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**CONSERVATION AGRICULTURE
FACILITATOR
PROGRESS REPORT**

October 2020 to September 2021

**Submitted to:
The Maize Trust**



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TABLE OF CONTENTS

1. INTRODUCTION	4
2. LONG TERM OBJECTIVES	4
2.1. AIM OF THE CONSERVATION AGRICULTURE (CA) FARMER INNOVATION PROGRAMME (FIP)	4
2.2. THE LONG-TERM OBJECTIVES OF THE CA FIP.....	5
3. SHORT TERM OBJECTIVES	5
4. SHORT TERM OBJECTIVES – PROGRESS AND DELIVERABLES FOR 2020-2021	6
4.1. DESCRIPTION OF CA SYSTEMS IN VARIOUS AGROECOLOGICAL REGIONS.....	6
4.2. RAISING AWARENESS ON CA	7
4.3. EDUCATION AND TRAINING	10
4.4. INNOVATION PLATFORMS, NETWORKS, SOCIAL LEARNING AND FACILITATION	11
4.4.1. Stakeholder communication and involvement	11
4.4.2. Participation in national and international CA initiatives and events.....	11
4.5. CA RESEARCH.....	12
5. SUMMARY OF CA FIP EXPENSES BY SEPTEMBER 2021	18
6. CONCLUSION	19
7. SUMMARY	19

LIST OF APPENDICES:

APPENDIX 1: OTTOSDAL PROGRESS REPORT

Farmer innovations in Conservation Agriculture (CA) systems for sustainable crop intensification in semi-arid, sandy soil conditions, North West Province

APPENDIX 2: MALUTI PROGRESS REPORT

Participatory systems research on conservation agriculture in the Maluti region

APPENDIX 3: MPUMALANGA HIGHVELD PROGRESS REPORT

Participatory systems research on conservation agriculture in the Mpumalanga Highveld region

APPENDIX 4: SMALLHOLDER PROGRESS REPORT

Quantitative research support to the Conservation Agriculture Smallholder Farmer Innovation Programme, KwaZulu-Natal

APPENDIX 5: CARBON FOOTPRINT OF MAIZE FARMING SYSTEMS IN SOUTH AFRICA

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 funded by the WCT. This report will cover the October 2020 to September 2021 period of business by the CA Facilitator at ASSET Research (<https://assetresearch.org.za/>).

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 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 focussed 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*); and
- e) Development of appropriate infrastructure (e.g. implements) that enable farmers to pursue 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 (KSOs) for the short-term. These KSOs and themes will be reviewed and/or improved upon continuously:

- 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 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 per the MT funding cycle (i.e. by 31 March and 30 September each year). Once they are received by the MT, they are directed to Dr Smith at ASSET Research, 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 2020–2021

4.1. Description of CA systems in various agroecological regions

The main expected outcome of this process is a clear and ‘pure’ description of the CA farming systems (or CA agroecosystems) practised by farmers in specific areas or agroecological zones (AEZ). In this respect, various popular magazines, such as *SA Grain/Graan*, *Landbouweekblad*, *Farmers Weekly* and *ReStory* newsletter, have been documenting and publishing as many of these successful case studies as possible. Several articles have been published already.

The published articles on CA will be maintained by ASSET Research (<https://assetresearch.org.za/>). 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. Several 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:

- Truter, W., Dannhauser, C., Smith, H.J. and Trytsman, G. 2017. Conservation agriculture: Integrated crop and pasture-based livestock production systems. Article series, *SA Grain* magazine. [<https://www.grainsa.co.za/sa-graan-grain-article-series/conservation-agriculture>]
- Haarhoff, S.J. and Swanepoel, P.A. 2020. Narrow rows and a 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, 29–32.
- Smith, H.J., Kruger, E., Knot, J. and Blignaut, J.N. 2017. Chapter 12: Conservation Agriculture in South Africa: lessons from case studies. In Kassam, A., Mkomwa, S. and Friedrich, T. (eds). *Conservation agriculture for Africa: building resilient farming systems in a changing climate*. Wallingford: CAB International.
- Smith, H.J., Kruger, E., Knot, J. and Blignaut, J. 2017. Conservation agriculture in South Africa: lessons from case studies. In Kassam, A., Mkomwa, S. and Friedrich, T. (eds). *Conservation agriculture for Africa: building resilient farming systems in a changing climate*. Wallingford: CAB International.
- Blignaut, J.N., de Wit, M., Knot, J., Smith, H., Nkambule, N., Drimie, S. and Midgley, S. 2015. Promoting and advancing the uptake of sustainable, regenerative, conservation agriculture in the maize production sector. Pretoria: Development Bank of Southern Africa, Green economy policy brief series.
- Kruger, E., Smith, H.J., Ngcobo, P., Dlamini, M. and Mathebula, T. 2021. *CA innovation systems* build climate resilience for smallholder farmers in South Africa. In *Conservation Agriculture in Africa: Climate Smart Agricultural Development*. CABI.
- Goddard, T., Basch, G., Derpsch, R., Hongwen, L., Jin, H., Karabayev, M., Kassam, A., Moriya, K., Peiretti, R. and Smith, H.J. 2020. Institutional and policy support for

Conservation Agriculture uptake In Kassam, A. (ed.). *Advances in Conservation Agriculture Volume 1: Systems and Science*. Cambridge: Burleigh Dodds Science Publishing.

