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## **APPENDIX 4: FINANCIAL ANALYSIS FINAL REPORT**

*An in-depth comparative farm-level financial analysis of different production systems in selected maize-based regions of South Africa*

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### **Phase 1: Qualitative analysis**

**To assess the general perceptions, the experiences of selected CA farmers, and an industry perspective concerning the conversion from Conventional Tillage (CT) to No-till/Conservation Agriculture (NT/CA).**



**September 2024**

# **FINAL REPORT**

## **An in-depth comparative farm-level financial analysis of different production systems in selected maize-based regions of South Africa**

**Phase 2: Qualitative analysis - To assess the general perceptions, the experiences of selected CA farmers, and an industry perspective concerning the conversion from Conventional Tillage (CT) to No-till/Conservation Agriculture (NT/CA).**

*For the period:*

**October 2023 to September 2024**

*Compiled by:*

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*Funded by:*



**The Maize Trust**

*Submission date:*

**September 2024**

## Executive summary

### Project objective

The project aim was to conduct an in-depth farm-level financial analysis of different farming systems in selected maize-based regions of South Africa and to gather insights from various producers and institutions on their experience with the Conservation Agriculture (CA) farming system.

### Project method

Primary qualitative data was compiled using online questionnaires. These were duly completed by institutions, industry experts and farmers across different maize-based regions of South Africa. All data was collected, compiled and analysed.

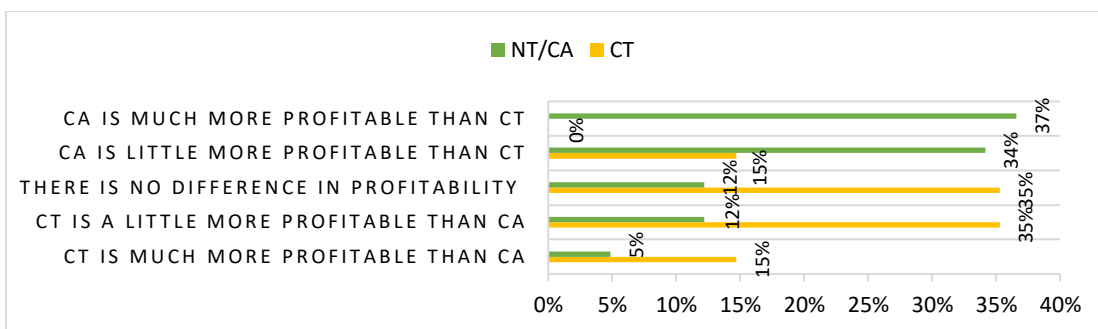
### Research focus and questions

This qualitative analysis had the following four key objectives:

1. To assess the general perceptions concerning the conversion from Conventional Tillage (CT) to No-till/Conservation Agriculture (NT/CA).
2. To assess the experiences of selected Conservation Agriculture farmers concerning their conversion from conventional tillage (CT) to no-till or Conservation Agriculture (NT/CA), their navigation of the transitions period and how they managed to operate successfully through the J-curve.
3. To assess the experiences of selected farmers concerning their view and experiences of discontinuing the use of no-till or conservation agriculture (NT/CA).
4. To ascertain an industry perspective as to the sentiment and experiences concerning no- or minimum tillage (NT) and Conservation Agriculture (CA), and the transition to it, both historically and in the future.

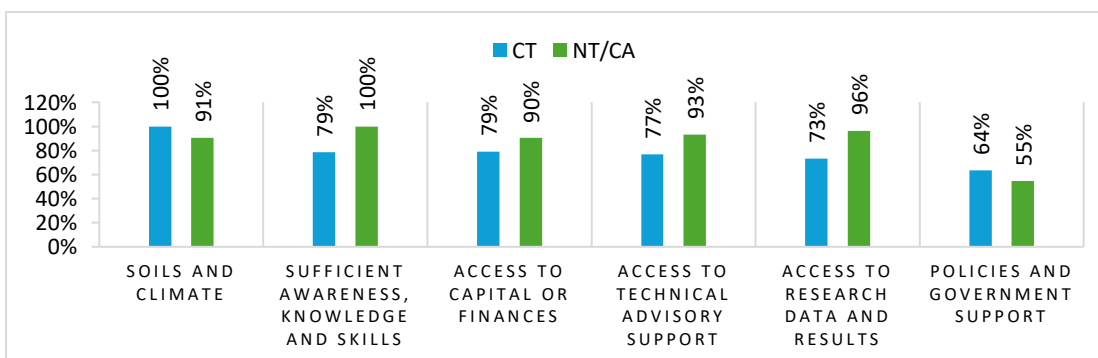
## Results

1. *General perceptions and sentiments on CA*
  - The results include data from 34 CT and 41 NT/CA farmers from all seven production regions of South Africa. Almost all CT farmers were aware of NT/CA (94%). Of the farmers, 26% were not upskilling to NT/CA at all, and majority of those who are upskilling (66%) rated their skill as small scale/trial level, novice or intermediary. Almost all NT/CA farmers have been practicing and upskilling for more than 5 years; hence, majority rated their skill as established or intermediary.



### Farmers' perception on the profitability of CA and CT

- Half of CT farmers perceive CT to be more profitable than NT/CA, 15% of them are not practicing CA at all and the rest practice in small scale, are novice and intermediate. More than half of CA farmers think that CA is more profitable than CT, most of these farmers have been practicing CA for more than 5 years.



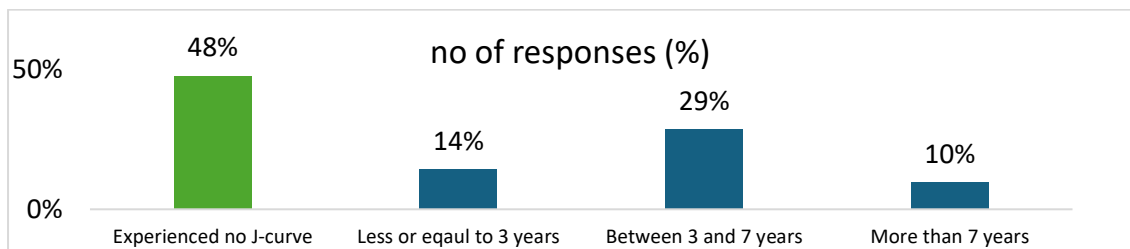
### Factors that influence farmers to change to NT/CA

- Most CT farmers indicated that soils and climate had the biggest influence to change or not to change to NT/CT, while NT/CA farmers rated lack of/sufficient awareness, knowledge and skills as the biggest influence.
- Access to technical advisory support was rated fourth under both factors influencing CT farmers to change or not to change to NT/CA. Both CT and NT/CA farmers rated weed management and (availability of new) herbicides as a component that needs the most support of all, followed by soil health and fertility management.
- Lack of access to capital and finance was one of the top-rated factors that influence farmers not to change to CA, almost half of CT farmers (47%) do not have enough capital or finance to change. Both CT and NT/CA farmers rated equipment (including tractors, no-till planters, sprayers, etc.) as a component that needs the most support of all followed by risk mitigation. Livestock integration was also identified as another key component that needs financial capital.

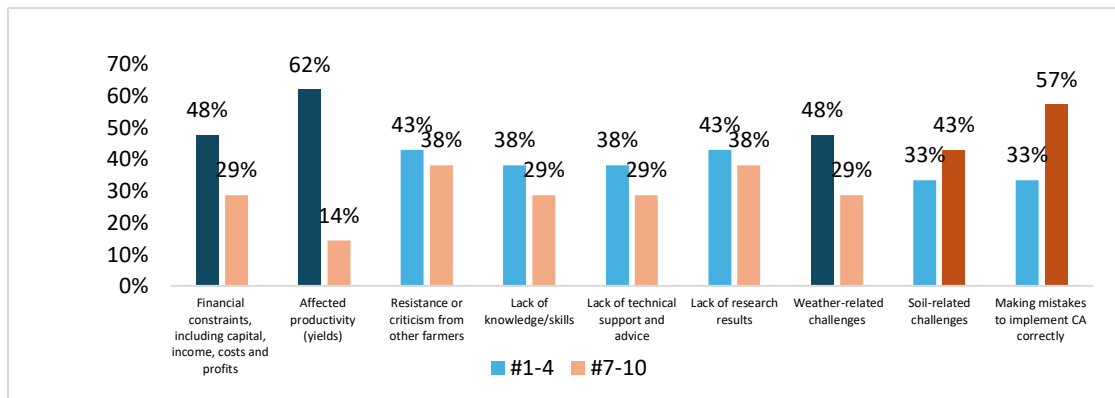
*A combination of factors contributes to farmers' decision to change or not to change to NT/CA. Soils and climate, and lack of/sufficient awareness, knowledge and skills have the biggest influence. While most farmers have sufficient access to capital and technical support to convert to NT/CA, some farmers still struggle to obtain such support. Overall, farmers have mixed perceptions on the profitability of CT and NT/CA.*

## 2. CA farmers' experiences

- The results include data from 21 CA farmers from six production regions of South Africa. Most farmers indicated that adverse soils and climate conditions were top motivating factors to change to NT/CA, and to some extent increases in awareness, knowledge and skills.
- In total, 95% of the farmers have heard of and/or are familiar with the J-curve. Further, 48% have not experienced it while 43% took 3 to 7 years to transition the J-curve, and only 10% experienced it for more than 7 years.



**Years farmers experienced the J-curve**



### General challenges faced during the transition period

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “least challenge” and 10 = “biggest challenge”. The blue bars reflect the percentage of the sum of the 1s to 4s out of the total number of responses received, with the light brown bars the percentage of sum of the 7s to 10s. The percentage does not add to 100%; the balance being the sum of those that scored 5s and 6s. The highlighted blue and brown bars indicate the major reasons.

- The biggest challenge faced during the transition period was that of making mistakes to implement CA correctly. This was followed by other soil-related challenges. Affected yields posed the least challenge during the transition period for most of these converted CA farmers.
- The biggest way in which farmers managed or overcame challenges experienced during the transition phase was through improving their knowledge and skills with 90% of farmers rating this aspect very highly. Knowledge seeking/sharing and interaction with other farmers has also been shown to be an essential aspect of success.
- During the transition period, integrated weed management, living roots in the soil, integrated soil fertility and acidity management, and retaining sufficient soil cover were found most difficult by farmers. Livestock integration, cash crop rotations, and access and use of CA machinery/implements posed the least difficulty for the farmers.
- Overall, most CA practices translate in a positive change or benefit between 1 and 5 years, and a few translate between 6 and 9 years while even fewer translate after 9+ years.

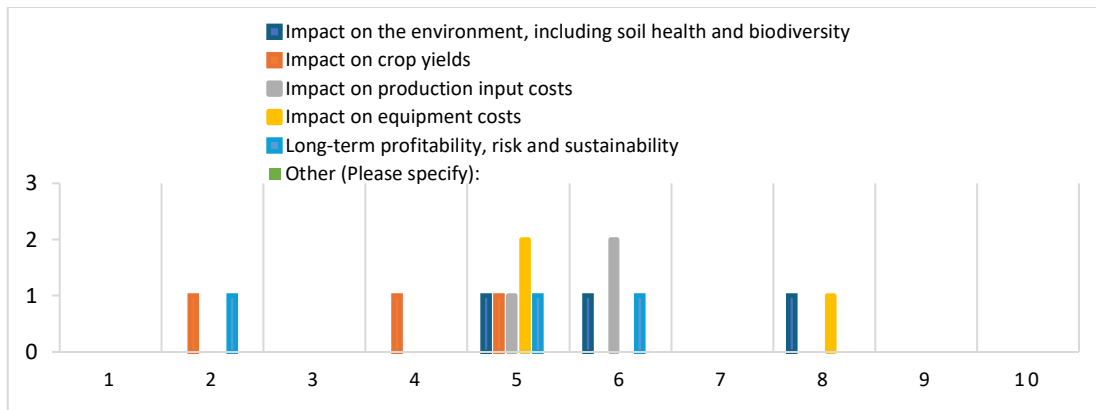
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*According to NT/CA farmers, the top reason for their shift from CT was adverse soils and climate conditions. During the transition period, the main challenges were making mistakes to implement NT/CA correctly and other soil related challenges. Farmers managed to overcome these challenges through initiatives such as: improvement of their knowledge and skills; regular monitoring and evaluation of results; formation of partnerships/networks for support (e.g. study groups); and seeking assistance from research/technical experts. With this, almost half (48%) of them had not experienced the J-curve, 14% had but for less than 3 years, 29% between 3 and 7 years, and 10% for more than 7 years.*

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### 3. CA dis-adopters experiences and insights

- The results include data from three dis-adopters, of which two practice minimum tillage, including rip-on-the-row, stubble management, etc., while the other practice full conventional tillage, with primary and secondary tillage practices.
- One farmer indicated to have applied NT/CA for 2 years before dis-adoption, the other indicated 3 years and the longest was 6 years.
- Of all the 9 practices, all three farmers indicated that they had not applied the practice of cover crops, and that they applied the practice of soil cover retention poorly. One farmer applied each of the following practices very well: cash crop rotations, cover crops, livestock integration, and living roots in the soil (as long as possible during the season). The rest were applied moderately well.



### Rating of farmers' perceptions or experiences with NT/CA

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = "negative" and 10 = "positive". The bars reflect farmers' rating of each factor.

- During the period of practicing NT/CA, these three farmers experienced a negative impact on crop yields and a positive impact on production inputs and equipment costs (reduction) and the environment, including soil health and biodiversity. Long-term profitability was rated between negative and moderate-to-positive impact.
- Their biggest reason for discontinuation was lower crop yields (compared to conventional), followed by the risk of reduced income during the transition period, as well as lack of access to necessary equipment (e.g. no-till planters) and weed, pest and disease management. Other factors had a moderate influence.

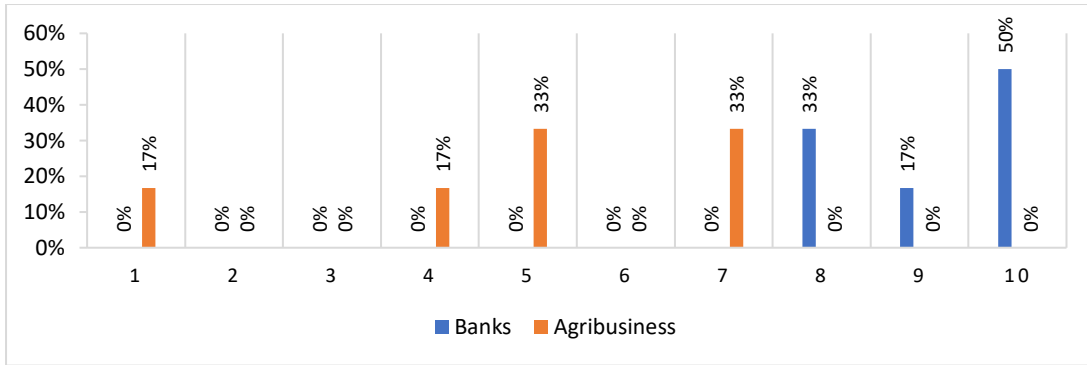
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*Only three responses were obtained of farmers who discontinued NT/CA; they practiced it between 2 and 6 years, and the most influential factors that contributed to their discontinuation were lower crop yields, perceived risk of reduced income, and lack of access to necessary equipment. Their adverse experiences included challenges in the application of certain practices such as cover crops and soil cover. The main benefits identified in their experience included a positive impact on production inputs and equipment costs and the environment, including soil health and biodiversity.*

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#### 4. Institutions' industry perceptions and sentiments concerning CA results

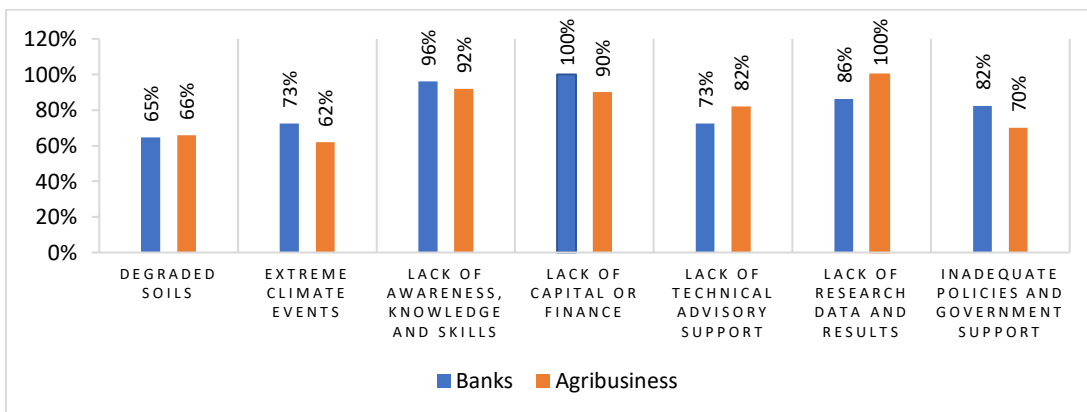
- The results of this questionnaire included data from 6 individuals from 5 agribusinesses and 6 individuals from 5 commercial banks. All banks see CA as a priority for sustainable agriculture and environmental stewardship and have an interest in advancing it while only 66% of agribusinesses see it as such and expressed an interest in its advancement.



### *Institutions' perception of CA as a priority for sustainable agriculture and environmental stewardship*

**Note:** Institutions were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or very little” and 10 = “very high”. The bars reflect institutions’ rating of each factor.

- Most banks (84%) rated their expertise and capacity in supporting producers pertaining to CA as 4 and 5/10, with the rest rating 10/10. Agribusinesses were equally split on low and high margins.
- Banks rated access to capital and finance as their top avenue for contribution followed by the provision of financial planning and analyses. To this, agribusinesses highlighted access to research data and results as their top avenue followed by both access to capital or finances and financial planning and analyses.
- Banks regard environmental considerations (e.g. sustainability goals and commitments, climate change, drought risks) as the most important factors to their interest in advancing CA, while agribusinesses regard economic considerations (e.g. potential cost savings, market opportunities) and access to financial incentives or funding opportunities as factors of most importance.



### *Perception on the barriers or challenges to adopting CA practices*

**Note:** Institutions were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or very little” and 10 = “very high”. The bars reflect institutions’ rating of each factor.

- According to banks, lack of capital or finance is the main barrier or challenge to adopting CA while agribusinesses perceive it to be the lack of research data and results, both perceive the lack of awareness, knowledge and skills as the second biggest barrier or challenge.



- Banks perceive that the concerns about the initial costs of transitioning to CA (such as investment in equipment, etc.) is a key concern about CA while agribusinesses perceive key concerns to be both lower yields (concern that adopting CA will lead to lower yields compared to CT) and timeframe (concern that the timeframe for seeing the benefits of CA is very long).
- In total, 87% of agribusinesses perceive that CA is much more profitable than CT while the rest perceive that there is no difference in profitability or that CT is much more profitable. Banks, however, are of the perception that CA is much more profitable.

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*Institutions perceive NT/CA as a priority for sustainable agriculture and environmental stewardship and indicated a positive interest in advancing it. They perceive that access to capital and finance, and to research data and results are key avenues of support for farmers to adopt NT/CA. Overall, most of the banks and agribusinesses are of the opinion that NT/CA is more profitable than CT. However, banks seem to have more capacity to support farmers towards CA than agribusinesses.*

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# Chapter 1: General background

## 1.1 Introduction

The current Conservation Agriculture Farmer Innovation Programme (CA FIP) research project has contributed significantly to the testing and adaptation of Conservation Agriculture (CA) systems with farmers in various maize production regions in South Africa, using scientifically designed and executed on-farm trials as a main tool. Progress and impact assessments focus on soil health (various soil biological, chemical and physical parameters), crop production (yields, efficiency, plant population, row width), crop and grain quality, diversification and integration of livestock, and profitability. Considering this, there has been a growing interest in the financial performance of CA and other local maize-based farming systems in different regions by the industry and CA evaluation panel.

This follows the observed evidence and results that indicate that it has become increasingly costly and riskier to farm due to the collective effect of rising input costs and declining soil health. Farm inputs, especially fertiliser, chemicals and diesel, became drastically more expensive in the last two growing seasons. The consequences of this rise in input costs and the associated financial risk it implies, is in addition to the consequences of soil degradation and a decline in soil health that requires more external inputs to sustain production yields. The effect of this horseshoe pincher is aggravated by South Africa's high variability and fluctuation in annual rainfall and distribution, high evaporation rates, and other natural phenomena such as wind and pests. Combined, these matters do pose a real threat to South Africa's food security and the long-term sustainability of the industry.

While the most used crop performance indicator is yield per hectare, long-term financial sustainability and profitability has gained much prominence with industry role-players such as Grain SA. It is therefore no surprise that in the recently concluded industry survey conducted by Grain SA among its producers, producers highlighted that their top concerns, threats and questions are, among others, related to finances, costs, profitability, return on investment and the lag-time of benefits. These concerns raised further interest in how CA producers navigated their transition to CA, as well as reasons behind those that discontinued CA. Moreover, the perceptions of institutions such as banks and agribusinesses on CA were also sought for the benefit of overall industry knowledge and sentiments.

