 AREA: VANDERBIJLPARK  
 DATE: 9 APRIL 2019  
<https://youtu.be/RneyOVp3dvo>

FARMER: VUYANI LOLWANE  
 AREA: LICHTENBURG  
 DATE: 15 APRIL 2019  
<https://youtu.be/b8DRH2R4BYc>

FARMER: ELVIS MONYE  
 AREA: COLIGNY  
 DATE: 16 APRIL 2019  
<https://youtu.be/VEJbqpAl5MM>

FARMER: BERTIE COETZEE  
 AREA: PRIESKA  
 DATE: 12-13 JUNE 2019  
 Short version: <https://youtu.be/NfpUNPTC3II>  
 Full version: <https://youtu.be/-Dk4srcWUL4>

### 4.3. Education and training

One of the key strategic objectives of the FIP, is CA education and training, which has three focus areas: a) school curriculum development, b) tertiary training on graduate and post-graduate level and c) training events and processes integrated with the project innovation process. The latter is reported in the project reports, while the following feedback is reported on the first two focus areas:

- **School curriculum development:** The CA FIP / Grain SA, with financial support from the Sasol Trust, VKB, John Deere and Standard bank, are involved with the CA curriculum development at the Reitz Agricultural Academy, linked to the Reitz High School. Ms Rihana Botha (curriculum development specialist), supported by Dr Smith has been contracted to develop a CA curriculum for Grade 10, 11 and 12 during 2019 and 2020. Parallel to that a curriculum is developed on precision agriculture. The academy opened its doors on 22 January 2020 and started the CA training for Grade 10's under the facilitation of Mr Martin Kruger.
- **Tertiary training on graduate and post-graduate level:** Several Masters and PhD studies have been done in the different on-farm innovation platforms (or projects) as part of the FIP. At the University of the Free State, Dr Smith presents a CA module for the honours group at the Centre for Sustainable Agriculture, Rural Development and Extension. Dr Smith has also been involved as examiner of several Masters thesis's and giving lectures on graduate level, e.g. at University of Pretoria.

#### 4.4. Innovation Platforms, Networks, Social learning and Facilitation

##### 4.4.1. Stakeholder communication and involvement

A range of stakeholders have been engaged with as part of a national and international stakeholder network. One of the major initiatives was the development of a CA forum aiming to reach a much wider stakeholder group in sharing and evaluating current CA FIP project results. The last CA forum meeting was held at the Grain Building on 18 September 2019.

The **Terms of Reference** of this forum is as follows:

- Identifying funding priorities and target groups/areas
  - Identify projects in different regions
  - Coordinate projects in areas
- Represent CA-FIP in different regions – awareness and scouting for opportunities and needs
- Evaluation of proposals (with other selected ‘experts’ on panel)
  - Make inputs on technical matters – make sure that farmers’ perspective counts
- Monitoring implementation and evaluating the impact of FIP projects
  - Participation in project meetings and activities
  - Review of technical (progress) reports
  - Make inputs on technical matters – make sure that farmers’ perspective counts
- Sharing of experiences and data – at awareness events, etc.
- Identify urgent (ad hoc) research & awareness needs

As part of their function to support MT to channel a portion of their funds towards CA research, the CA forum guided by the CA Facilitator (Dr Smith), has created a CA evaluation panel, comprising a range of mostly local, but also international experts, to assist in the evaluation of new CA project proposals, as well as annual progress reports. A range of criteria have been developed for this purpose. These CA panel members will be involved in the CA forum as far as possible.

##### 4.4.2. Participation in Grain SA Regional and Executive Management Meetings

Dr Smith has attended all the Executive Management Meetings, as well as the Grain SA annual congress at Bothaville on 4 and 5 March 2020.

##### 4.4.3. Participation in national and international CA initiatives and events

Participation in national CA forums and events is seen as an important objective to continuously improve the enabling environment for CA to flourish. A number of key issues and initiatives are being addressed by these forums. Most events were cancelled due to Covid19, including the World Congress on Conservation Agriculture that were supposed to take place in Switzerland in July 2020.