Smith, H.J., Trytsman, G. and Nel, A.A. 2021. On-farm experimentation for scaling-out conservation agriculture using an innovation system approach in the North West Province, South Africa. In *Conservation Agriculture in Africa: Climate Smart Agricultural Development*. CABI.

Smith, H.J., Trytsman, G., Nel, A.A., Strauss J.A., Kruger, E., Mampholo, R.K., Van Coller, J.N., Otto, H., Steyn, J.G., Dreyer, I.D., Slabbert, D., Findlay, R., Zunckel, E. and Visser, L. 2021. From theory to practice – key lessons in the adoption of Conservation Agriculture in South Africa. In Kassam, A. (ed.). *Advances in Conservation Agriculture Volume 3: Adoption and Spread*. Cambridge: Burleigh Dodds Science Publishing.

Strauss, J.A., Swanepoel, P.A., Smith, H.J. and Smit, E.H. 2021. A history of conservation agriculture in South Africa. *South African Journal of Plant and Soil*. DOI: 10.1080/02571862.2021.1979112.

Strauss, J.A., Swanepoel, P.A., Laker, M.C. and Smith, H.J. 2021. Conservation agriculture in rainfed annual crop production in South Africa. *South African Journal of Plant and Soil*. DOI: 10.1080/02571862.2021.1891472.

4.2. Raising awareness on CA

General awareness (or sensitisation) has been experienced as particularly important to stimulate farmers to get 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 motivation and inspiration (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 most CA information days were cancelled due to the Covid-19 pandemic. The following few events, however, took place:

Commercial farmers’ awareness events:

Owing to the Covid-19 pandemic, the first CA farmers’ day on the Mpumalanga Highveld (on Nicol de Vos farm in Secunda) scheduled for 18 February had to be cancelled. Instead of the farmers day, it was decided to shoot a range of short videos that would be distributed in the Mpumalanga Highveld CA network (through a Whatsapp group). These videos illustrated all the objectives, activities, treatments and indicators measured on the trials. Video material was also collected and used for *Landbouweekliks* TV shows aired during the season. Similar videos were shot at the other project sites (e.g. Ottosdal farmers’ day) and used for similar purposes. These videos were also used in a full CA webinar later, which was conducted in collaboration with *Landbouweekblad* on 27 and 28 July 2021. Photos 1a–d were taken during the fieldwork and video sessions on the Mpumalanga Highveld trials from 15–19 February 2021. The farmers’ days in Ottosdal (18 March), Marquard (27 April) and Standerton (7 May) did go ahead with a good attendance of around 100 people at each. All Covid-19 protocols and regulations were strictly followed.



Photos 1a-d: Activities during the fieldwork and video sessions at the Mpumalanga Highveld study areas (15–19 February 2021).

The Ottosdal No-till Club held an informal trial visit field day with 10 speakers and discussions on 18 March 2021.



Photos 2a and b: Activities during the trial visit field day at Ottosdal (18 March 2021). Prof. Charlie Reinhardt of NWU was one of the speakers who talked about weeds.



Photos 3a and b: Dr Gerhard du Preez (NWU) talked about soil health, Mr Gerrie Trytsman (ASSET Research) spoke on cover crops and livestock integration and Mr Adriaan Dreyer (SGS) did a soil profile evaluation during the trial visit field day at Ottosdal (18 March 2021).



Photos 4a and b: Participants have discussions on cover crops and livestock integration and a soil profile evaluation during the field day at Yzel farming, Marquard on 27 April 2021.



Photos 5a and b: Participants have discussions on cover crops and livestock integration and a soil profile evaluation during the field day at H2 Agri Business, Standerton on 7 May 2021.

Smallholder farmers' awareness events



Photo 6: Farmers at Khulekani Dladla's fodder trial plot at Stulwane, Bergville, with Lungelo Buthelezi explaining the process during a cross visit of a small group of eight smallholder farmers from Ngongonini, SKZN.

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 at graduate and postgraduate 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, is 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 10s.
- **Tertiary training at graduate and postgraduate 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 an examiner of several Masters' thesis's and giving lectures at graduate level (e.g. at the University of Pretoria).