## 1.2 Project background

### 1.2.1 Project aim

The project aim is to conduct a farm-level financial analysis of different farming systems in selected maize-based regions of South Africa; and investigate the perceptions and sentiments

of CA and non-CA producers, CA dis-adopters, and institutions on their experience with the CA production system.

### **1.2.2 Funder**

The Maize Trust

### **1.2.3 Implementing agency**

ASSET Research (<https://assetresearch.org.za/conservation-agriculture/>)

### **1.2.4 The objectives of this qualitative farmer surveys**

This qualitative analysis had four key objectives:

1. To assess the general perceptions concerning the conversion from Conventional Tillage (CT) to No-till/Conservation Agriculture (NT/CA).
2. To assess the experiences of selected Conservation Agriculture farmers concerning their conversion from conventional tillage (CT) to no-till or Conservation Agriculture (NT/CA), their navigation of the transition period and how they managed to operate successfully through the J-curve. A J-curve is a trendline of initial financial losses (or investments) followed by an exponential gain (see Maluleke et al. 2024 Figure 4).
3. To assess the experiences of selected farmers concerning their view and experiences of discontinuing the use of No-till or Conservation Agriculture (NT/CA).
4. To ascertain an industry perspective as to the sentiment and experiences concerning No-till or minimum tillage (NT) and conservation agriculture (CA), and the transition to it, both historically and in the future.

### **1.2.5 Definitions**

CT – conventional tillage, using primary and secondary tillage practices to prepare and manage cropping fields.

NT/CA – no-tillage (NT), conservation and regenerative agriculture (CA), to include climate-smart sustainable agriculture.

## 1.3 Research method

The research data was collected through four short online questionnaires. These were designed and developed with careful consideration of each objective and could be completed in approximately 15 minutes or less. Research data was consequently analysed by the ASSET research team, then interpreted and discussed in this report.

### 1.3.1 General questionnaire

First, the general perceptions and sentiments questionnaire was developed aimed at enquiring from responding farmers about their perceptions, sentiments and experiences concerning CT and NT/CA, and the conversion process. It included sections on their practice region, awareness, skill, profitability, influencing factors to change or not to change to NT/CA, technical and advisory support, and financial capital (see Annexure 2A). For this questionnaire, two versions were created using Microsoft Forms (links: Afrikaans version <https://forms.gle/ub5hww4FFErMrtr9LA> & English version <https://forms.gle/RXpEqmrnoKiEb9f7>). Key NT and CA farm(er)s and networks in the different regions were identified using the adoption of CA in South Africa study that documented in detail adopters per province and magisterial districts, or sub-regions (FAO 2011). As a starting point, in addition to the ASSET Research team, representatives from Grain SA were requested to assist and contribute to the selection process. Once selection was done, distribution commenced on various platforms including Grain SA bulk mail and other farming community and CA WhatsApp groups. This was first shared in February and was redistributed through March. Upon the survey due date, data was collected, compiled and analysed. A total of 79 responses were received with 75 from the Afrikaans version and 4 from the English version. When capturing and analysing the data, discrepancies on the English version were identified and that data was excluded from the final analysis and results.

### 1.3.2 CA farmers' questionnaire

A questionnaire was developed aimed at assessing the experiences of selected CA farmers concerning their conversion from CT to NT or CA. The questionnaire included sections on their practice region, motivating factors to change, familiarity and experience with the J-curve, challenges faced during the transition period, solutions to overcoming these, and support (see Annexure 3A). An online version of the questionnaire was created using Microsoft Forms (<https://forms.gle/x57ZCqo4Vdr9oMg97>). A total of 25 CA farm(er)s in the different production regions were identified by the ASSET Research team. It should therefore be noted that the response to this questionnaire is from experienced and knowledgeable CA farmers. The questionnaire link was shared with each of them via email and WhatsApp, where applicable. The link was first shared at the beginning of June and a couple of follow-ups were done thereafter. Upon the survey due date, data was collected, compiled and analysed. A total of 21 responses were received. In capturing and analysing the data, no discrepancies were found.

### 1.3.3 CA dis-adopters questionnaire

Thereafter, the dis-adopters questionnaire was developed aimed at assessing the experiences of selected CA dis-adopters concerning their discontinuation of NT or CA practices. The questionnaire included questions on their practice region, current agricultural practices, awareness, knowledge and

skills of NT/CA. It also included questions on which practices were applied and for what duration of time, perceptions and experiences with NT/CA, and factors that influenced the decision to stop NT/CA (see Annexure 4A). An online version of the questionnaire was created using Microsoft Forms (<https://forms.gle/sMSkct2jzKmZZhxn9>). Several attempts were made by the ASSET Research team to reach out to as many NT/CA dis-adopters as possible. Throughout the month of June, a total of 33 farmer key informants were contacted to assist the project team to identify CA dis-adopters. These informants are mostly leader farmers in the South African grain industry or in their regions such as the eastern Free State, north western Free State, North West and Mpumalanga Highveld. Although they had access to potentially hundreds or even thousands of other farmers to share the questionnaire with, only three dis-adopters eventually responded. Data from these three was collected, compiled and analysed. In capturing and analysing the data, no discrepancies were found.

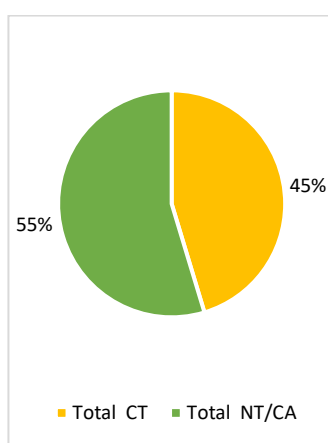
#### **1.3.4 Institutions questionnaire**

Lastly, an institutional survey was developed to ascertain an industry perspective as to the sentiment and experiences concerning NT/CA and the transition to it, both historically and in the future. This questionnaire included sections on affiliation, provision of technical and financial support to farmers, evaluation norms against implementation, awareness and eagerness for CA, expertise and capacity pertaining to CA, prioritisation and interest in advancing CA, perceived concerns and/or misconceptions about CA, thoughts on fundamental reasons why CA is not working at farm level, as well as how institutions contribute to supporting producers to adopt CA (see Annexure 5A). This questionnaire is available on <https://forms.gle/cXRegSMTi8jpRk1s7>. Key institutions in the agribusiness and banking industries were approached and the questionnaire link was sent through email. Six key agribusinesses and six key commercial banks involved in agricultural financiering in South Africa were identified (see the institutions below in the results section). These emails were first shared the beginning of April and were distributed twice. Upon the survey due date, a total of 12 responses were received. This data was collected and carefully consolidated, and each institution was sent their results using the Delphi method that compares each with those against the other responses. In addition to this, a comparative analysis of the two (agribusinesses and financial institutions) was done.

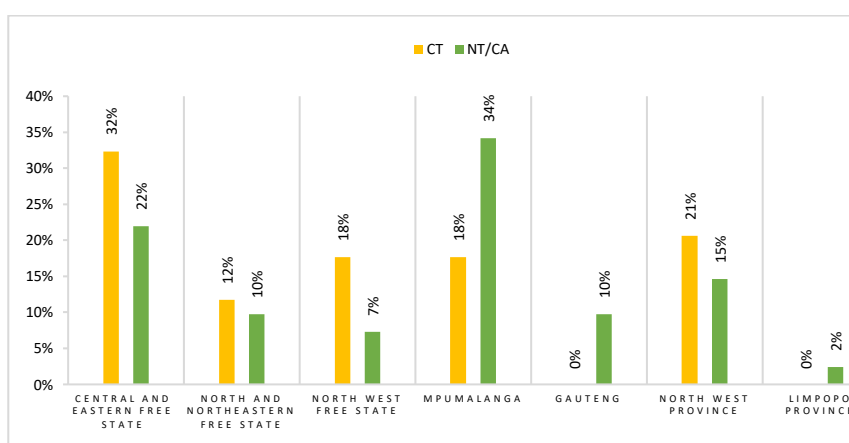
## Chapter 2: General perceptions and sentiments on CA results

### 2.1 Result highlights

The results include data from 34 CT and 41 NT/CA farmers from all seven production regions of South Africa with the majority based in the central and eastern Free State, Mpumalanga and North West provinces (see Figure 1a and 1b). In total, 98% of NT/CA farmers have been aware of and upskilling to NT/CA for more than 5 years, and 78% rated their skill as established. Also, 82% of CT farmers have been aware of NT/CA with only 41% of those actively upskilling to NT/CA for more than 5 years. However, 6% of CT farmers were not aware of NT/CA at all and 26% are not upskilling to NT/CA (see Annexure 2B question 3–5).



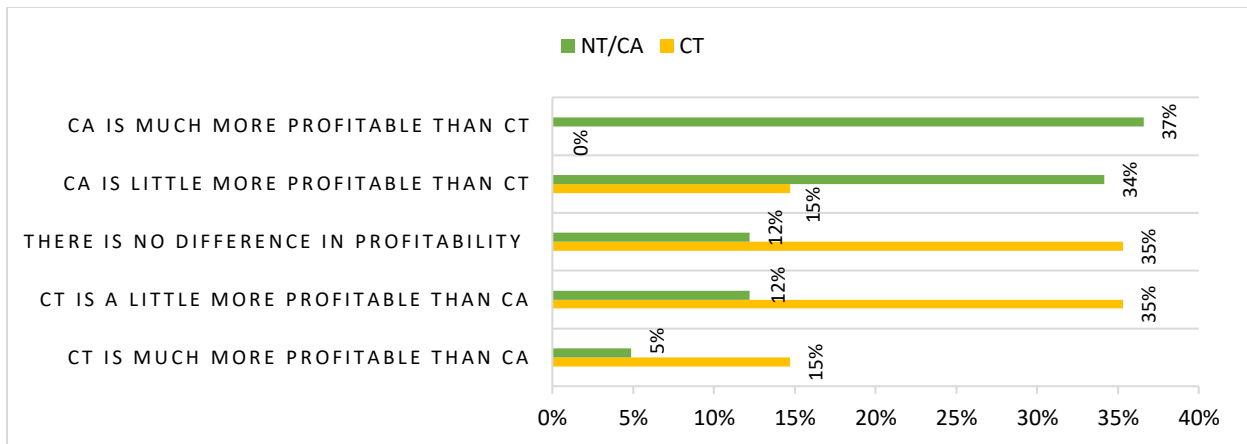
**Figure 1a: Distribution of type of practice farmers do on their crop fields**



**Figure 1b: Distribution regions farmers practice**

Respondents were asked to indicate their thoughts on the difference in profitability between CT and CA. Here, 50% of CT farmers thought that CT was more profitable than CA, 35% thought there was no difference, and 15% thought CA was a little more profitable than CT. Interestingly, 71% of CA farmers thought that CA was more profitable than CT, 12% thought there was no difference, and 17% thought CT was more profitable than CA (see Figure 2).





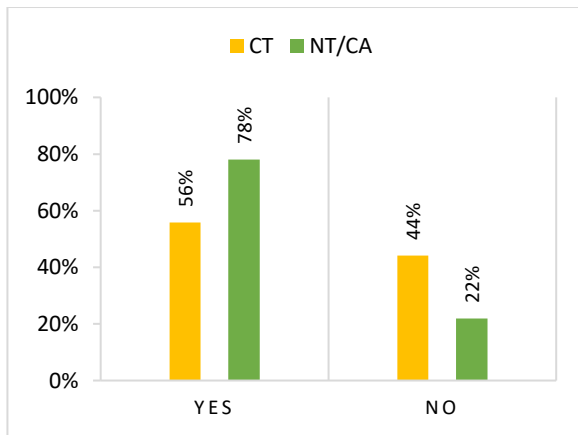
**Figure 2: Farmers' perception on the profitability of CA and CT**

In response to factors influencing farmers to change (Question 7) and not to change (Question 8) to NT/CA, most CT farmers indicated that soils and climate had the biggest influence to change or not to change to NT/CT, while NT/CA farmers rated lack of/sufficient awareness, knowledge and skills as the biggest influence. Access to research data and results, capital or finance, and technical advisory support were also rated to have significant influence (see Annex 2B questions 7 and 8).

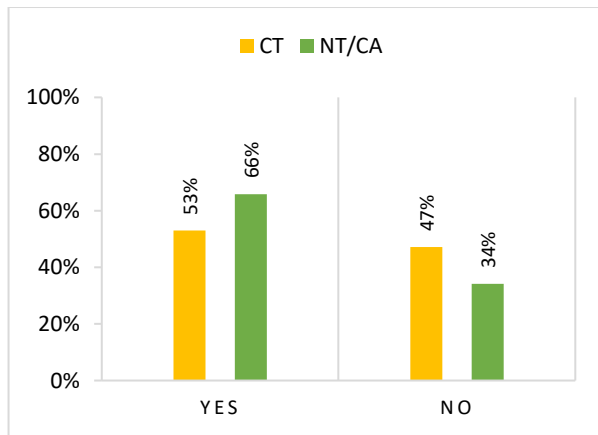
Other farmers mentioned additional factors such as precision technology, crop rotation restrictions, the timeframe of benefits, transition costs, yield loss during conversion, fear of change, and soil type (classification), among others.

When asked if farmers had access to sufficient and appropriate technical and advisory support to convert to CA right now, most of both CT (56%) and NT/CA (78%) farmers said "Yes", while 44% CT and 22% NT/CA farmers said "No" (Figure 3a). To this, both CT and NT/CA farmers agreed that the biggest components in need of technical and advisory support to change to NT/CA are weed management and the availability of new herbicides as well as soil health and fertility management (see Annex 2B question 10).

In terms of capital or financial assistance to convert right now, likewise most of both CT (53%) and NT/CA (66%) farmers said "Yes" while 47% CT and 34% NT/CA said "No" (Figure 3b). Here, both CT and NT/CA farmers also agreed that the biggest component in need of financial capital to change was equipment (including tractors, no-till planters, sprayers, etc.) and risk mitigation (see Annex 2B question 12).



**Figure 3a: Farmer's access to sufficient and appropriate technical and advisory support to convert to CA now**



**Figure 3b: Farmer's access to enough capital or financial assistance to convert to CA now**

## 2.2 Discussion

This questionnaire was designed to acquire perceptions, sentiments and experiences concerning CT and NT/CA, and the conversion process from CT to NT/CA. The inputs received provided a large set of significant findings.

### Awareness

- Almost all CT farmers were aware of NT/CA (94%) and only 6% were not aware.
- However, 26% were not upskilling to NT/CA at all which implies that 20% of those that are aware have chosen not to upskill.
- Majority of those who are upskilling (66%) rated their skill as small scale/trial level, novice or intermediary. While 3% rated themselves as established and 32% rated not practicing at all. The latter might indicate some discrepancy as in the previous question only 26% said they were not upskilling at all. It seems the difference is due to farmers who stated they had been practicing NT/CA between 1 and 3 years then proceeded to answer that they were not practicing NT/CA at all when requested to rate their skill.
- Almost all NT/CA farmers have been practicing and upskilling for more than 5 years which may explain why majority rated their skill as established or intermediary.

### Profitability

- Half of CT farmers perceive CT to be more profitable than NT/CA this might imply that these CT farmers are still profitable or have a perception of reduced profit or higher cost of production under NT/CA.
- Indeed the 15% that think CT is much more profitable are not practicing CA at all and the rest practice in small scale, are novice and intermediate.
- Only 15% of CT farmers think that CA is a little more profitable than CT. This could imply that such farmers have started to see a decline in their profitability.

- However, none think that CA is much more profitable than CT which is an interesting finding that may indicate a degree of scepticism on the potential of CA to offer high profits.
- More than half of CA farmers on the other hand think that CA is more profitable than CT. This is an interesting finding since most of the farmers have been practicing for more than 5 years.
- Very few think there is no difference in profitability to CT, and 17% believe CT is more profitable. Interestingly, these are all farmers who have been practising for more than 5 years and include those who have rated their skill as small scale, intermediary and established (most being established).
- The 5% who think CT is much more profitable has been practicing for more than 5 years and are established. This could imply that they are still at a stage of reduced profits in the transition period and are exposed to margins that are lower than when they practiced CT. There could also be other factors contributing to this.

#### Factors that influence farmers not to change

- Soils and climate were the most rated factors of influence for CT farmers. This implies that the biggest perceived barrier for most farmers is the state or type of their soils, and the risks or challenges associated with climate variability.
- The second most rated factor of influence was the lack of research data and results, indicating that farmers have a need for appropriate research data and results that prove the feasibility and success of NT/CA in their region or contexts, which might nudge them to convert to NT/CA.
- An important factor shown to be the lack of capital or finances, implying that the capital and finances required to convert is indeed a great concern for farmers.
- Lack of technical advisory support and lack of awareness, knowledge and skill were also significantly acknowledged, especially by CT farmers.
- Interestingly, NT/CA farmers highlighted a lack of awareness, knowledge and skill as the biggest factor of influence followed by a lack of technical advisory support. They clearly seemed to have suffered from these shortcomings in their transition period.
- Both groups do agree, however, that policies and government support is the least barrier.

#### Factors that influence farmers to change

- The top three factors that influence CT farmers to change are soil and climate, sufficient awareness, knowledge and skill, and access to capital. This indicates that nature (awareness) can push farmers to change; however, they will also need sufficient knowledge, enhanced skill and enough capital and finance for CT farmers to pursue that change.
- Looking at NT/CA farmers, it seems that they were stirred or inspired by sufficient awareness, knowledge and skills to change, together with access to research data and results, and access to technical advisory and support. This indicates that support is an essential factor in the conversion to or practice of NT/CA. Soil and climate were also indicated as a great influence.
- The results also reveal a need for sound research data and results to convince and aid farmers to change.
- The sometimes large differences (almost opposite views or perceptions) between the two groups of farmers could be explained by the aggregated effect of all the factors NT/CA farmers experienced during their transition and implementation period, which was initiated by a deep awareness of the need to change.

### Access to sufficient and appropriate technical and advisory support

- Access to technical advisory support was rated fourth under both factors that influence CT farmers to change or not to change to NT/CA.
- Interestingly, more than half of CT farmers said they have enough technical advisory support to immediately convert to CA. However, there is still almost half of CT farmers without that access. This explains why it was rated fourth as a barrier.
- This factor is also highlighted as of importance by NT/CA farmers that rated it top three factors of influence to change.
- Although NT/CA rates this factor highly, 22% of these farmers indicated not having this access.
- Surprisingly, this included established NT/CA farmers as well who by implication have been starting and practicing it without that support.

### Biggest components in need to technical advisory support

- Both CT and NT/CA farmers rated weed management and (availability of new) herbicides as a component that needs the most support of all followed by soil health and fertility management. This correlates with practical and research experiences in the field.
- Both groups have rated all components as relatively similar with minor variations that do not impose significant differences in perception. This suggests that technical and advisory needs is similar under both systems.
- Pest and disease management may exhibit minor variations.

### Access to enough capital or financial assistance to convert to CA right now

- Lack of access to capital and finance was one of the top-rated factors that influence farmers not to change to CA. It is therefore not surprising to find that almost half of CT farmers (47%) do not have enough capital or finance to change. It is, however, surprising that even without enough to convert, 81% of these farmers are upskilling at some level.
- Most CT farmers however do have enough capital and finance (53%) and although access was rated as the third factor that influences change, it is positive that 67% of these farmers are already upskilling to NT/CA.
- More than half (66%) of NT/CA farmers have enough capital or finance to convert to CA, however, 34% of them do not.
- All of those who do not have access to capital or finance have been practising for more than 5 years and 57% of them rated their skill as established, 29% as intermediary, and 14% are practicing at small scale.
- These findings suggest starting on small scale as a viable strategy for CT farmers willing to start the conversion process without access to enough capital or finance.

### Biggest components in need of financial capital to change to NT/CA

- Both CT and NT/CA farmers rated equipment (including tractors, no-till planters, sprayers, etc.) as a component that needs the most support of all followed by risk mitigation. This finding support existing literature showing the huge contribution that equipment makes out in the farming budget (Maluleke et al. 2024). It also implies that farmers have found that risk mitigation strategies may be costly and need sufficient financial capital.

- Livestock integration was also identified as another key component that needs financial capital. This is one of the biggest reasons for an initial reduction in profits at the transition phase which has also be recalled as the J-curve.

## 2.3 References

Food and Agriculture Organisation (FAO). 2011. *Save and Grow: A Policymaker's Guide to the Sustainable Intensification of Smallholder Crop Production*. Rome: FAO, 1–37.

Maluleke, M., Van Schalkwyk, N., De Beer, A., Smith, H., Blignaut, J., Knot, J., Trytsman, G., and Erasmus, L. 2024. Comparing the financial benefits of different grain production systems in South Africa's summer rainfall region. *South African Journal of Science*, 120(7/8). <https://doi.org/10.17159/sajs.2024/17091>.

## 2.4 Annexure 2A: Questionnaire outline

### Project aim

The project aim is to conduct a farm-level financial analysis of different farming systems in selected maize-based regions of South Africa.