#### 4.5. CA Research

The Maize Trust is currently funding a number of CA research projects for the 2019/20 crop season and has requested the CA facilitator at Grain SA to assist with the evaluation and re-alignment of these projects under the CA-FIP philosophy. A panel of national and international CA experts has been established to assist with the evaluation of new CA project proposals and progress/final reports. The panel has successfully assisted The Maize Trust with evaluation of the 2019 applications and reports and has also been available to assist the WCT when needed.

Six MT funded research projects, which are hosted under the banner of the CA-FIP at Grain SA, is currently being implemented and launching various activities in the different study areas. In the North West Province, a project investigates commercial CA practices under semi-arid, sandy soil conditions, while the focus in the KwaZulu-Natal (Bergville, southern KZN and Midlands) and Eastern Cape (Matatiele) projects is on different approaches

and technological options for smallholder farmers in the adaptation of CA in these situations. Another project has been initiated in the 2015/2016 season to implement CA in two commercial farming study areas in the North Eastern Free State. These projects are implemented in collaboration with the Riemland (Reitz) and Ascent (Vrede) study groups and the completion of the first three seasons can be seen as successful; the fourth and final season kicked-off in October 2019, with VKB, North West University (NWU) and ARC as prominent partners in the implementing team. The participation of local stakeholders like VKB is welcomed, since one of the expected outcomes of the IS approach followed by the CA FIP, is the development of local capacity and ownership (in this case farmer groups and a local cooperative) to essentially take over the process as soon as possible. This is an important indicator of sustainability or impact of the project.

These CA FIP projects advocate the Grain SA / Maize Trust's new strategy on CA and strictly follows an on-farm IS approach, whereby farmers are deeply involved in experiments on their farms, of which the collaborative-managed (farmer-researcher) trials (CMTs) are properly designed and well supported by researchers, input suppliers and manufacturers. These trials focus on practices such as crop rotations, crop density, cover crops and livestock integration. Various key aspects are investigated, in particular soil health, productivity and profitability, and various stakeholders have been involved to take up these responsibilities. The farmer-managed trials (FMTs) refer to experiments / practices where farmers adapt CA principles in their own contexts or realities; the more farmers are involved with CA 'experimentation', the better. Some FMT's are also monitored at the Vrede and Reitz study areas, as well as with the smallholder projects under MDF.

The prime objectives of these on-farm research projects are to continuously research and develop CA systems in a range of contexts, by working with and empowering farmers to adapt CA in their own realities. In this process relevant research questions on all aspects in the CA approach and technologies are being posed for continuous improvement and adaptation using appropriate farmer-led IS research methodologies. In smallholder systems, this process is more complex and critical and much more emphasis is placed on FMT's and the development of institutional, infrastructure, social and economic components of the system, including the value chain.

The latest results show that significant progress and impact have been made in all these projects, which imply that CA crop production systems (in both commercial and smallholder situations) are being successfully adapted by participating farmers in their own realities, as well as farmers exposed to these project activities through awareness events and publications. However, amidst the various serious environmental threats and dire economic situation of many grain farmers, a greater urgency emerged to adapt CA with more farmers much faster. For that purpose, much more resources are needed, including manpower, funding and infrastructure. **Separate progress reports for these four projects are attached in Appendix 1 to 5.** These reports will also be available on the Grain CA website at <http://www.grainsa.co.za/grain-research/conservation-agriculture>.

A MT funded project with the title "Determining the carbon footprint of different grain farming systems in the summer rainfall regions" is currently in Phase 2 and is reported on in a separate document (see **Appendix 6**).