4.4. Innovation platforms, networks, social learning and facilitation

4.4.1. Stakeholder communication and involvement

A range of stakeholders has 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 and was since interrupted by the Covid-19 pandemic. Online stakeholder meetings are planned for later in the season.

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

- Identify 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 and awareness needs

As part of their function to support the 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 has 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 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. Several key issues and initiatives are being addressed by these forums. Most events were cancelled due to Covid-19, however, several online events did take place, such as the 8th World Congress on Conservation Agriculture (8WCCA) that took place in Switzerland from 21 to 25 June 2021, and the *Landbouweekblad* CA webinar that took place on 27 and 28 July 2021. Dr Smith delivered a CA FIP presentation at the 8WCCA with the title “A systems approach to mainstream conservation agriculture in South Africa”, with authors: H.J. Smith (ASSET Research), J. Van Niekerk (UFS) and J. Blignaut (ASSET Research). Several CA FIP-related presentations form part of the *Landbouweekblad* webinar with Dr Smith’s presentation on “The latest CA results and adoption figures in South Africa”, as well as a presentation by Prof. James Blignaut (Economics of CA) and Dr Gerhard van Rensburg (Soil Health) and two CA producers (Danie Bester and Hannes Botha) involved in the Mpumalanga Highveld CA study group.

4.5. CA research

The Maize Trust funded several CA research projects for the 2019/20 and 2020/2021 crop seasons and has requested the CA facilitator at ASSET Research to assist with the evaluation and re-alignment of these projects under the CA FIP philosophy. A panel of CA experts was established to assist with the evaluation of new CA project proposals and progress/final reports. The panel has successfully assisted the MT with an evaluation of the 2020–2021 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 ASSET Research, are implemented in 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 were on different approaches and technological options for smallholder farmers in the adaptation of CA in these situations. Another project was initiated in the 2015/2016 season to research CA in two commercial farming study areas in the North Eastern Free State. These projects were implemented in collaboration with the Riemland (Reitz) and Ascent (Vrede) study groups but ended by the end of September 2020 after the completion of four successful seasons; VKB, North West University (NWU) and ARC were prominent partners in the implementing team.

CA smallholder project

The three smallholder projects mentioned above were not approved for another project cycle. A new smallholder project was approved, which focuses on *adaptive quantitative CA research* in KwaZulu-Natal and started in October 2020 (see Photo 7 showing the establishment of a new on-farm trial at a KZN study site).



Photo 7: Planting of quantitative adaptive trials, Ozwathini (top) planting of 10 x 10 plots by hand, (bottom left) summer cover crops plot planted using a haracca hand planter, (bottom right) summer cover crops lines planted using a two-row tractor-drawn planter.



Photos 8a and b: An on-farm CA bean and maize trial of Nombono Zikode at Ezibomvini, Bergville



Photos 9a and b: An on-farm CA trial of Leonard Gamede at Ngongonini, southern KZN

Commercial farmer CA projects

The CA project in the North West Province started with its eighth season in collaboration with the Ottosdal No-till Club. More than 80 on-farm collaborative-managed (CM or mother-trials) (farmer-researcher) have so far been implemented in this project producing valuable results for this region. Two farm locations have been used to implement a range of trials in the 2020–2021 season, namely Korannafontein (Hannes Otto) and Humanskraal (George Steyn). See photos below.



Photos 10a and b: CA treatments of an on-farm trial site on Korannafontein; **Photos 10c** is a cultivar trial and **10d** a sunflower intercropping trial at Humanskraal, Ottosdal.

Two new participatory systems research projects on CA were approved for commercial farmers in the Maluti (eastern Free State) and the Mpumalanga Highveld regions, respectively; both projects successfully started in October 2020 and a total of five (5) major on-farm mother-trials were implemented on a representative, important ecotopes in the following areas: Marquard and Ficksburg (Maluti), Standerton and Secunda (x2) (Mpumalanga Highveld) (see Photos 11 and 12).



Photos 11a and b: Identification of on-farm trial sites at Ficksburg (Maluti) and Secunda (Mpumalanga Highveld), November 2020.



Photos 12a and b: Monitoring on-farm trial sites at Ficksburg (Maluti) and Secunda (Mpumalanga Highveld), January 2021.



Photos 13a to d: Monitoring on-farm trial sites at Mpumalanga Highveld, 15-19 Feb 2021.



Photo 14: An aerial view of the Onverwach on-farm trial site at Secunda, Mpumalanga Highveld. Five similar “mother” trials were established in the Mpumalanga Highveld and Maluti study area;

each trial has 8 treatments and 3 replications. Different CA treatments are clearly visible in the photo.