### Funder

The Maize Trust

### Implementing agency

ASSET Research (<https://assetresearch.org.za/conservation-agriculture/>)

### Research team

Drs James Blignaut ([inblignaut@gmail.com](mailto:inblignaut@gmail.com)) and Hendrik Smith ([smith.hendrik@gmail.com](mailto:smith.hendrik@gmail.com)), Ms Mary Maluleke ([maryameliamaluleke@gmail.com](mailto:maryameliamaluleke@gmail.com)), Ms Petru Fourie ([petru.fourie@gmail.com](mailto:petru.fourie@gmail.com))

### Collaborators

Grain industry (Grain SA, SAGRA, study groups, etc.), Agribusiness (co-ops, banks, etc.)

### The objective of this qualitative farmer survey

An assessment of the general perceptions concerning the conversion from CT to NT/CA.

## Research method

A short questionnaire that can be completed in less than 15 minutes asking responding farmers their perceptions and sentiments concerning CT and NT/CA and the conversion process based on a Likert scale.

**Due Date: 15 March 2024**

**NB: Feedback and communication of survey results are viewed as a priority.**

1. What **practice** are you doing on your grain crop fields?
  - i. Conventional or reduced tillage (CT)
  - ii. No-tillage and/or conservation agriculture (NT or CA)
  
2. In which **region** do you farm?
  - i. Central and Eastern Free state
  - ii. North and Northeastern Free State
  - iii. North West Free State
  - iv. Mpumalanga
  - v. Gauteng
  - vi. North West Province
  - vii. Limpopo Province
  
3. How long have you been **aware** of NT/CA?
  - i. Not aware of
  - ii. Less than a year
  - iii. Between 1 and 3 years
  - iv. Between 3 and 5 years
  - v. More than 5 years
  
4. How long have you been actively **upskilling** yourself pertaining to NT/CA?
  - i. Not at all
  - ii. Less than a year
  - iii. Between 1 and 3 years
  - iv. Between 3 and 5 years
  - v. More than 5 years
  
5. How would you rate your skill in **practicing** NT/CA?
  - i. Not practicing at all
  - ii. Small scale or at trial level
  - iii. Novice
  - iv. Intermediary
  - v. Established
  
6. What do you think is the difference, if at all, in the **profitability** between CA and CT?
  - i. CT is much more profitable than CA
  - ii. CT is a little more profitable than CA

- iii. There is no difference in profitability
- iv. CA is little more profitable than CT
- v. CA is much more profitable than CT

7. a. How do you rate the following factors' influence on farmers **NOT to change** to NT/CA?

Give each a score out of 10.

Factor	Score out of 10 (10 = biggest influence)
Soils and climate	
Lack of awareness, knowledge and skills	
Lack of capital or finances	
Lack of technical advisory support	
Lack of research data and results	
Policies and government support	

b. Please state **any other factors** that influence farmers' **NOT** to change to NT/CA. If **not listed above** and give each a score out of 10.

8. a. How do you rate the following factors' influence on farmers **to change** to NT/CA?

Give each a score out of 10.

Factor	Score out of 10 (10 = biggest influence)
Soils and climate	
Sufficient awareness, knowledge and skills	
Access to capital or finances	
Access to technical advisory support	
Access to research data and results	
Policies and government support	

b. Please state **any other factors** that influence farmers **TO** change to NT/CA. If **not listed above** and give each a score out of 10.

9. If you want to convert to CA right now, do you have access to sufficient and **appropriate technical and advisory support** to do so?

- i. No
- ii. Yes

10. a. What are the biggest **components** in need of technical and advisory support to change to NT/CA?

Give each a score out of 10.

Factor	Score out of 10 (10 = biggest influence)
Soil health and fertility management	
Cover crops	
Livestock integration	
Agronomy: cash crop selection & rotations	
Weed management and herbicides; Pest and disease management	

Financial planning and analyses	
Starting with NT/CA	

b. Please state **any other biggest components** in need of technical and advisory support to change to NT/CA? If **not listed above** and give each a score out of 10.

11. If you want to convert to CA right now, do you have enough **capital or financial assistance** to do so?
- i. No
  - ii. Yes

12. a. What are the biggest **components** in need of financial capital to change to NT/CA? Give each a score out of 10.

Factor	Score out of 10 (10 = biggest influence)
Equipment (including tractors, no-till planters, sprayers, etc.)	
Livestock (for integrated crop-livestock CA systems)	
Infrastructure (e.g. fencing, water reticulation, etc.)	
Input costs	
Overhead costs (salaries, maintenance, etc.)	
Risk mitigation	

b. Please state **any other biggest components** in need of technical and advisory support to change to NT/CA? If **not listed above** and give each a score out of 10.

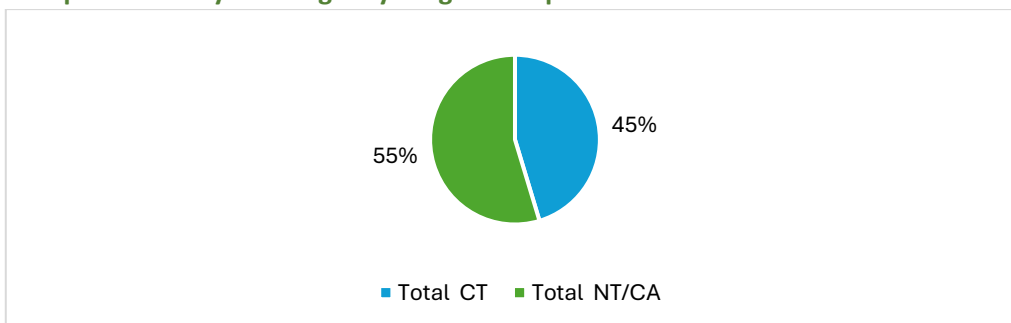
## 2.5 Annexure 2B: Result details

*n*: CT = 34

*n*: NT/CA = 41

*n*: Total = 75

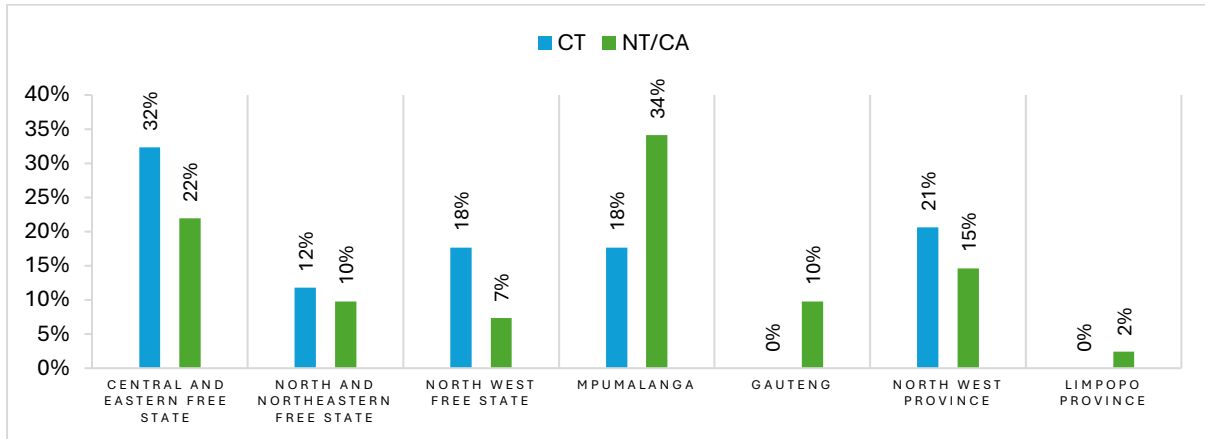
1. **What practice are you doing on your grain crop fields?**



Most of the responses came from NT/CA famers.

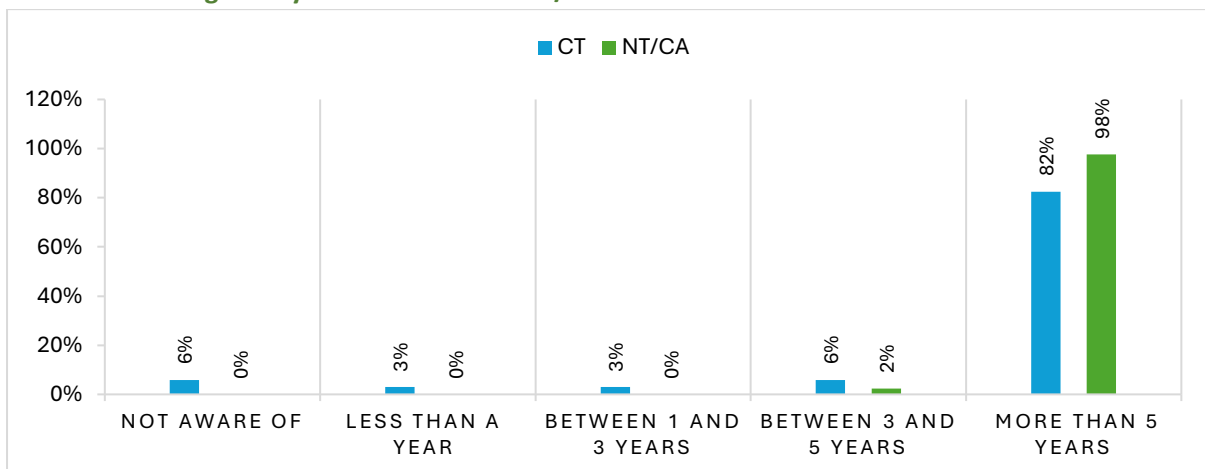


## 2. In which region do you farm?



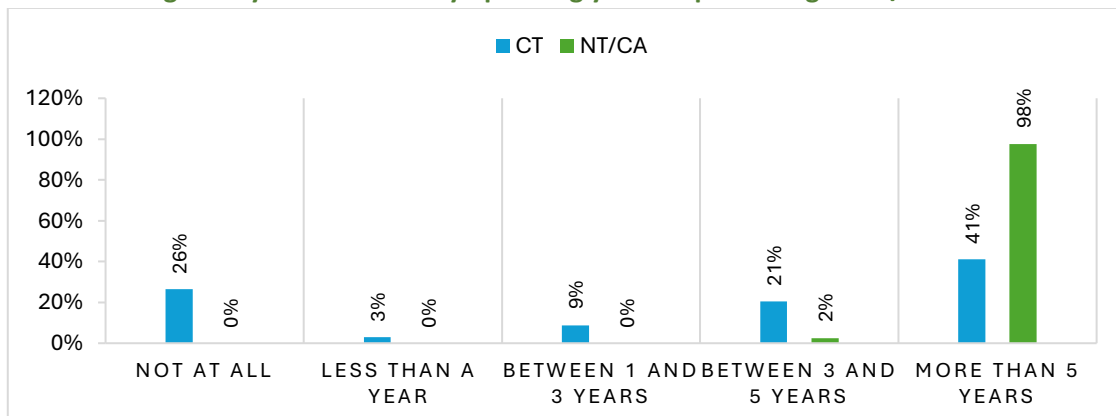
Majority of CT respondents farm in the central and eastern Free State and majority of NT/CA in Mpumalanga.

## 3. How long have you been aware of NT/CA?



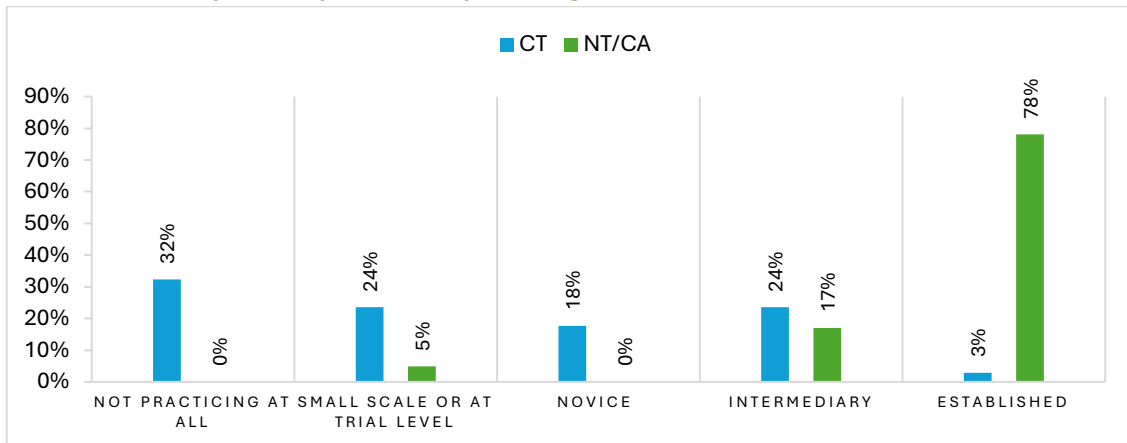
Most CT and NT/CA farmers have been aware of NT/CA for more than 5 years.

## 4. How long have you been actively upskilling yourself pertaining to NT/CA?



Most NT/CA farmers (98%) have been actively upskilling pertaining to NT/CA for more than 5 years; 41% of CT farmers have been actively upskilling pertaining to NT/CA.

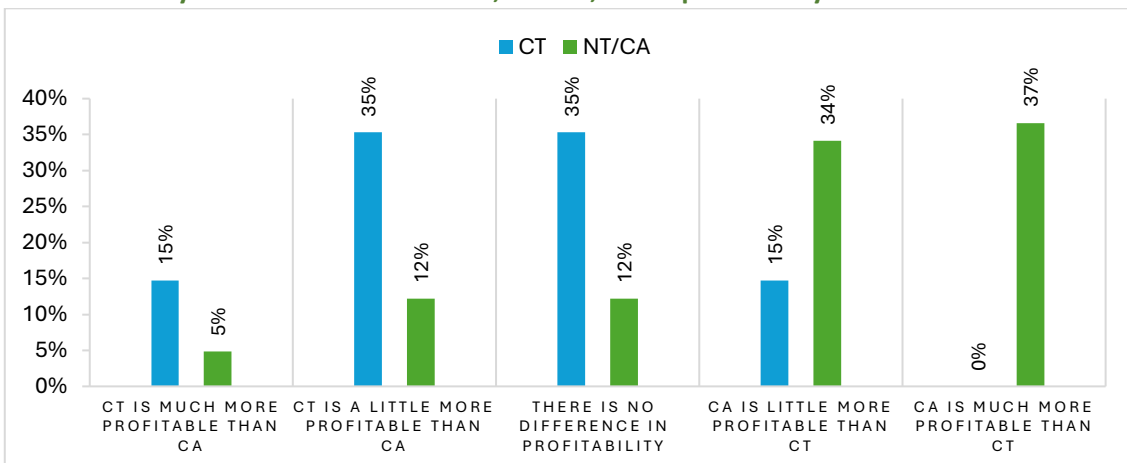
### 5. How would you rate your skill in practicing NT/CA?



**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “least” and 10 = “biggest”. The blue bars reflect the percentage for CT farmers while the green reflects those for NT/CA farmers.

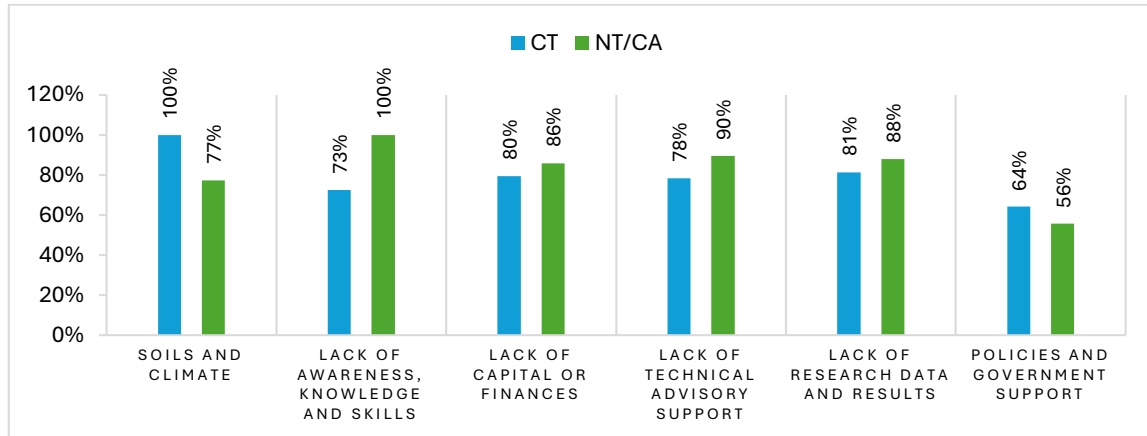
78% of NT/CA farmers rated their skills in practicing NT/CA as established, while 32% of CT farmers are not practicing NT/CA at all and 24% of them practice it at small scale or at trial level.

### 6. What do you think is the difference, if at all, in the profitability between CA and CT?



In terms of profitability, most CT farmers think that there is little to no difference in profitability between in CT and CA, while most CA farmers think that there is little to no difference in profitability between CT and CA.

7. a) How do you rate the following factors' influence on farmers NOT to change to NT/CA?



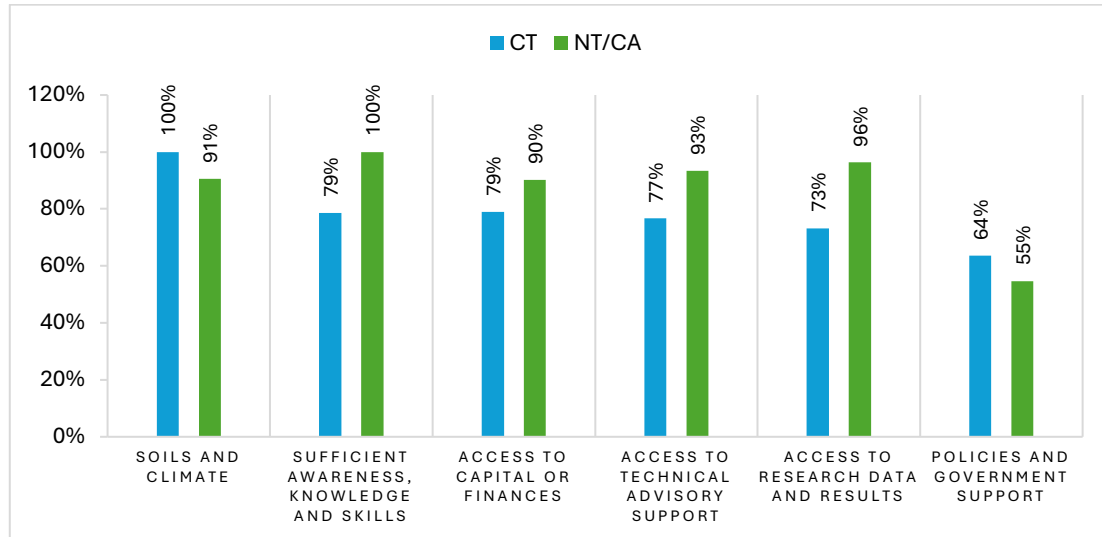
**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “least” and 10 = “biggest”. The blue bars reflect the percentage for CT farmers while the green reflects those for NT/CA farmers.

CT famers indicated soils and climate as the biggest influence not to change to NT/CT followed by lack of research data and results. NT/CA famers rated lack of awareness, knowledge and skills as the biggest influence followed by lack of technical advisory support.

b) Please state any other factors that influence farmers' NOT to change to NT/CA. If not listed above and give each a score out of 10.

Comments	Rating
Precision technology is required, but is very expensive	10
NT/CA it is save time and capital. Let us go for profit	Not provided
Ground does not allow NT	Not provided
Public opinion, lack of successful examples in our area	Not provided
Resistance of weeds to herbicide; I moved back to CT and tilled all my fields.	8
Integrated livestock branching	9
Crop rotation restrictions	7
Takes too long	Not provided
Financial	Not provided
Soil Chemistry quality not up to standard to apply NT.	Not provided
Cost of herbicides versus tillage.	Not provided
The yield loss for the first few years during the conversion	Not provided
Fear of change.	Not provided

8. a) How do you rate the following factors' influence on farmers to change to NT/CA?



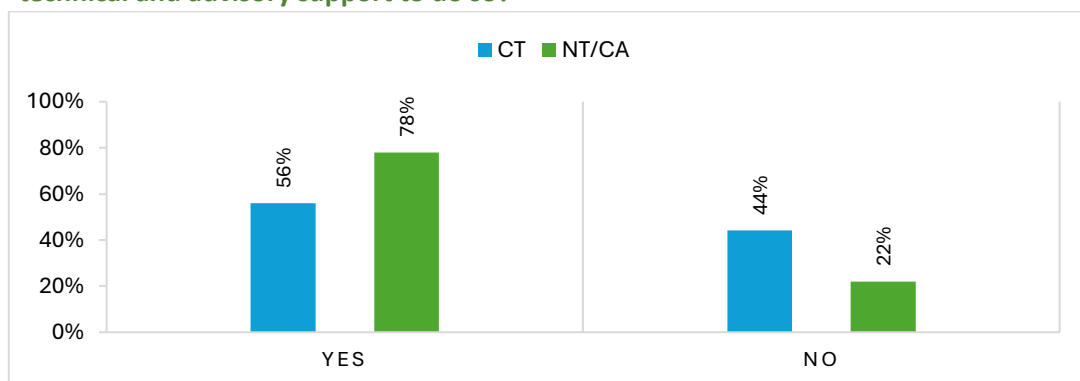
**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “least” and 10 = “biggest”. The blue bars reflect the percentage for CT farmers while the green reflects those for NT/CA farmers.