## 5. SUMMARY OF CA FIP EXPENSES BY AUGUST 2020

Summary of budget / expenses - period October 2019 to August 2020

<b>Project Description</b>	<b>Total Actual YTD Aug 2020</b>	<b>Total Budget YTD Sep2020</b>	<b>Available to use</b>
Support Regional CA awareness	24 660	48 000	23 340
Support for a national Innovation Platform	-	43 854	43 854
Ottosdal: Soil	48 640	118 396	69 756
Ottosdal: Cover crops	102 173	150 570	48 397
Ottosdal: Agronomy	108 399	109 050	651
Ottosdal: Grain SA	59 017	110 000	50 983
Ottosdal: Farmer facilitator	63 510	64 723	1 213
Smallholder Farming (Bergville)	670 229	670 228	-1
Smallholder Farming (Southern-KZN & Eastern Cape)	595 529	595 528	-1

Smallholder Farming (KZN Midlands)	482 631	540 820	58 189
Temporary CA Workers	551 225	551 225	-0
Reitz: Soil	19 520	60 000	40 480
Vrede: Soil	37 154	60 000	22 846
NE FS: Cover crops	105 196	143 140	37 944
Reitz: Agronomy	26 946	63 695	36 749
Vrede: Agronomy	-	36 177	36 177
Commercial Farming NE FS; Reitz: Grain SA	-	85 000	85 000
Vrede: Grain SA	-	25 000	25 000
Reitz: Dung Beetle Monitoring	57 768	57 920	152
Vrede: Dung Beetle Monitoring	61 264	61 200	-64
Soil ecosystem health: Reitz	111 400	111 400	-
<b>Total</b>	<b>3 125 259</b>	<b>3 705 926</b>	<b>580 667</b>
<b>Plus: Management fee (5%)</b>	<b>156 263</b>	<b>185 296</b>	<b>29 033</b>
<b>Grand Total</b>	<b>3 281 522</b>	<b>3 891 222</b>	<b>609 700</b>

## 6. CONCLUSION

Feedback and observations during CA FIP outreach and awareness activities show that a significant interest has been developed among grain producers and other key stakeholders during the last seven years. Many more farmers are interested to start their journey towards a sustainable crop-livestock industry, supported by a systems research approach where innovative farmers and researchers are leading the way. The CA FIP has been one of the key initiatives driving and supporting this transformation and will have to be very prominently positioned in the crucial next five years to sustain this momentum.

## 7. SUMMARY

The following is a summary of the short term results described above:

- The CA FIP has successfully designed, implemented and managed various CA Key Strategic Objectives (KSO's) and projects, mostly funded by The Maize Trust and to a lesser extent by the Winter Cereal Trust. The CA FIP is in its seventh year (season) and significant momentum has been developed through the current season, despite the major setback of the Covid19 pandemic.
- One of the prime sources of CA information that has increased significantly, is the amount of CA related articles published, especially in *SA Grain* magazine. This is still seen as very relevant and important and will continue. Other relevant stakeholders, such as popular magazines (e.g. *Landbouweekblad*, *Farmers Weekly*, *Veeplaas*, etc.) have been very supportive to accelerate this process. All the articles in *SA Grain* can be accessed through the Grain SA website. A number of peer-reviewed articles and book chapters based on the results from the CA FIP projects have been published during the last couple of years.
- Awareness on CA forms a critical impetus for the innovation process. Any relevant event of quality, such as annual CA conferences and farmers' days, are opportunities to inspire and inform key stakeholders about CA. Many of the awareness events planned for this period were cancelled due to Covid19. The development of a series of CA videos (*Shepherds of the soil*), has been completed. Videos are all available on the website.
- Participation in national CA forums is seen as an important objective to continuously improve the enabling environment for CA to flourish and various forums, conferences and workshops are being supported in this regard.
- The implementation of on-farm research projects with commercial and smallholder farmers are seen as key building blocks in the research and development of context-specific CA systems. At the moment five projects are implemented at various sites and follow the Innovation Systems approach, having farmers in the centre

of the innovation process. At this stage these projects have shown remarkable success, progress and impact with significant milestones being achieved.

- The study to determining the carbon footprint of different grain farming systems in the summer rainfall regions is in its second phase and is reported on in a separate document (see **Appendix 6**).
- Amidst the various serious environmental threats and dire economic situation of many grain farmers, a greater urgency emerged (primarily from producers) to scale out CA to more farmers much faster. For that purpose, more resources are needed, including manpower, funding and infrastructure. Various opportunities are continuously being explored in this regard.