These CA FIP projects advocate The Maize Trust's strategy on CA and strictly follow an on-farm IS approach, whereby farmers are deeply involved in experiments on their farms, of which the mother-trials are statistically designed and well supported by researchers. These trials focus on practices (treatments) such as crop rotations, crop density, cover crops and livestock integration (see photos above). 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 (FM) or baby-trials refer to experiments/practices where farmers test CA treatments (ideally from the mother trials) in their own contexts or realities; the more farmers are involved with CA 'experimentation', the better. Some baby trials were previously monitored at the Vrede and Reitz study areas, as well as with the smallholder projects under MDF, and results were documented in the annual progress reports.

The prime objectives of these participatory systems research projects are to continuously research and develop CA systems in a range of local farming contexts, by working with and empowering farmers to adopt CA in their own realities. In this process, relevant research questions on all aspects of the CA approach and technologies are being posed for continuous improvement and adaptation. In smallholder systems, this process is more complex and critical and mother trials are established parallel to baby trials and the development of institutional, infrastructure, social and economic components of the system, including the value chain.

The results described in the annual progress reports 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 tested and adapted through a collaborative effort (farmers and researchers) and by local farmers in their own realities, which are mostly farmers who were 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. **Separate progress reports for these four projects are attached in Appendix 1 to 5.** These reports will also be available on the Asset Research website at <https://assetresearch.org.za/>.

An MT-funded project with the title "Determining the carbon footprint of different grain farming systems in the summer rainfall regions" is currently in the final phase (Phase 3) and is reported on in a separate document (see **Appendix 5**).

5. SUMMARY OF CA FIP EXPENSES BY SEPTEMBER 2021

Summary of budget/expenses - period October 2020 to September 2021

PROJECTS AND WORK PACKAGES	YTD ACTUAL	YTD BUDGET	YTD VARIANCE
Support Regional CA Awareness activities	63 740	75 000	11 260
Support for a National CA Innovation Platform	15 580	45 000	29 420
OTTOSDAL CA PROJECT, NORTH WEST			
Ottosdal - Soil	105 953	119 125	13 172
Ottosdal - Cover crops	114 812	128 990	14 178
Ottosdal - Agronomic statistics	80 221	112 725	32 504
Ottosdal - Programme management	120 467	130 000	9 533
Ottosdal - Field trial activities	63 050	64 250	1 200
Ottosdal Total	484 503	555 090	70 587
Smallholder CA Research with MDF	777 904	778 664	760
MALUTI CA PROJECT, EASTERN FREE STATE			
Maluti - Programme management	62 485	105 920	43 436
Maluti - Soil	109 863	119 125	9 262
Maluti - Cover crops	107 355	108 165	810
Maluti - Monitoring and facilitation	100 200	165 325	65 125
Maluti Total	379 902	498 535	118 633
MPUMALANGA HIGHVELD CA PROJECT			
Mpumalanga - Programme management	75 731	93 960	18 230
Mpumalanga - Soil	100 320	112 460	12 140
Mpumalanga - Cover crops	104 521	104 895	374
Mpumalanga - Monitoring and facilitation	175 325	236 655	61 330
Mpumalanga Highveld Total	455 896	547 970	92 074
CARBON FOOTPRINT IN MAIZE SYSTEMS			
Carbon Footprint- ASSET	-	16 800	16 800
Blue North - Obj1	48 000	48 000	-
TerraSim - Obj1	55 000	55 000	-
Blue North - Obj2	32 000	32 000	-
TerraSim - Obj2	30 000	30 000	-
Blue North - Obj3	10 000	10 000	-
TerraSim - Obj3	10 000	10 000	-
Carbon footprint Total	185 000	201 800	16 800
Total CA FIP expenses by September 2021 ¹	2 362 524	2 702 059	339 535

¹ A few outstanding invoices are still expected for this period

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 system, 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 (KSOs) and projects, mostly funded by The Maize Trust and to a lesser extent by the Winter Cereal Trust. The CA FIP is in its eighth year (season) and significant momentum has been developed through the current season, despite the major setback of the Covid-19 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*, *ReStory*, *African Farmer*, *Veeplaas*, etc.) have been very supportive to accelerate this process. All the articles in *SA Grain* can be accessed through the ASSET Research website. Several 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 of 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. Some of the awareness events planned for this period were cancelled due to Covid-19. However, some of the farmers' days were still held and a series of CA videos were developed in collaboration with *Landbouweekblad* and shown on several occasions, on social media and a CA webinar organised in collaboration with *Landbouweekblad*. Videos are all available on the ASSET Research 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 key building blocks in the research and development of context-specific CA systems. Five projects were successfully implemented until September 2020 at various sites. Of these, three smallholder projects ended, and one new project started; two commercial projects ended, and two new projects started. At this stage, these projects have shown acceptable success, progress and impact with expected milestones being achieved.

- The study to determine the carbon footprint of different grain farming systems in the summer rainfall regions continues in its 3rd and final phase and is reported on in a separate document (see **Appendix 5**).
- 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.