Soils and climate are perceived to have the biggest influence in CT farmer’s decision to change to NT/CA. NT/CA farmers rated that as sufficient knowledge, awareness and skills.

9. b) Please state any other factors that influence farmers TO change to NT/CA. If not listed above and give each a score out of 10.

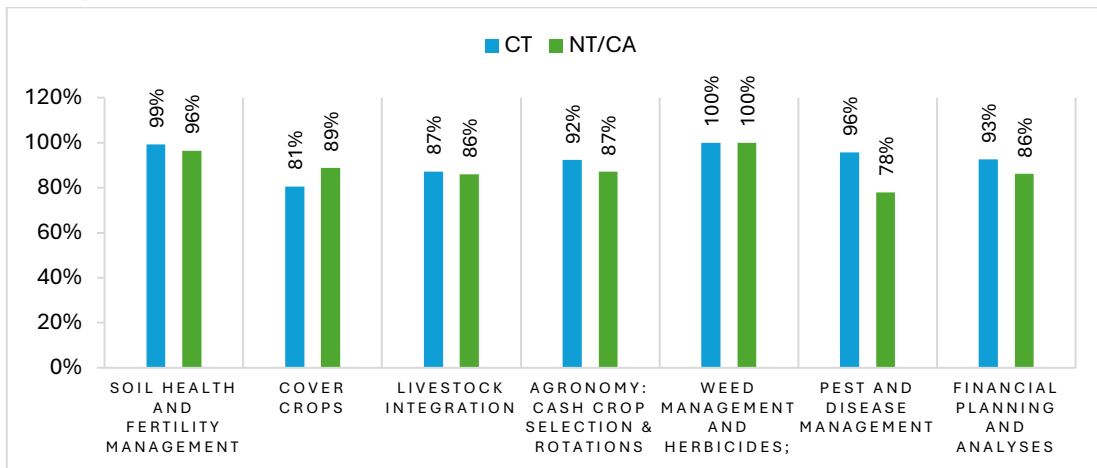
Comments	Rating
Precision technology is required, but is very expensive	10
Lack of support	8
Soil type does not allow NT	
Soil classification. Ground Does Not Allow NT. Only 4% of countries are suitable for NT	

10. If you want to convert to CA right now, do you have access to sufficient and appropriate technical and advisory support to do so?



Most CT famers have access to sufficient and appropriate technical and advisory support to convert to CA right now, and even more NT/CA farmers do.

**11. a) What are the biggest components in need of technical and advisory support to change to NT/CA?**



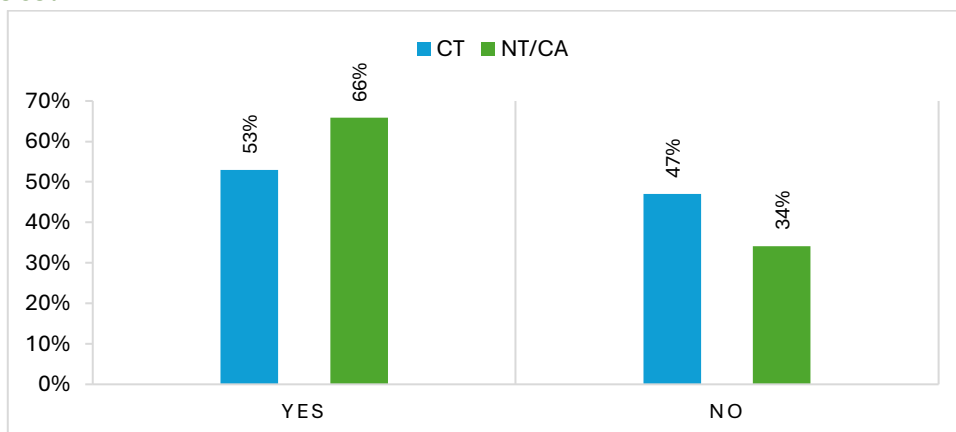
**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “least” and 10 = “biggest”. The blue bars reflect the percentage for CT farmers while the green reflects those for NT/CA farmers.

According to both CT and NT/CA farmers, the biggest components in need of technical and advisory support to change to NT/CA are weed management and herbicides as well as soil health and fertility management.

**b) Please state any other biggest components in need of technical and advisory support to change to NT/CA? If not listed above and give each a score out of 10.**

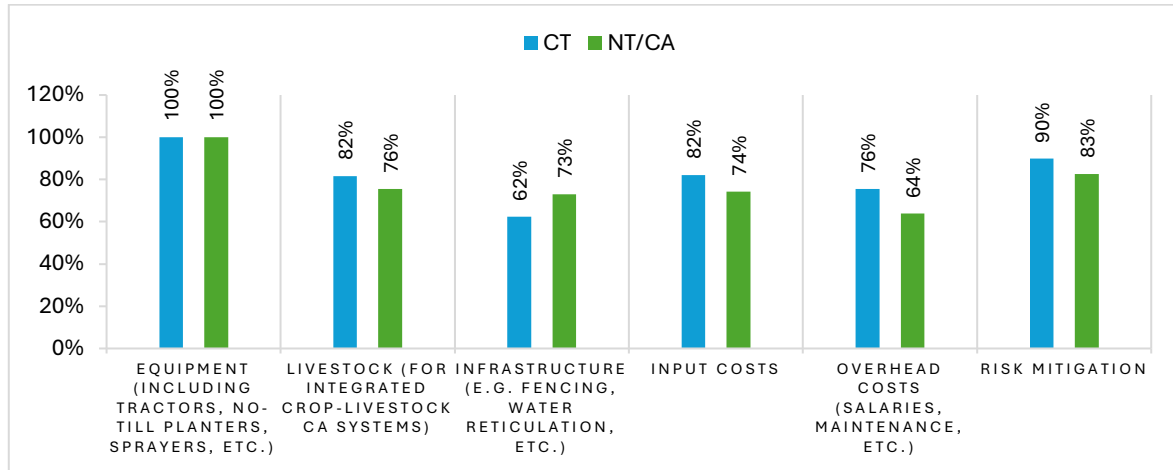
Comments	Rating
Precision technology is required, but is very expensive	10
Relevant research results	8

**12. If you want to convert to CA right now, do you have enough capital or financial assistance to do so?**



Most CT farmers have enough capital or financial assistance support to convert to CA right now, and most NT/CA farmers do as well.

13. a) What are the biggest components in need of financial capital to change to NT/CA?



**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “least” and 10 = “biggest”. The blue bars reflect the percentage for CT farmers while the green reflects those for NT/CA farmers.

Both CT and NT/CA farmers need perceive equipment (including tractors, no-till planters, sprayers, etc.) to need the biggest financial capital. Risk mitigation was also rated highly.

b) Please state any other biggest components in need of financial capital to change to NT/CA? If not listed above and give each a score out of 10.

Comments	Rating
Precision technology is required, but is very expensive	10
Change planters to no till	7
All input costs rising. To change anything costs Millions.	Not Provided

## Chapter 3: CA farmers' experiences results

### 3.1 Result highlights

#### Key factors that motivated the decision to change from CT to NT/CA

The results include data from 21 CA farmers from six production regions of South Africa with the majority based in the central and eastern Free State and Mpumalanga (see Figure 4). When asked about factors that motivated their decision to change from CT to NT/CA, the majority of farmers indicated that adverse soils and climate conditions were top motivating factors (higher than the average), and to some extent increases in awareness, knowledge and skills, which were slightly more positive than negative. Policies and government support, and access to capital or finance were considered to have the least motivation to change (all were lower than the average) (see Figure 5).

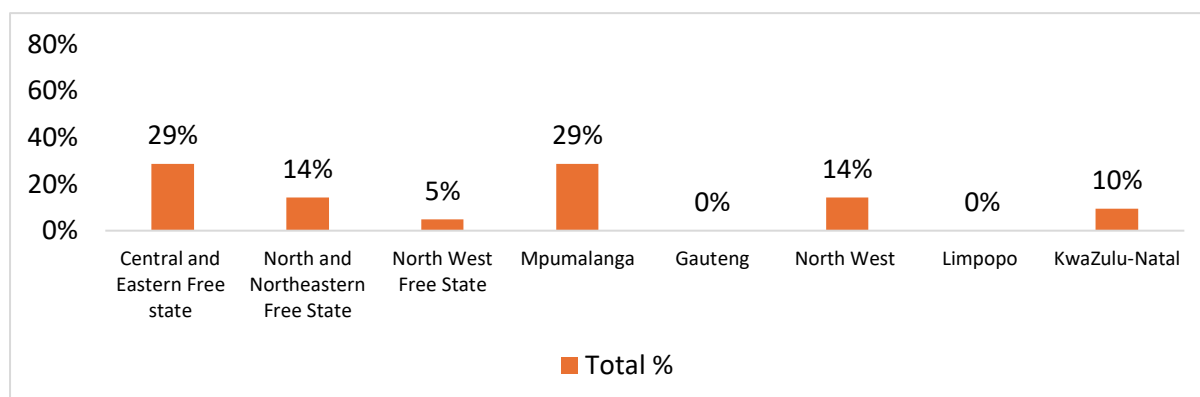


Figure 4: Distribution of regions of the farms

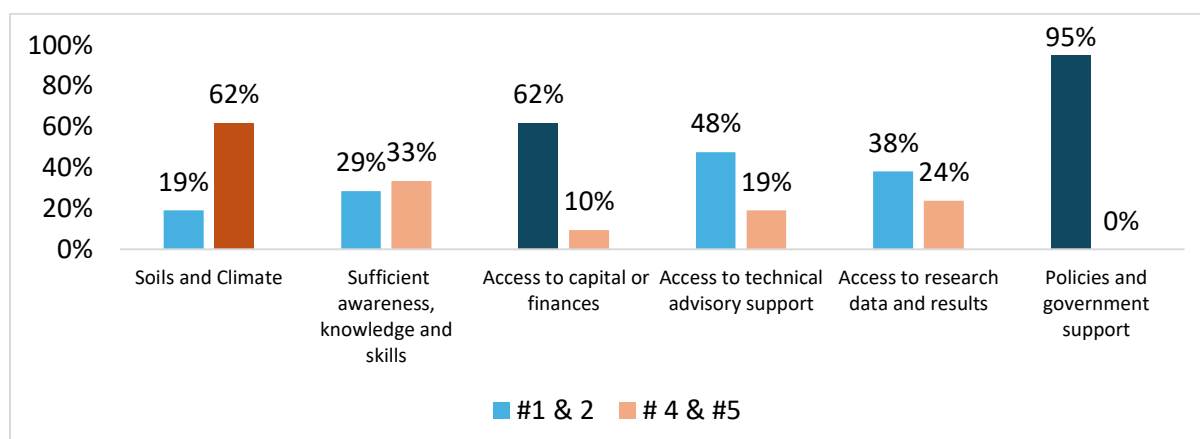
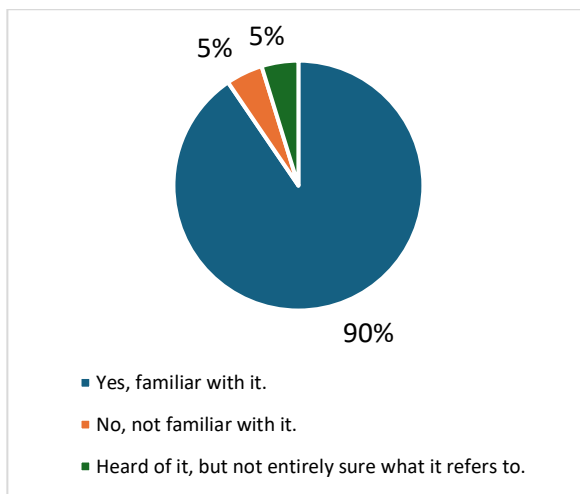


Figure 5: Key factors that motivated the decision to change from CT to NT/CA

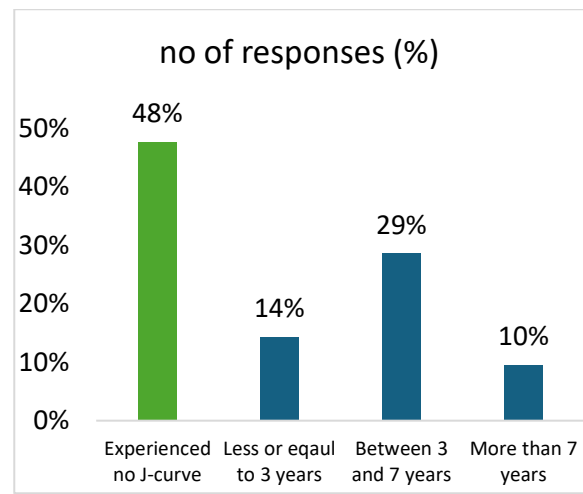
**Note:** Farmers were asked to indicate their answers on a scale of 1 to 5, with 1 = “no or little” and 5 = “very high”. The blue bars reflect the percentage of the sum of the 1s and 2s out of the total number of responses received, with the light brown bars the percentage of sum of the 4s and 5s. The percentage does not add to 100%; the balance being those that scored 3. The highlighted blue and brown bars indicate the major reasons.

### Farmers’ familiarity and experience with the concept of the J-curve

Of all farmers, 90% said to be familiar with the concept of the J-curve, while 5% were not and the rest had heard of it but were not entirely sure what it refers to (see Figure 6). When asked if they had experienced the impact of the J-curve, almost half (48%) had not, 14% had but for less than 3 years, 29% between 3 and 7 years, and 10% for more than 7 years (see Figure 7).



**Figure 6: Farmers’ familiarity with the J-curve**



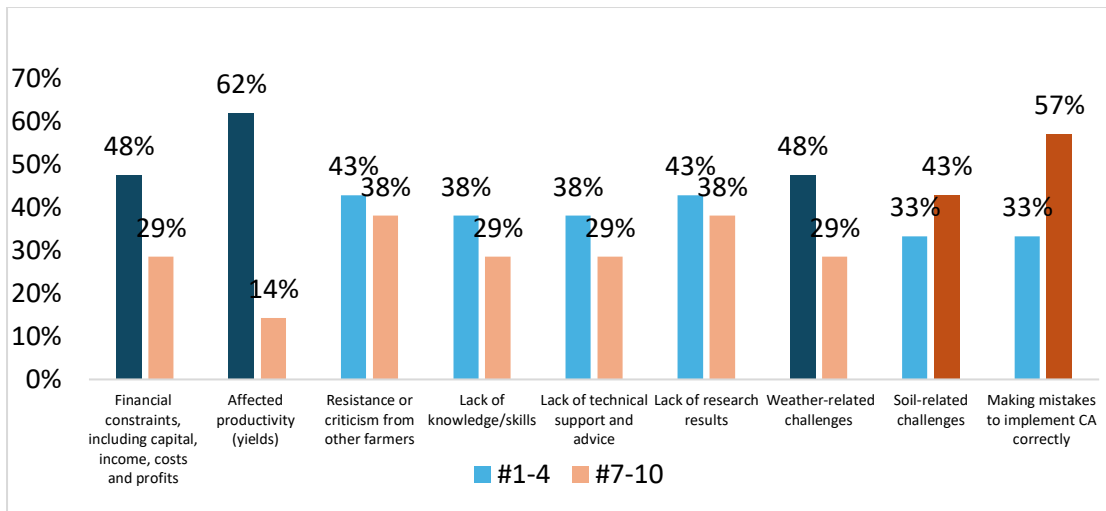
**Figure 7: Years farmers experienced the J-curve**

**Note:** Farmers were asked to indicate their experience of the J-curve in years with the option to select 0 = “have not experienced” or state the “number of years it took to go through it”. Their answers were categorised as either 0 = experience no J-curve, 1–2 = less than or equal to 3 years, 4–7 = between 3 and 7 years, and 8+ = more than 7 years. The graphs reflect the percentage of the sum of each category out of the total number of responses received.

### General challenges faced during the transition period

Farmers further indicated that their biggest challenges faced during the transition period were making mistakes to implement CA correctly and soil related challenges. Contrary to expectation, affected productivity (yields), financial constraints, and weather-related challenges imposed the least challenge on most of the farmers (see Figure 8).



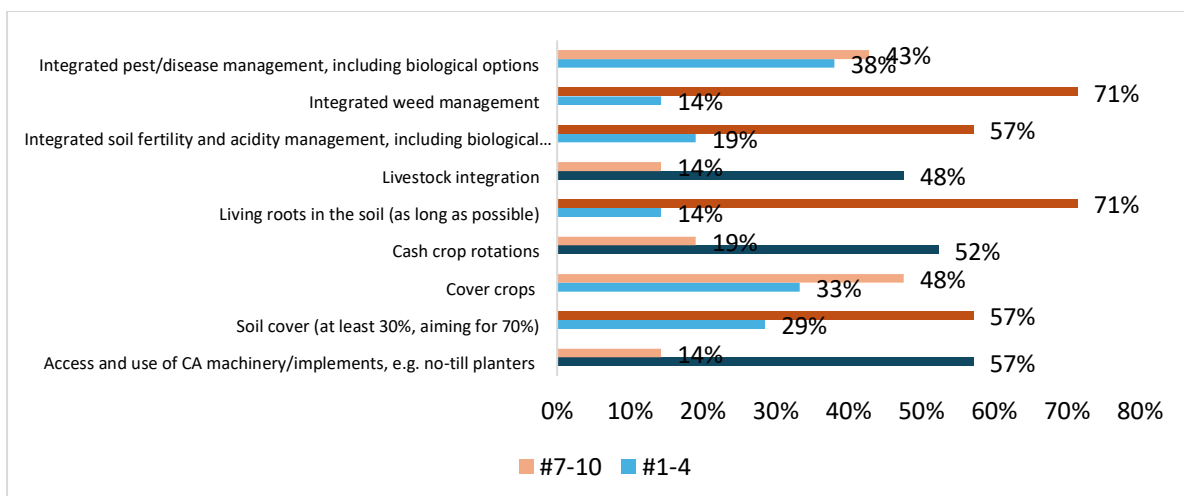


**Figure 8: General challenges faced during the transition period**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or little” and 10 = “very high”. The blue bars reflect the percentage of the sum of the 1s to 4s out of the total number of responses received, with the light brown bars the percentage of sum of the 7s to 10s. The percentage does not add to 100%; the balance being the sum of those that scored 5s and 6s. The highlighted blue and brown bars indicate the major reasons.

#### Level of difficulty farmers faced with different CA practices during the transition period

More specifically, farmers were asked to indicate their level of difficulty faced with different CA practices during the transition phase and the following principles were rated most difficult: integrated weed management, living roots in the soil, integrated soil fertility and acidity management, and soil cover. Of the principles, most farmers rated livestock integration, cash crop rotation, and access and use of CA machinery/implements to be, on average, the least difficult to implement (see Figure 9).



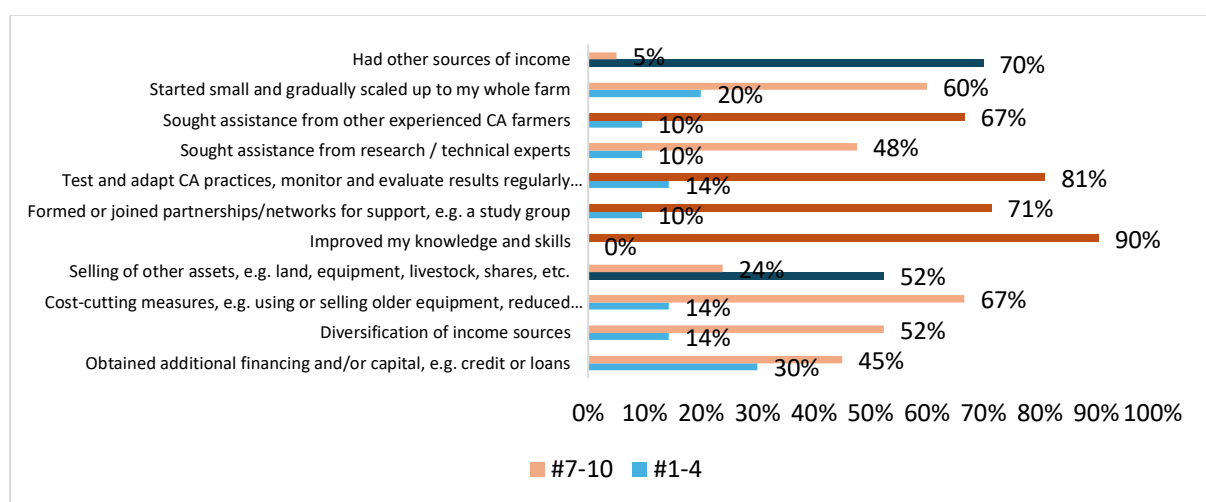
**Figure 9: Level of difficulty farmers faced with different CA practices during the transition period**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or little” and 10 = “very high”. The blue bars reflect the percentage of the sum of the 1s to 4s out of the total number of responses received, with the light brown bars the percentage of sum of the 7s to 10s. The percentage does not add to 100%; the balance being the sum of those that scored 5s and 6s.

100%; the balance being the sum of those that scored 5s and 6s. The highlighted blue and brown bars indicate the major reasons.

### How farmers managed to overcome the above challenges during the transition phase

Farmers were asked to indicate how they managed to overcome a list of common challenges in the transition phase. To this, improvement of farmer’s knowledge and skill; (on-farm) testing and adapting of CA practices, regular monitoring and evaluation of results; formed or joined partnerships/networks for support; and sought assistance from research/technical experts, were used most to manage or overcome challenges during the transition phase. The following strategies were the least commonly used to manage or overcome challenges during the transition phase: using other sources of income and selling of other assets.

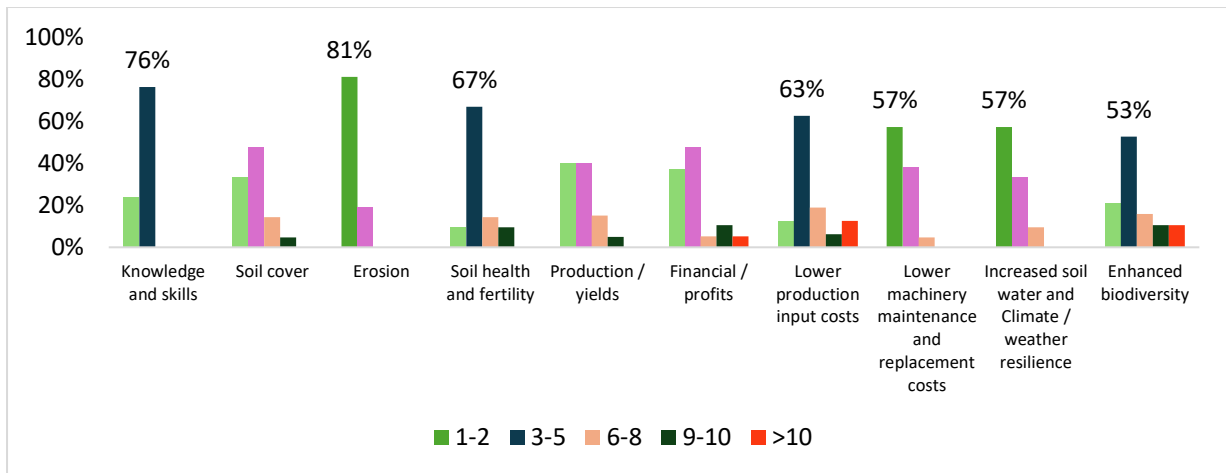


**Figure 10: How farmers managed to overcome the above challenges during the transition phase (J-curve)**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or little” and 10 = “very high”. The blue bars reflect the percentage of the sum of the 1s to 4s out of the total number of responses received, with the light brown bars the percentage of sum of the 7s to 10s. The percentage does not add to 100%; the balance being the sum of those that scored 5s and 6s. The highlighted blue and brown bars indicate the major reasons.

### The duration of time it took before farmers observed any positive changes or benefits

There were varied responses to the duration of time it took before farmers observed any positive changes or benefits following the initial dip in productivity or income (see Figure 11). The results indicate that most farmers saw positive changes in erosion, lower machinery maintenance and replacement costs, and increased soil water and climate/weather resilience between 1 and 2 years. Knowledge and skills, soil health and fertility, lower production input costs, and improved biodiversity were found, by most farmers, to yield benefits after 3 to 5 years. Positive changes or benefits from financial profits and production/yields were said to mostly translate between 1 and 5 years with some farmers indicating it took them between 6 and 10 years.

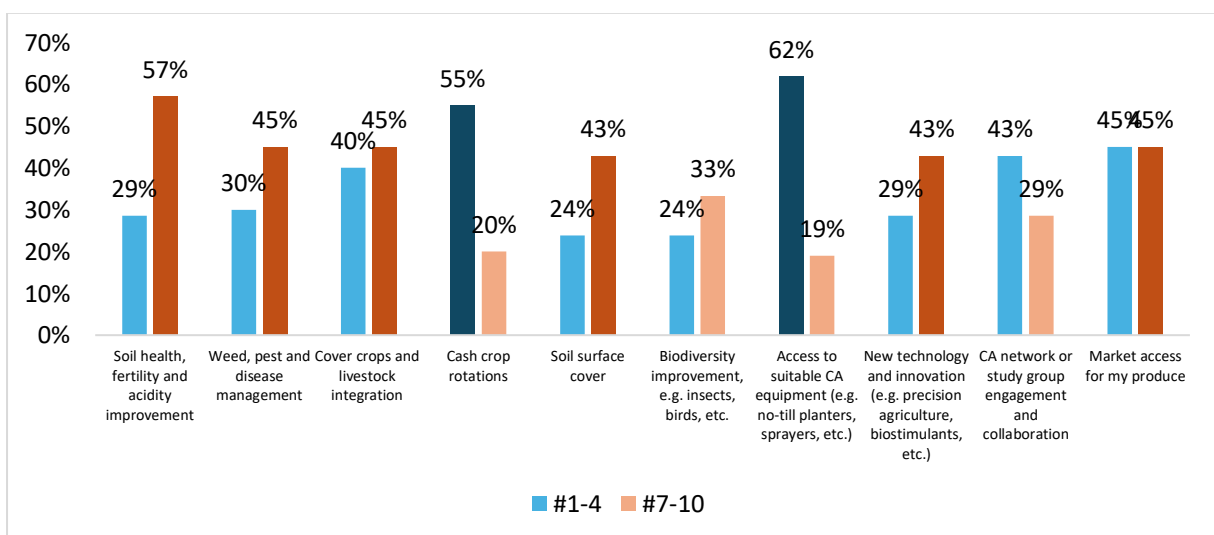


**Figure 11: The duration of time it took before farmers observed any positive changes or benefits following the initial dip in productivity or income**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10 years, with an additional option of more than 10 years as well. The green bars reflect the percentage of the sum of the 1s and 2s out of the total number of responses received; the blue bars reflect those of the 3s to 5s; the light brown bars those of the 6s to 8s; the grey bars those of the 9s and 10s; with the red bars reflecting those greater than 10. The percentage add to 100%, and the highlighted colour bars indicate the major reasons.

### The biggest gaps, challenges or areas for improvement in farmers' CA practices

When asked where farmers have the biggest gaps, challenges or areas for improvement in their CA practices currently, after the transition period, farmers indicated the following: soil health, fertility and acidity improvements was rated the most. This was followed equally by weed, pest and disease management, cover crops and livestock integration, and market access for produce. Again, access to suitable CA equipment and cash crop rotations were considered the least (see Figure 12).

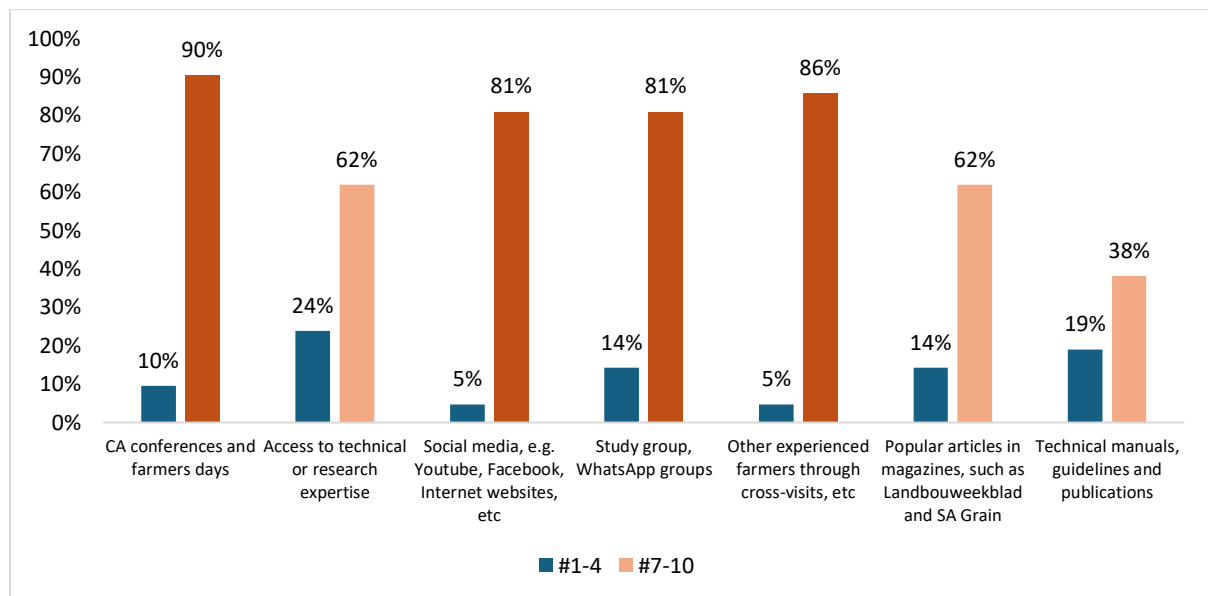


**Figure 12: The biggest gaps, challenges or areas for improvement in their CA practices right now (after the transition period)**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “least” and 10 = “most”. The blue bars reflect the percentage of the sum of the 1s to 4s out of the total number of responses received, with the light brown bars the percentage of sum of the 7s to 10s. The percentage does not add to 100%; the balance being the sum of those that scored 5s and 6s. The highlighted blue and brown bars indicate the major reasons.

### Support and resources most helpful for information and advice during the transition process.

All listed methods of support and resources were found reasonable and most helpful for information and advice during the transition process by most of the farmers (see Figure 13). However, CA conferences and farmers’ days were found the most helpful followed by other experienced farmers through cross-visits, etc., study groups (including WhatsApp groups), and social media, e.g. YouTube, Facebook, Internet websites, etc. Interestingly, technical manuals, guidelines and publications were the least helpful relatively.



**Figure 13: Support and resources most helpful for information and advice during the transition process**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “not or least helpful” and 10 = “most helpful”. The blue bars reflect the percentage of the sum of the 1s to 4s out of the total number of responses received, with the light brown bars the percentage of sum of the 7s to 10s. The percentage does not add to 100%; the balance being the sum of those that scored 5s and 6s. The highlighted blue and brown bars indicate the major reasons.

## 3.2 Discussion

This questionnaire was designed to investigate the CA producers’ transition journey to CA and gather insights on how they navigated the J-curve. The inputs received provided a large set of significant and useful findings.

The motivating factors for change can be summarised as follows:

1. Farmers have different motivations to change from CT to NT/CA as they face different on-farm realities. However, the results show that ultimately, all listed motivating factors have an influence but at different degrees. Adverse soil and climate conditions are the biggest motivating factors to change from CT with 62% of farmers allocating an upper bound rating.
2. This typically implies the following conditions: dry, hot and erratic weather, with either a combination of sandy, degraded, eroded, leached and/or compacted soils. For most converted CA farmers, this state and nature of soils and impact of climate variations (and/or adaptiveness) under CT have been a push factor to NT/CA. The expected positive effects of improved soils and mitigation of the negative effects of climate change were significant motivational factors towards NT/CA.
3. Sufficient awareness, knowledge and skills, was the second highest rated factor which reinforces the inspiration, confidence and guidance that awareness, knowledge and skills adds to the eventual decision to change to NT/CA. It would be safe to say that change would not happen without a deep awareness of the problems farmers face (and create), and the short-, medium- and long-term strategies for recovery.

Familiarity and experience with the J-curve during the transition phase can be summarised as follows:

1. Of the CA farmers, 21 (95%) have heard of and/or are familiar with the J-curve.
2. Surprisingly, 48% of these CA farmers indicated that they have experienced no J-curve, and only 1 farmer indicated that they were not familiar with it. This means that the majority know what it is but have not experienced it. This is a positive sign for the feasibility of CA.
3. In total, 43% took 3 to 7 years to transition the J-curve, and only 10% experienced it for more than 7 years. This might be sufficient evidence that on average the J-curve could last between 3 to 7 years.

Challenges during the transition phase that have been encountered are as follows:

1. The biggest challenge faced during the transition period was that of making mistakes to implement CA correctly.
2. "NT/CA can deliver many benefits to soils and balance sheets, but making early mistakes can have the opposite effect" (*Farmers Weekly* 2023). The fear of making mistakes can also stifle progress. This corroborates the importance and high ranking of sufficient awareness, knowledge and skills as a motivation for change to CA as it could be thought to minimise mistakes in implementation. Usually, farmers are advised to take at least one year to build enough knowledge to start the transition journey.
3. Soil-related challenges is the second biggest challenge during the transition phase. This may support the argument that CT does indeed cause various soil-related challenges (such as degraded, eroded, leached and/or compacted soils) that pose a serious challenge in the transition phase, and that in most cases CA practices take a while to translate positive benefits because of the time needed to restore soil health. This is further supported by the indication that soil health, fertility and acidity improvements were rated the biggest challenges or areas for improvement in CA practices both during and after the transition period.

4. Affected yields is often viewed as a major problem during the transition from CT to NT/CA (Jat et al. 2013; Sosibo et al. 2017). However, according to most of these converted CA farmers, this posed the least challenge during the transition period. Hence, it was also the case that most farmers found financial constraints to have a relatively low impact.
5. Weather-related challenges were also said to pose little challenge. This could be due to the level of adaptation and resilience farmers have already reached to mitigate and overcome adverse local weather patterns, but probably also reflects the benefits that have started to flow from the collective implementation of CA practices.

How to manage and overcome challenges during the transition period, can be summarised as follows:

1. The biggest way in which farmers managed or overcame challenges experienced during the transition phase was through improved farmer knowledge and skills with 90% of farmers rating it very highly. This further reinforces the significance of this factor to overall farmers' success in implementing CA.
2. A farmer's ability to test and adapt CA practices, and monitor and evaluate results regularly (e.g. through on-farm trials, trial-and-error), are the second most rated ways in which farmers manage and overcome challenges. Indeed, this is showing that an on-farm learning and adapting approach is most effective, backed-up or informed by constant monitoring and evaluation. This way, farmers avoid or mitigate the biggest challenge often faced during the transition period of making mistakes to implement CA correctly; they would be quick to pick up mistakes and change course, or apply corrective measures.
3. Knowledge seeking/sharing and interaction with other farmers has also been shown to be an essential aspect of success. Hence, most farmers rated farmer-to-farmer partnerships/networks for support (e.g. a study group) very high as well. This was also rated very high under support and resources most helpful for information and advice during the transition phase.

Difficulty faced with CA practices during and after the transition period and duration of time to see a positive change or benefits, are as follows:

1. During the transition period, integrated weed management, living roots in the soil, integrated soil fertility and acidity management, and soil cover practices were found most difficult by farmers.
2. The transition to NT/CA usually corresponds with a changing and even higher weed pressure that can't rely on tillage anymore but involve cultural (crop rotations, diversity, livestock integration), biological and chemical (herbicides) solutions, which are tricky, requiring new knowledge and continuous adaptation of good control practices under a holistic approach. Resistant and obnoxious weeds are an increasing problem giving farmers headaches.
3. The practice of keeping living roots in the soil is associated with the practice of cover crop integration (including diverse summer and winter mixtures) in rotation with cash crops and grazed by cattle. This is a new practice, and farmers haven't mastered it completely yet.
4. Throughout the survey results it became clear that farmers have difficulties with integrated soil fertility and acidity management. Soil is generally accepted as a difficult discipline with various branches and combined with the degraded status of soils under

cropland in South Africa, farmers require specialised advice on all the different soil science branches, i.e. soil physics, chemistry, biology and pedology (soil characterisation and classification). This is a challenge, with a general lack of technical and practical support on farmer level. Furthermore, technical advisors who primarily studied at universities still need significant levels of additional knowledge, training and experience to advise farmers through a holistic soil health approach.

5. Acceptable soil surface cover levels are still difficult to achieve on most NT/CA farms, which is highlighted by the survey results. Typical maize and soya bean, or maize and sunflower rotations (which are typically practiced under simple NT systems) don't produce sufficient biomass for good soil cover. The one aim of cover crop and livestock integration in full CA systems is to improve soil cover; however, there seems to still be a gap in good management skills and is also dependent on seasonal weather conditions.
6. Interestingly, the same factors mentioned and described above were rated most difficult to implement *after* the transition period as well. This emphasised the fact that soil health-oriented CA systems need to cross certain soil function threshold values (e.g. soil organic carbon, soil biology, structure, pH, etc.) before it functions properly providing the expected ecosystems services, due to the severely degraded state of soils (after many decades of tillage). This soil restoration process seemingly takes longer than originally expected, depending on various factors and influences in the farmers' contexts, such as the unique soil and climate conditions, equipment, knowledge, finances, etc. This statement is supported by the finding that most farmers indicate positive changes or benefit of improved soil health and fertility, and soil cover only after 3 to 5 years, and a few farmers even longer after the start of the transition process.
7. Practices imposing the least difficulty during the transition phase included livestock integration (which is quite surprising), cash crop rotations, and access and use of CA machinery/implements. Similarly, the latter two practices were considered the least difficult even after the transition period. Maize-based cash crop rotations have been developed over many decades now and farmers are well-skilled in that. Similarly, machinery/implements are highly sophisticated technology with many brand names and manufacturers competing and investing lots of resources to improve, sell and advise farmers on it.
8. Overall, most CA practices translate in a positive change or benefit between 1 and 5 years, and a few translate between 6 and 9 years while even fewer translate after 9+ years. This may be due to multiple factors such as those that are on farm and region specific. Across the board, CA farmers indicated that positive impact can be experienced sooner and not much later.

Support and resources most helpful for information and advice during the transition process, are as follows:

1. In line with the survey findings revealing how farmers manage or overcome challenges, farmers have found (farmer-to-farmer) knowledge and experience sharing platforms to be most helpful. Hence, CA conferences and farmers' days were found the most helpful followed by other experienced farmers through cross-visits, etc., study group (including WhatsApp groups), and social media, e.g. YouTube, Facebook, Internet websites, etc. – were rated highly.

2. Technical manuals, guidelines and publications was rated the least helpful. This supports the above finding that farmers prefer to learn from peers in aiding the transition to CA.

### 3.3 References

*Farmers Weekly*. (2023). 5 mistakes when adopting regen farming and how to avoid them, July. Available at: <https://www.fwi.co.uk/regenerative-agriculture/5-mistakes-when-adopting-regen-farming-and-how-to-avoid-them> (accessed on 8 July 2024).

Jat, M.L., Gathala, M.K., Saharawat, Y.S., Tatarwal, J.P., Gupta, R. (2013). Double no-till and permanent raised beds in maize–wheat rotation of north-western IndoGangetic plains of India: effects on crop yields, water productivity, profitability, and soil physical properties. *Field Crops Res.* 149, 291–299. <https://doi.org/10.1016/j.fcr.2013.04.024>

Sosibo, N.Z., Muchaonyerwa, P., Visser, L., Barnard, A., Dube, E., Tsilo, T.J. (2017). Soil fertility constraints and yield gaps of irrigation wheat in South Africa. *S Afr J Sci.* 113(1/2), 9. <http://dx.doi.org/10.17159/sajs.2017/20160141>

### 3.4 Annexure 3A: Questionnaire outline

#### **Project aim:**

The project aim is to conduct a farm-level financial analysis of different farming systems in selected maize-based regions of South Africa.

#### **Funder:**

The Maize Trust

#### **Implementing agency:**

ASSET Research (<https://assetresearch.org.za/conservation-agriculture/>)

#### **Research team:**

Drs James Blignaut ([jnblignaut@gmail.com](mailto:jnblignaut@gmail.com)) and Hendrik Smith ([smith.hendrik@gmail.com](mailto:smith.hendrik@gmail.com)), Ms Mary Maluleke ([maryameliamaluleke@gmail.com](mailto:maryameliamaluleke@gmail.com))

#### **Collaborators:**

Grain industry (Grain SA, SAGRA, study groups, etc.), Agribusiness (co-ops, banks, etc.)



**The objective of this qualitative farmer survey:**

An assessment of the experiences of selected conservation agriculture farmers concerning their conversion from conventional tillage (CT) to no-till or conservation agriculture (NT/CA)

**Research method:**

A short questionnaire that can be completed in less than 15 minutes asking responding conservation agriculture farmers their experiences concerning their transition from conventional tillage (CT) to no-till or conservation agriculture (NT/CA) based on a Likert scale.

**Due Date: 30 June 2024**

**NB: Feedback and communication of survey results are viewed as a priority.**

**1. In which region do you farm?**

- Central and Eastern Free state
- North and Northeastern Free State
- North West Free State
- Mpumalanga
- Gauteng
- North West Province
- Limpopo Province
- KwaZulu-Natal

**2. What key factors motivated your decision to change from traditional conventional tillage (CT) practices to NT/CA? What were the driving forces behind the transition? Please provide a score out of 5, with 1 = no or very little, 5 = very high.**

Factor	Score out of 10 (10 = biggest influence)
Soils and climate	
Sufficient awareness, knowledge and skills	
Access to capital or finances	
Access to technical advisory support	
Access to research data and results	
Policies and government support	
Others: Please list	

**3. Are you familiar with the concept of the J-curve (a financial dip after starting the transition)?**

- Yes, familiar with it.
- No, not familiar with it.
- Heard of it, but not entirely sure what it refers to.

**4. How long have you experienced a J-curve in your transition journey?**

- 0 years (have not experienced it)
- Number (#) of years it took to go through the J-curve?

**5. Rate the general challenges you faced during the transition period? Give each a score out of 10 (1 = no or very little and 10 = very high)**

- Financial constraints, including capital, income, costs and profits
- Affected productivity (yields)
- Resistance or criticism from other farmers
- Lack of knowledge/skills
- Lack of technical support and advice
- Lack of research results
- Weather-related challenges
- Soil-related challenges
- Making mistakes to implement CA correctly
- Other (please specify)

**6. Rate the specific challenges (level of difficulty) you faced with different CA practices during the transition period? Please provide a score out of 10 (1 = not difficult and 10 = very difficult).**

- Access and use of CA machinery/implements, e.g. no-till planters
- Soil cover (at least 30%, aiming for 70%)
- Cover crops
- Cash crop rotations
- Living roots in the soil (as long as possible)
- Livestock integration
- Integrated soil fertility and acidity management, including biological options
- Integrated weed management
- Integrated pest/disease management, including biological options
- Other (please specify)

**7. How did you manage or overcome the above challenges during the transition phase (J-curve)? Please provide a score out of 10 (1 = not difficult and 10 = very difficult)**

- Obtained additional financing and/or capital, e.g. credit or loans
- Diversification of income sources
- Cost-cutting measures, e.g. using or selling older equipment, reduced input costs
- Selling of other assets, e.g. land, equipment, livestock, shares, etc.
- Improved my knowledge and skills
- Formed or joined partnerships/networks for support, e.g. a study group
- Test and adapt CA practices, monitor and evaluate results regularly (e.g. through on-farm trials, trial-and-error)
- Sought assistance from research / technical experts
- Sought assistance from other experienced CA farmers
- Started small and gradually scaled up to my whole farm
- Had other sources of income
- Other (please specify)

**8. How long did it take before you observed any positive changes or benefits following the initial dip in productivity or income? Please specify the # of years at each.**

- Knowledge and skills (Years)
- Soil cover (Years)
- Erosion (Years)
- Soil health and fertility (Years)
- Production / yields (Years)
- Financial / profits (Years)
- Lower production input costs
- Lower machinery maintenance and replacement costs
- Increased soil water and Climate / weather resilience
- Enhanced biodiversity
- Other (please specify)

**9. What support or resources did you personally find most helpful for information and advice during the transition process? Please provide a score for each (1 = not or least helpful and 10 = most helpful).**

- CA conferences and farmers days.
- Access to technical or research expertise.
- Social media, e.g. YouTube, Facebook, Internet websites, etc.
- Study group, WhatsApp groups.
- Other experienced farmers through cross-visits, etc.
- Popular articles in magazines, such as *Landbouweekblad* and *SA Grain*.
- Technical manuals, guidelines and publications.
- Other (please specify)

**10. Where do you have the biggest gaps, challenges or areas for improvement in your CA practices right now (after the transition period)? 1 Please provide a score for each (1 = least and 10 = most)**

- Soil health, fertility and acidity improvement
- Weed, pest and disease management
- Cover crops and livestock integration
- Cas crop rotations
- Soil surface cover
- Biodiversity improvement, e.g. insects, birds, etc.
- Access to suitable CA equipment (e.g. no-till planters, sprayers, etc.)
- New technology and innovation (e.g. precision agriculture, biostimulants, etc.)
- CA network or study group engagement and collaboration
- Market access for my produce
- Other (please specify)

### 3.5 Annexure 3B: Result details

n: NT/CA = 1

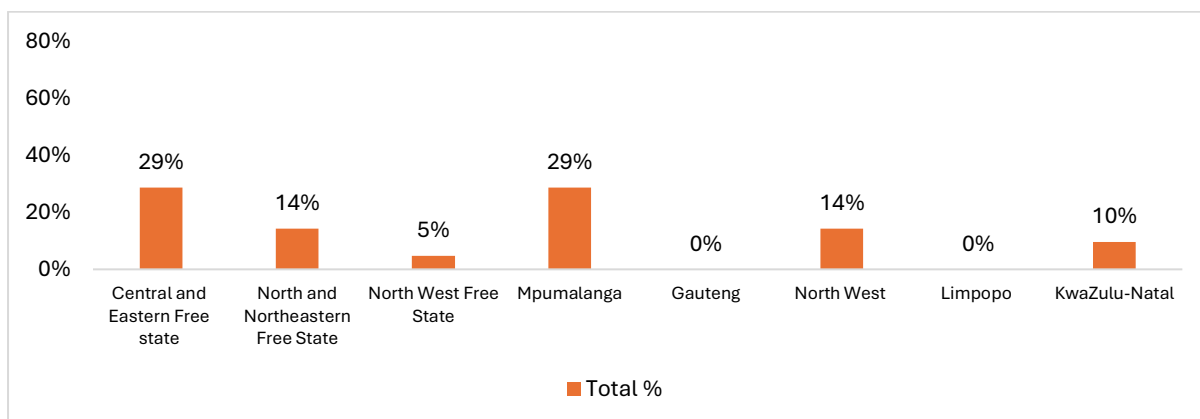


Figure 14: Distribution of regions of the farms

The results include data from 21 CA farmers from six production regions of South Africa with the majority based in the central and eastern Free State and Mpumalanga (see Figure 14).

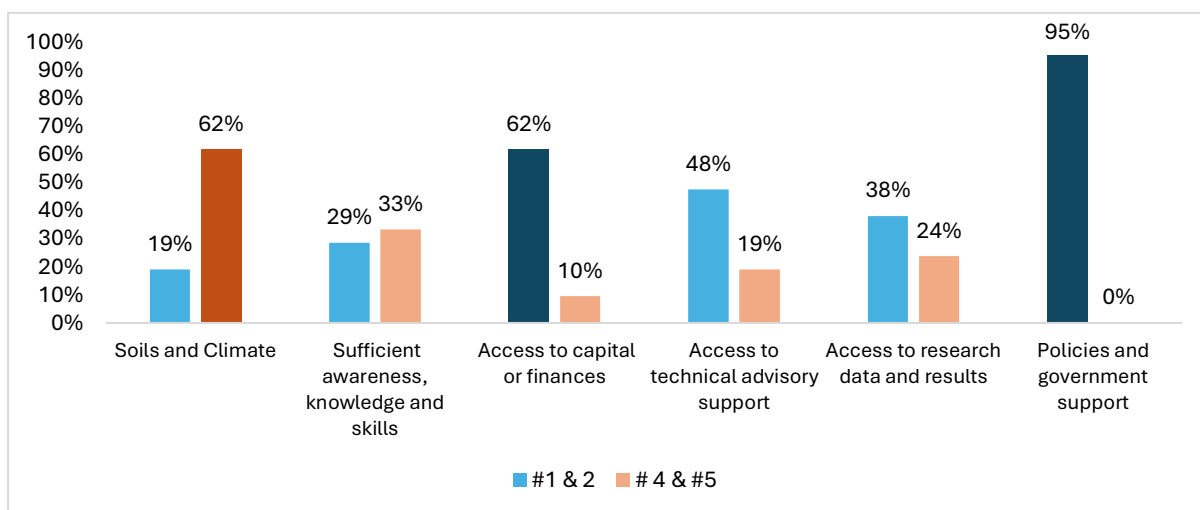
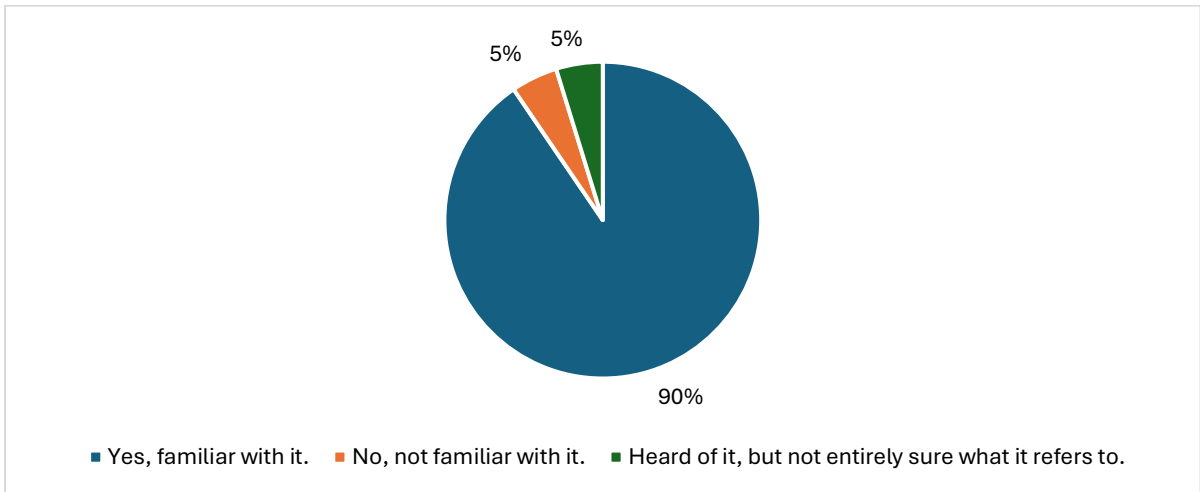


Figure 15: Key factors that motivated the decision to change from CT to NT/CA

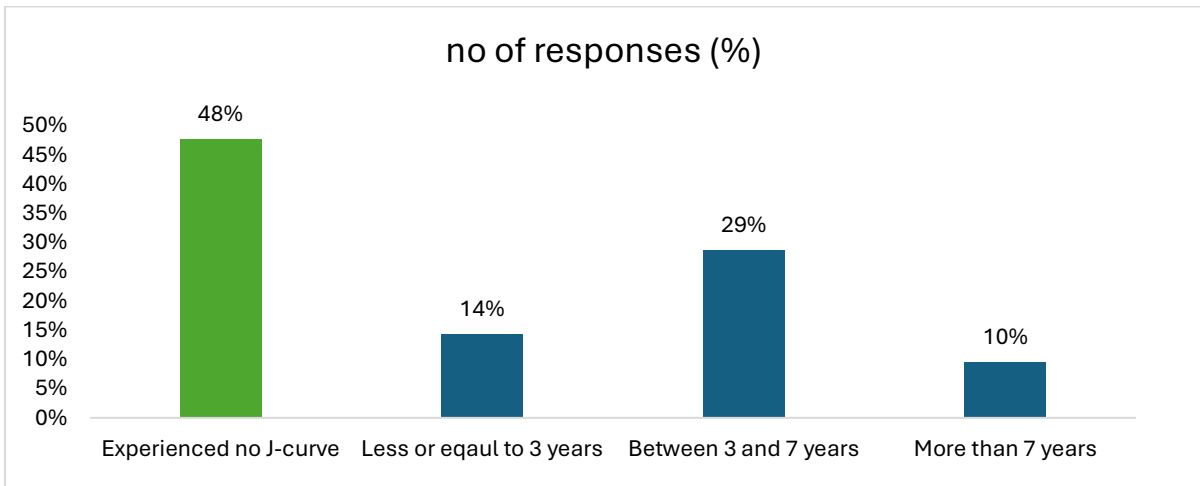
**Note:** Farmers were asked to indicate their answers on a scale of 1 to 5, with 1 = “no or little” and 5 = “very high”. The blue bars reflect the percentage of the sum of the 1s and 2s out of the total number of responses received, with the light brown bars the percentage of sum of the 4s and 5s. The percentage does not add to 100%; the balance being those that scored 3. The highlighted blue and brown bars indicate the major reasons.

When asked about factors that motivated their decision to change from CT to NT/CA, the majority of farmers indicated that adverse soils and climate conditions were top motivating factors (higher than the average).



**Figure 16: Farmers' familiarity with the J-curve**

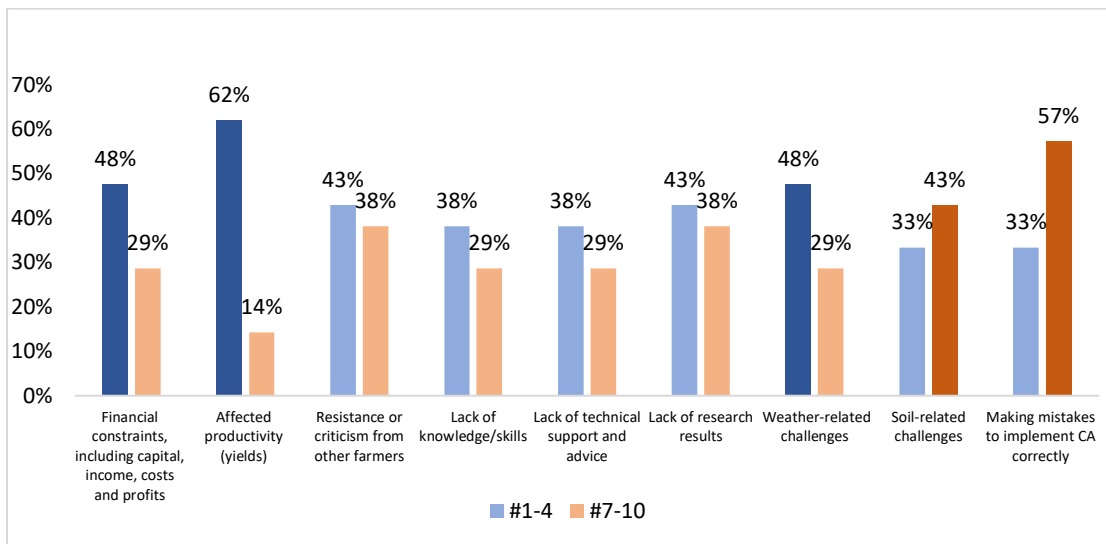
Of all farmers, 90% said to be familiar with the concept of the J-curve, while 5% were not and the rest had heard of it but were not entirely sure what it refers to (see Figure 16).



**Figure 17: Years farmers experienced the J-curve**

**Note:** Farmers were asked to indicate their experience of the J-curve in years with the option to select 0 = "have not experienced" or state the "number of years it took to go through it". Their answers were categorised as either 0 = experience no J-curve, 1–2 = less than or equal to 3 years, 4–7 = between 3 and 7 years, and 8+ = more than 7 years. The graphs reflect the percentage of the sum of each category out of the total number of responses received.

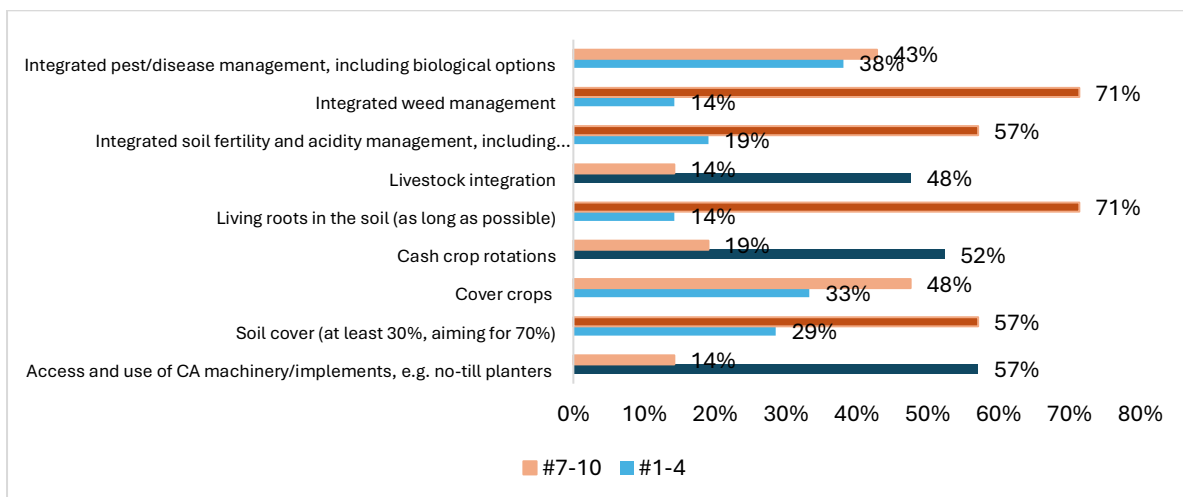
When asked if they had experienced the impact of the J-curve, almost half (48%) had not, 14% had but for less than 3 years, 29% between 3 and 7 years, and 10% for more than 7 years (see Figure 17).



**Figure 18: General challenges faced during the transition period**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or little” and 10 = “very high”. The blue bars reflect the percentage of the sum of the 1s to 4s out of the total number of responses received, with the light brown bars the percentage of sum of the 7s to 10s. The percentage does not add to 100%; the balance being the sum of those that scored 5s and 6s. The highlighted blue and brown bars indicate the major reasons.

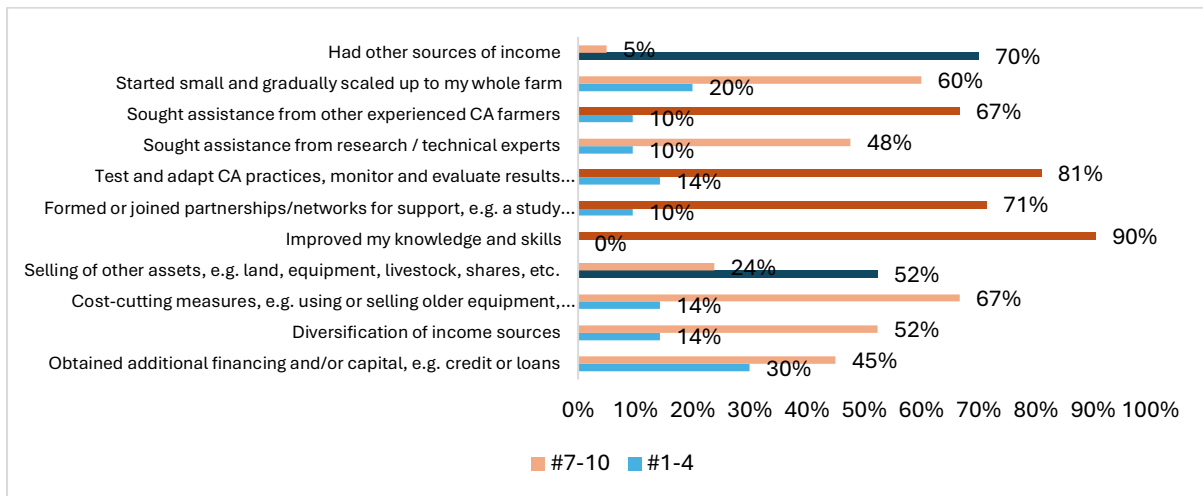
Farmers further indicated that their biggest challenges faced during the transition period were making mistakes to implement CA correctly and soil related challenges.



**Figure 19: Level of difficulty farmers faced with different CA practices during the transition period**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or little” and 10 = “very high”. The blue bars reflect the percentage of the sum of the 1s to 4s out of the total number of responses received, with the light brown bars the percentage of sum of the 7s to 10s. The percentage does not add to 100%; the balance being the sum of those that scored 5s and 6s. The highlighted blue and brown bars indicate the major reasons.

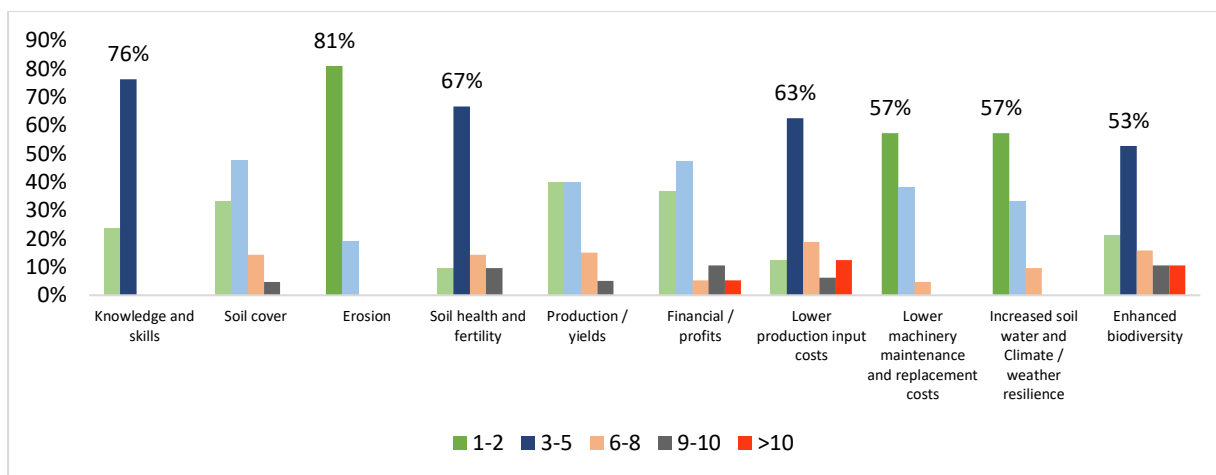
Farmers were asked to indicate their level of difficulty faced with different CA practices during the transition phase and the following principles were rated most difficult: integrated weed management, living roots in the soil, integrated soil fertility and acidity management, and soil cover.



**Figure 20: How farmers managed to overcome the above challenges during the transition phase (J-curve)**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or little” and 10 = “very high”. The blue bars reflect the percentage of the sum of the 1s to 4s out of the total number of responses received, with the light brown bars the percentage of sum of the 7s to 10s. The percentage does not add to 100%; the balance being the sum of those that scored 5s and 6s. The highlighted blue and brown bars indicate the major reasons.

Farmers were asked to indicate how they managed to overcome a list of common challenges in the transition phase. To this, improvement of farmer’s knowledge and skill; (on-farm) testing and adapting of CA practices, regular monitoring and evaluation of results; formed or joined partnerships/networks for support; and sought assistance from research/technical experts, were used most to manage or overcome challenges during the transition phase.

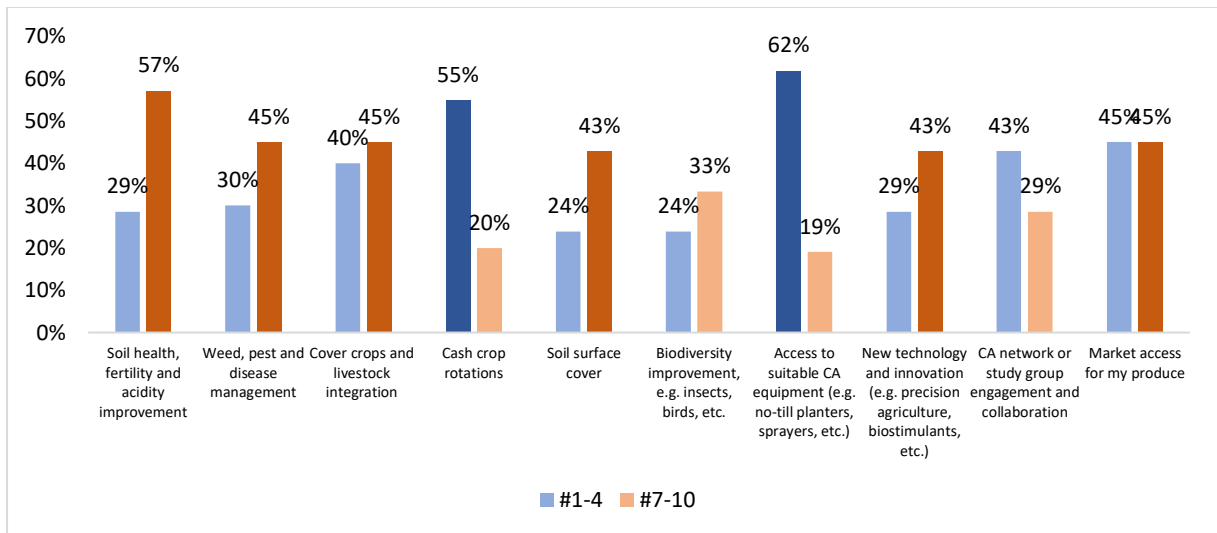


**Figure 21: The duration of time it took before farmers observed any positive changes or benefits following the initial dip in productivity or income**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10 years, with an additional option of more than 10 years as well. The green bars reflect the percentage of the sum of the 1s and 2s out of the total number of responses received; the blue bars reflect those of the 3s to 5s; the light brown bars those of the 6s to 8s; the grey bars those of the 9s and 10s; with the red bars reflecting those greater than 10. The percentage add to 100%, and the highlighted colour bars indicate the major reasons.

There were varied responses to the duration of time it took before farmers observed any positive changes or benefits following the initial dip in productivity or income (see Figure 21). The results indicate that most farmers saw positive changes in erosion, lower machinery maintenance and replacement costs, and increased soil water and climate/weather resilience between 1 and 2 years. Knowledge and skills, soil health and fertility, lower production input costs, and improved biodiversity were found, by most farmers, to yield benefits after 3 to 5 years. Positive changes or benefits from financial profits and production/yields were said to mostly translate between 1 and 5 years with some farmers indicating it took them between 6 and 10 years.

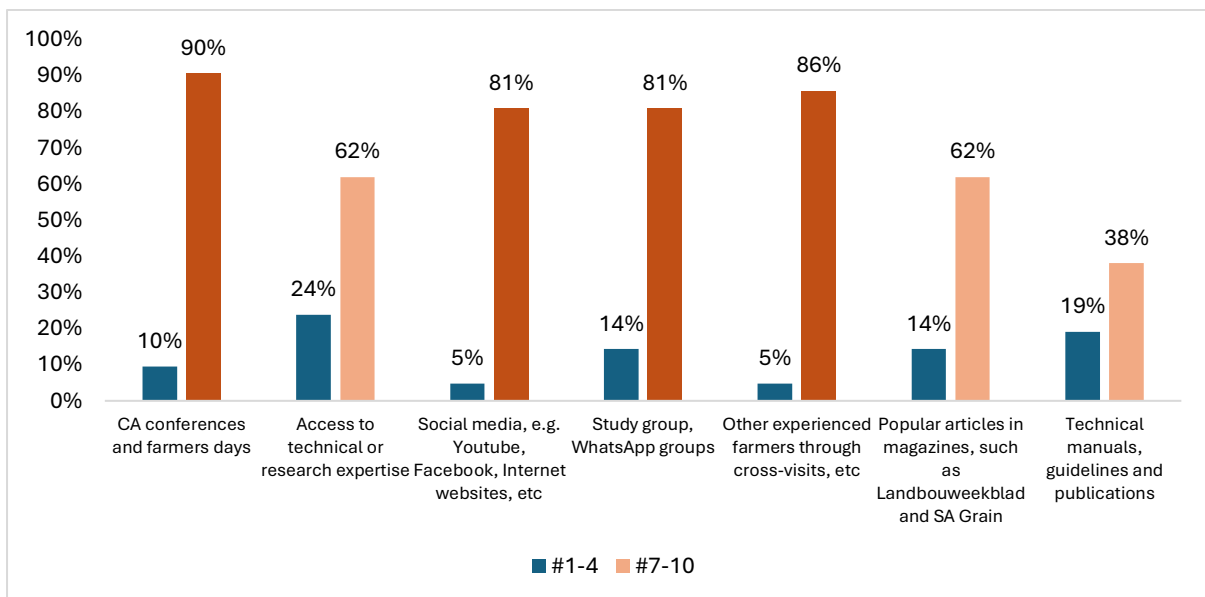




**Figure 22: The biggest gaps, challenges or areas for improvement in their CA practices right now (after the transition period)**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “least” and 10 = “most”. The blue bars reflect the percentage of the sum of the 1s to 4s out of the total number of responses received, with the light brown bars the percentage of sum of the 7s to 10s. The percentage does not add to 100%; the balance being the sum of those that scored 5s and 6s. The highlighted blue and brown bars indicate the major reasons.

Farmers indicated the following: soil health, fertility and acidity improvements were areas with the biggest gaps, challenges or need for improvement in their CA practices currently, after the transition period the most.



**Figure 23: Support and resources most helpful for information and advice during the transition process**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “not or least helpful” and 10 = “most helpful”. The blue bars reflect the percentage of the sum of the 1s to 4s out of the total number of responses received, with the light brown bars the percentage of sum of the 7s to 10s. The percentage does not add to 100%; the balance being the sum of those that scored 5s and 6s. The highlighted blue and brown bars indicate the major reasons.

All listed methods of support and resources were found reasonable and most helpful for information and advice during the transition process by most of the farmers (see Figure 23).

## Chapter 4: CA dis-adopters experiences and insights results

### 4.1 Result highlights

The results include data from three dis-adopters; two from the central and eastern Free State and one from the north western Free State (see Figure 24). They are, however, inconclusive given the small sample and the wide range of responses.

When asked about their current agricultural practice, two farmers indicated they practice minimum tillage, including rip-on-the row, stubble management, etc., while the other practice full conventional tillage, with primary and secondary tillage practices (see Figure 25).

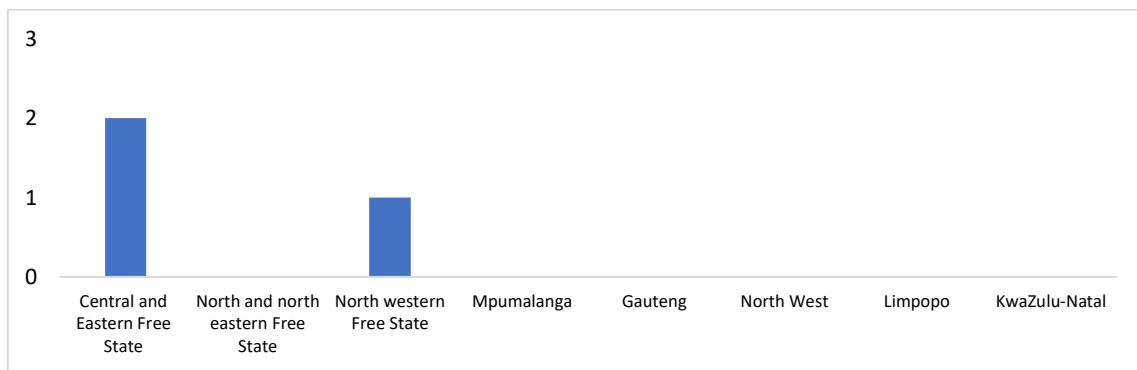


Figure 24: Distribution of regions of the farms



Figure 25: Farmer's current agricultural practices

Farmers' own awareness, knowledge and skill of NT/CA practices, duration of time practiced, and future stance

When asked to rate their awareness, knowledge and skills of NT/CA practices, one farmer rated “very high”, the other “fairly high”, and the third “fairly low” (see Figure 26). In terms of the number of years they each applied NT/CA practices before they stopped, one farmer indicated 2 years, the other indicated 3 years and the longest was 6 years (see Figure 27). One farmer was sure to have stopped NT/CA permanently while the other was not sure whether they have stopped permanently or temporarily (see Figure 28).

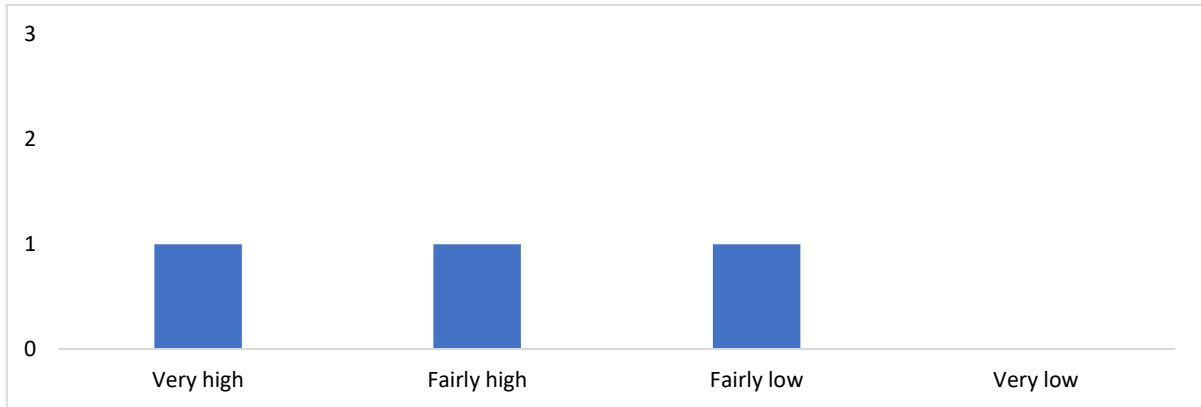


Figure 26: Farmers' own awareness, knowledge and skills of NT/CA practices

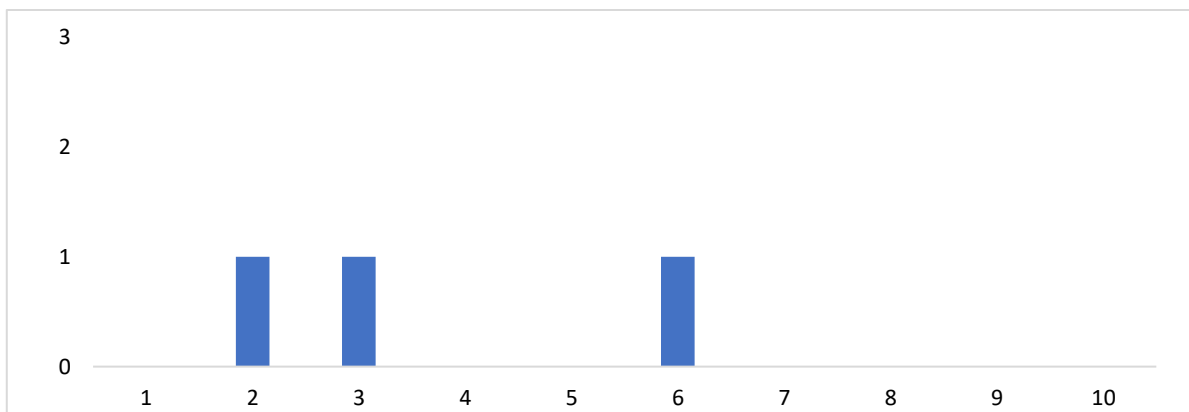
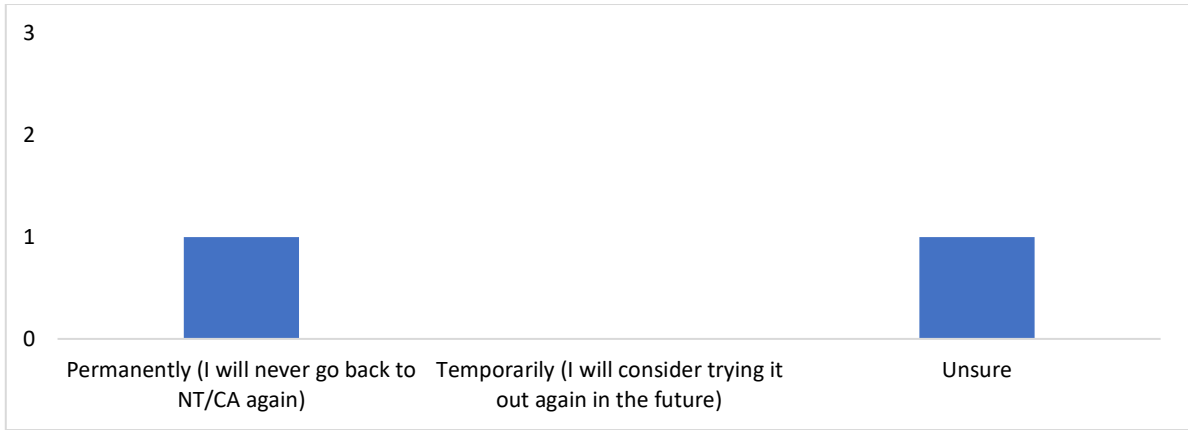


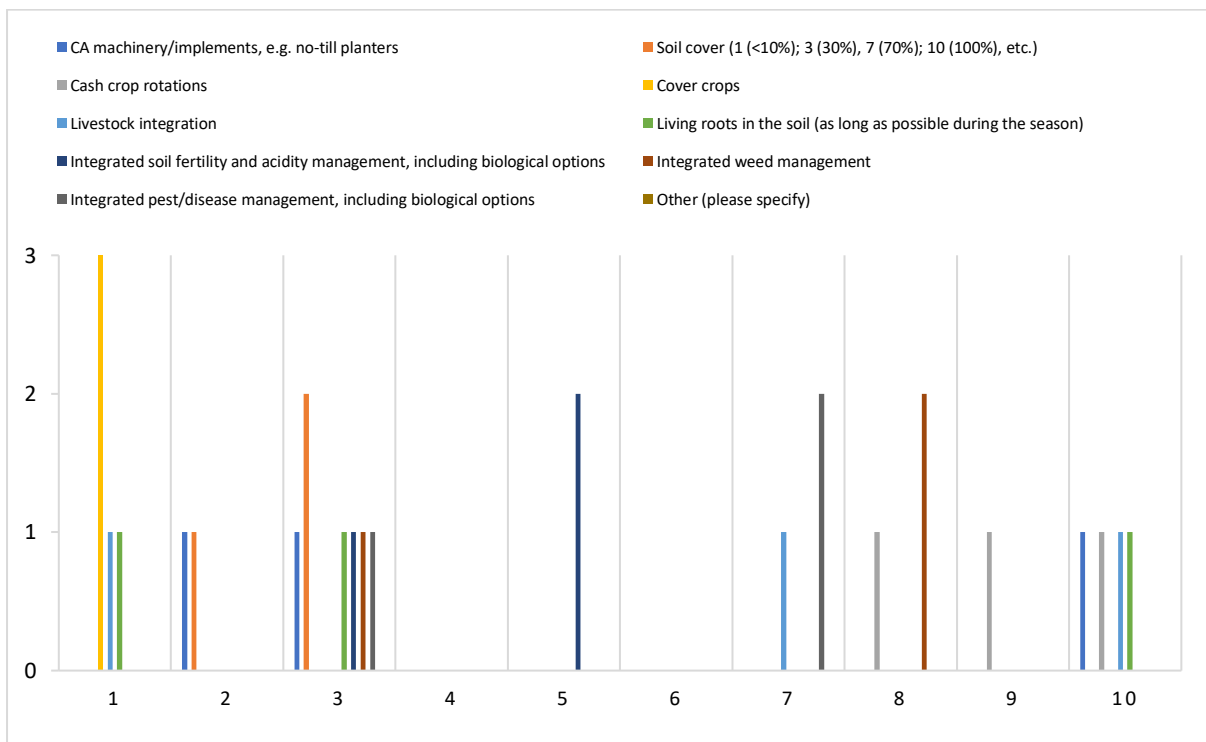
Figure 27: Years farmers applied NT/CA practices before they stopped



**Figure 28: Farmer's plan to stop with NT/CA**

### NT/CA practices that farmers applied prior to dis-adoption

Farmers were asked to indicate which NT/CA practices they implemented and provide a rating of how well they did so. Of all the 9 practices, all three farmers indicated that they had not applied the practice of cover crops; and that they applied the practice of soil cover poorly. The following practices were mostly applied moderately well: integrated soil fertility and acidity management, including biological options; integrated weed management; and integrated pest/disease management, including biological options. One farmer applied each of the following practices very well: cash crop rotations, cover crops, livestock integration, living roots in the soil (as long as possible during the season) (see Figure 29).

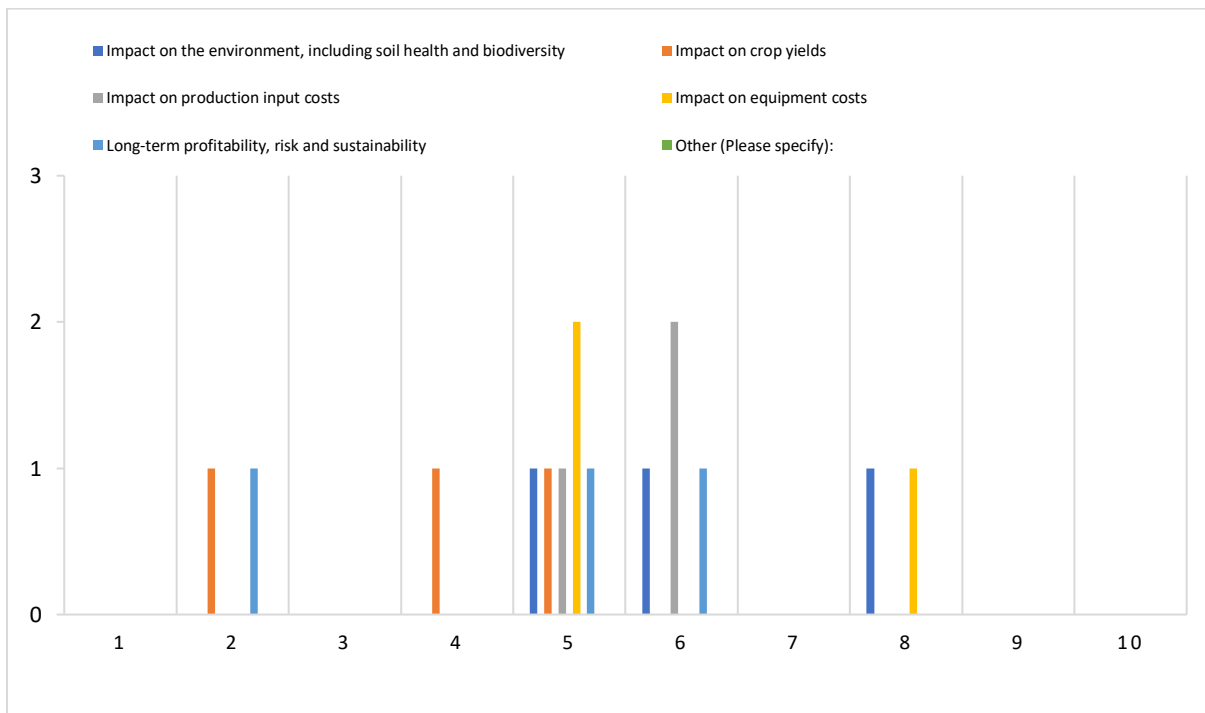


**Figure 29: Rating of NT/CA practices that farmers applied**

**Note:** Farmers were asked to indicate the number of years they each applied NT/CA practices before they stopped on a scale of 1 to 10, 1 = “not applied”, 2 = “applied poorly”, 5 = “applied moderately well”, and 10 = “applied very well”. The graph reflects the farmers’ rating per practice.

### Farmers’ perceptions or experiences with NT/CA

Farmers were asked to indicate their perceptions or experiences with NT/CA. To this, the farmers’ responses were mostly distributed in the centre of the scale. Impact on crop yields was rated more to the left (negative) while impact on production input costs and on equipment costs were rated more to the right (positive) by the three farmers (see Figure 30).

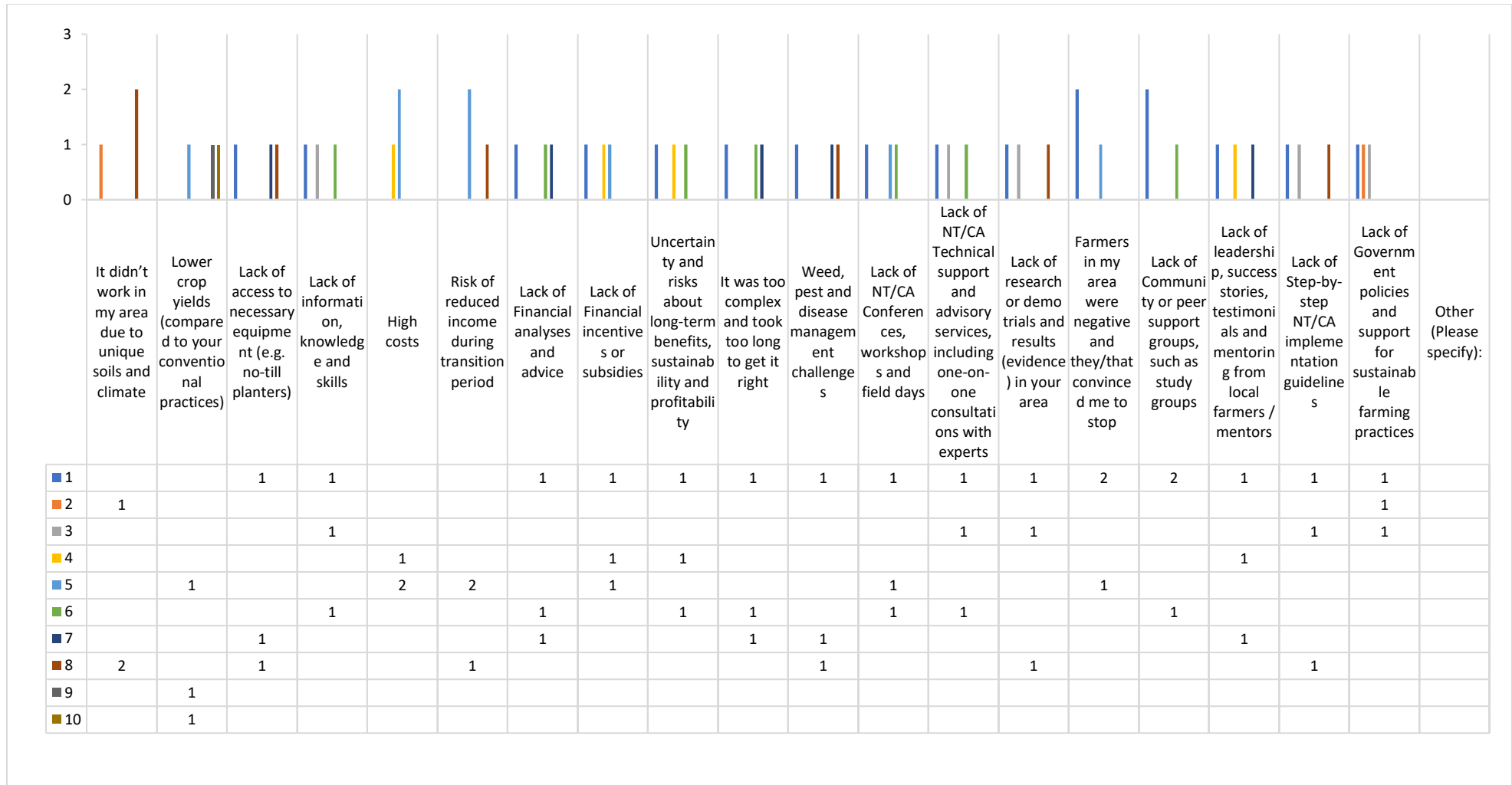


**Figure 30: Rating of farmers’ perceptions or experiences with NT/CA**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “negative” and 10 = “positive”. The bars reflect farmers’ rating of each factor.

### Possible factors or reasons that led farmers to stop NT/CA

There were varied responses to the factors that led farmers to stop NT/CA (see Figure 31). Looking at the results, 2/3 farmers rated the factor that “it didn’t work in my area due to unique soils and climate” to have had high influence. Lower crop yields, high costs and risk of reduced income during the transition period were also rated to have had a moderate impact by 2/3 farmers. Factors that were considered to have low influence on decision was “farmers in my area were negative and they/that convinced me to stop” and “lack of community or peer support groups, such as study groups”.



**Figure 31: Rating the possible factors or reasons that led farmers to stop NT/CA**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “low influence” and 10 = “high influence”. The bars reflect farmers’ rating of each factor.

## 4.2 Discussion

This questionnaire was designed to investigate the experiences of selected CA dis-adopters concerning their discontinuation of NT or CA practices. The inputs received provided a set of useful findings.

Farmers' own awareness, knowledge and skill of NT/CA practices, duration of time practiced, and future stance can be summarised as follows:

1. The three farmers each have different levels of awareness, knowledge, and skill of NT/CA; being very high, fairly high, and fairly low.
2. Interestingly, the level of skill correlates with the number of years farmers applied NT/CA practices before they stopped. In that, the farmer rated very high applied NT/CA for 6 years, the farmer rated fairly high applied it for 3 years, and the farmer rated fairly low applied it for 2 years.
3. With regards to the perceived future plans, it is interesting that the farmer that applied NT/CA for 6 years and said to have very high awareness, knowledge and skill indicated that they have permanently stopped NT/CA with no intention to go back. The farmer is currently practicing minimum tillage, including rip-on-the row, stubble management, etc.
4. One farmer was unsure of future application plans. This was a farmer that rated their awareness, knowledge and skill as fairly high, applied for 3 years, and currently practices full conventional tillage, with primary and secondary tillage practices, minimum tillage, including rip-on-the row, stubble management, etc.

NT/CA practices that farmers applied prior to dis-adoption can be summarised as follows:

1. Of the listed NT/CA practices, none of the three farmers applied cover crops. Which explain why all three indicated to have applied the practice of soil cover poorly. Both practices are essential for keeping the living roots in soil and so it is not surprising to see that this practice was also mostly implemented poorly.
2. Interestingly, three of the practices were applied moderately well by farmers. This means that farmers applied 70% of these practices poorly or moderately well.
3. This could explain the results that farmers experienced with the efficacy in their application of NT/CA as the collective impact of these practices aid the success of NT/CA.
4. Only one farmer indicated to have applied the following practices very well: cash crop rotations, cover crops, livestock integration, living roots in the soil (as long as possible during the season). This was the 6-year-long application farmer with fairly high awareness, knowledge and skill of NT/CA.

Farmers' perceptions or experiences with NT/CA can be summarised as follows:

1. Looking at the results, the farmers experienced a negative impact on crop yields.
2. It is interesting, however, that the farmer that practiced the longest experienced the most negative impact on crop yields with a 2/10 rating while the others had a 4/10 and 5/10 rating on yield impact. This could be related to the fact that some of problem(s) in his



fields accumulated over this period leading to dwindling crop yields. It is difficult to know what exactly it is, but it is probably soil related, such as compaction.

3. All three farmers experienced a positive impact on production inputs and equipment costs. Both, the 2- and 3-year-applied farmers indicated to have experienced a greater impact while the 6-year-applied farmer indicated a somewhat moderate impact (of 5/10).
4. With regards to the impact on long-term profitability, the 6-year-applied farmer indicated to a significantly negative impact of 2/10 while the other two had a moderate to positive impact. This could suggest that the duration of time that farmers applied NT/CA could have an influence on their perception and experience with profitability. The same farmer (6 years) also experienced the most negative impact on yields which could explain this perception as well.
5. On average, all three farmers saw a positive impact on the environment, including soil health and biodiversity which proves the benefits of NT/CA.

Possible factors or reasons that led farmers to stop NT/CA can be summarised as follows:

1. The biggest reason why farmers discontinued NT/CA was due to lower crop yields (compared to conventional). This factor was rated as a high influence factor by 2/3 farmers and shows that yields influence farmer decision significantly.
2. The second biggest reasons that led to farmers discontinuing with NT/CA was the risk of reduced income during transition period and that it did not work in their area due to unique soils. This shows that the J-curve is a concern for some farmers and that NT/CA responsiveness and success in certain regions are important considerations for farmers.
3. Interestingly, the two farmers from the central and eastern Free State had different views on this. The one indicated this to have a high influence (8/10) and the other found it to have a low influence on their decision (2/10).
4. Lack of access to necessary equipment (e.g. no-till planters) and weed, pest and disease management challenges were also among the top-rated reasons that led to farmers' decision to stop NT/CA.
5. The two farmers that stopped within 2 and 3 years indicated that it was too complex and took too long to get it right with a 6/10 and 7/10 rating. One of these also rated the lack of NT/CA technical support and advisory services, including one-on-one consultations with experts fairly highly alongside lack of lack of information, knowledge and skills.
6. High costs and lack of financial analyses and advice were also moderate to highly rated reasons.
7. The rest of the factors were also rated to have a moderate to poor influence.
8. The least influence came from factors such as lack of government policies and support for sustainable farming practices, lack of community or peer support groups, such as study groups, and that of farmers in my area were negative and they/that convinced me to stop. This suggest that external influence is not so significant as farmers' own perception, experience and on-farm realities.

## 4.3 Annexure 4A: Questionnaire outline

### Questionnaire for dis-adopters of conservation agriculture

#### Project aim:

The project aim is to conduct a farm-level financial analysis of different farming systems in selected maize-based regions of South Africa.

#### Funder:

The Maize Trust

#### Implementing agency:

ASSET Research (<https://assetresearch.org.za/conservation-agriculture/>)

#### Research team:

Drs James Blignaut ([jnblignaut@gmail.com](mailto:jnblignaut@gmail.com)) and Hendrik Smith ([smith.hendrik@gmail.com](mailto:smith.hendrik@gmail.com)), Ms Mary Maluleke ([maryameliamaluleke@gmail.com](mailto:maryameliamaluleke@gmail.com))

#### Collaborators:

Grain industry (Grain SA, SAGRA, study groups, etc.), Agribusiness (co-ops, banks, etc.)

#### The objective of this qualitative farmer survey:

An assessment of the experiences of selected farmers concerning their view and experiences of stopping to use no-till or conservation agriculture (NT/CA).

#### Research method:

A short questionnaire that can be completed in less than 15 minutes asking responding farmers their view and experiences of stopping to use NT/CA based on a Likert scale.

#### Due Date: 30 June 2024

**NB: Feedback and communication of survey results are viewed as a priority.**

#### 1. In which region do you farm?

- Central and Eastern Free state
- North and Northeastern Free State
- North West Free State
- Mpumalanga
- Gauteng
- North West Province
- Limpopo Province

- KwaZulu-Natal

**2. What are your current agricultural practices? (Please check all that apply)**

- Full conventional tillage, with primary and secondary tillage practices
- Strip-till
- Minimum tillage, including rip-on-the row, stubble management, etc.
- Monoculture
- Crop Rotation
- Other (Please specify):

**3. Rate your own awareness, knowledge and skills of NT/CA practices?**

- Very high
- Fairly high
- Fairly low
- Very low

**4. How long (# years) did you apply NT/CA practices before you stopped?**

# years

**5. Do you plan or envisage to stop with NT/CA**

- Permanently (I will never go back to NT/CA again)
- Temporarily (I will consider trying it out again in the future)
- Unsure

**6. Which of the following CA practices did you apply?**

**A scale from 1-10, where 1 (not applied); 2 (applied poorly); 5 (applied moderately well); 10 (applied very well)**

- CA machinery/implements, e.g. no-till planters
- Soil cover (1 (<10%); 3 (30%), 7 (70%); 10 (100%), etc.)
- Cash crop rotations
- Cover crops
- Livestock integration
- Living roots in the soil (as long as possible during the season)
- Integrated soil fertility and acidity management, including biological options
- Integrated weed management
- Integrated pest/disease management, including biological options
- Other (please specify)

**7. What are your perceptions or experiences with NT/CA?**

**Scale from 1-10, where 1 (negative) and 10 (positive)**

- Impact on the environment, including soil health and biodiversity
- Impact on crop yields
- Impact on production input costs
- Impact on equipment costs
- Long-term profitability, risk and sustainability
- Other (Please specify):

**8. Rate the possible factors or reasons that led you to stop NT/CA?**

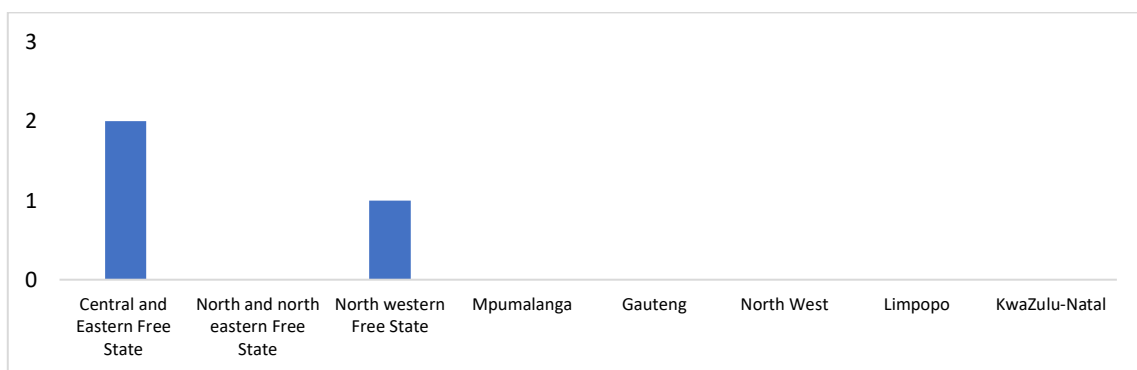
**A scale from 1 (low influence) – 10 (high influence)**

- It didn't work in my area due to unique soils and climate
- Lower crop yields (compared to your conventional practices)
- Lack of access to necessary equipment (e.g. no-till planters)
- Lack of information, knowledge and skills
- High costs
- Risk of reduced income during transition period
- Lack of Financial analyses and advice
- Lack of Financial incentives or subsidies
- Uncertainty and risks about long-term benefits, sustainability and profitability
- It was too complex and took too long to get it right
- Weed, pest and disease management challenges
- Lack of NT/CA Conferences, workshops and field days
- Lack of NT/CA Technical support and advisory services, including one-on-one consultations with experts
- Lack of research or demo trials and results (evidence) in your area
- Farmers in my area were negative and they/that convinced me to stop
- Lack of Community or peer support groups, such as study groups
- Lack of leadership, success stories, testimonials and mentoring from local farmers / mentors
- Lack of Step-by-step NT/CA implementation guidelines
- Lack of Government policies and support for sustainable farming practices
- Other (Please specify):

**9. Any other additional comments or thoughts about NT/CA and its adoption in your farming system.**

#### 4.4 Annexure 4B: Result details

n: CA dis-adopters = 3



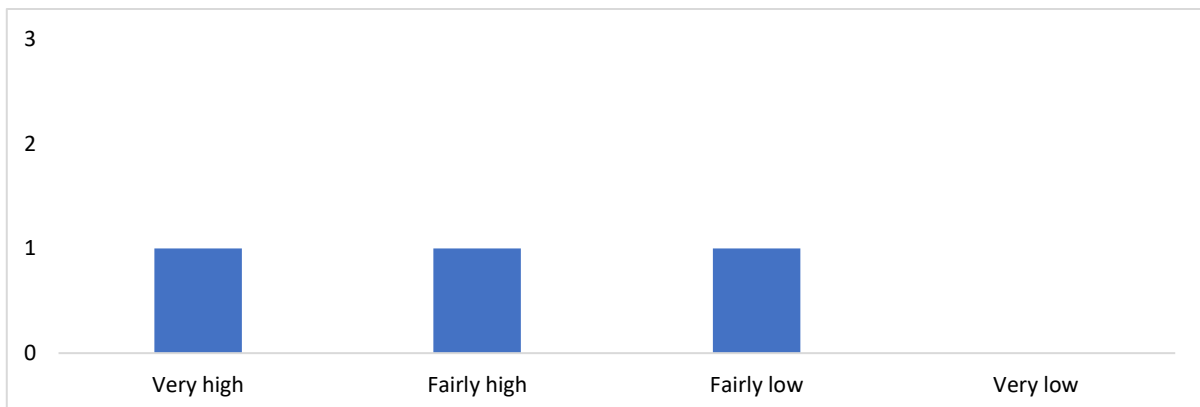
**Figure 32: Distribution of regions of the farms**

The results include data from three dis-adopters; two from the central and eastern Free State and one from the north western Free State (see Figure 32).



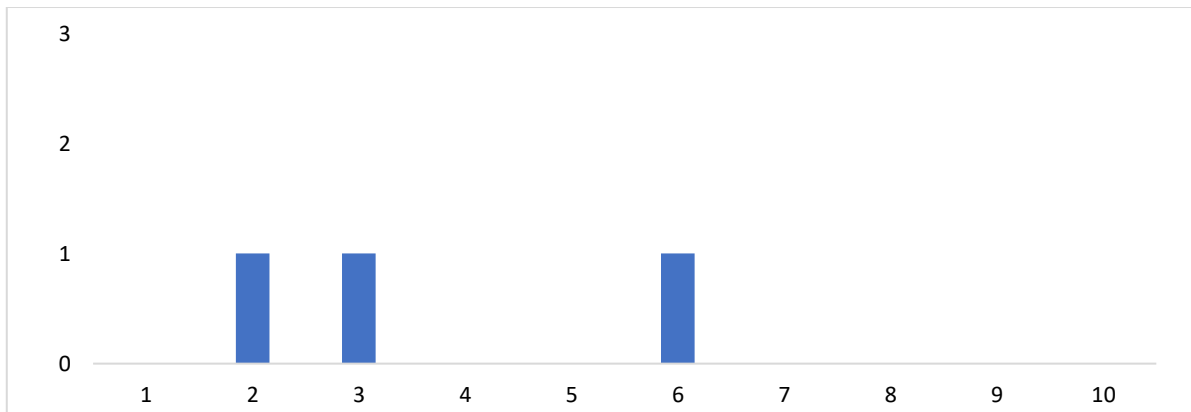
**Figure 33: Farmer's current agricultural practices**

When asked about their current agricultural practice, two farmers indicated they practice minimum tillage, including rip-on-the row, stubble management, etc., while the other practice full conventional tillage, with primary and secondary tillage practices (see Figure 33).



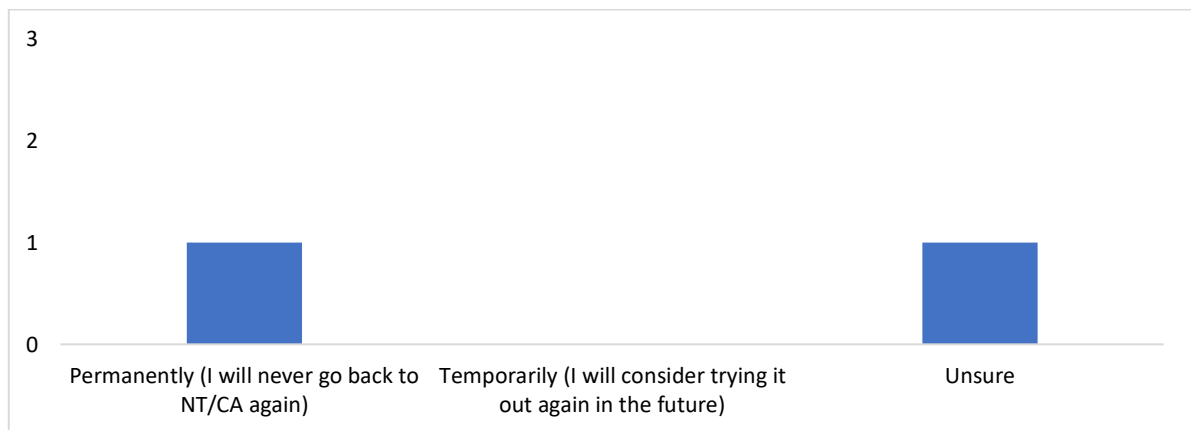
**Figure 34: Farmers' own awareness, knowledge and skills of NT/CA practices**

When asked to rate their awareness, knowledge and skills of NT/CA practices, one farmer rated “very high”, the other “fairly high”, and the third “fairly low” (see Figure 34).



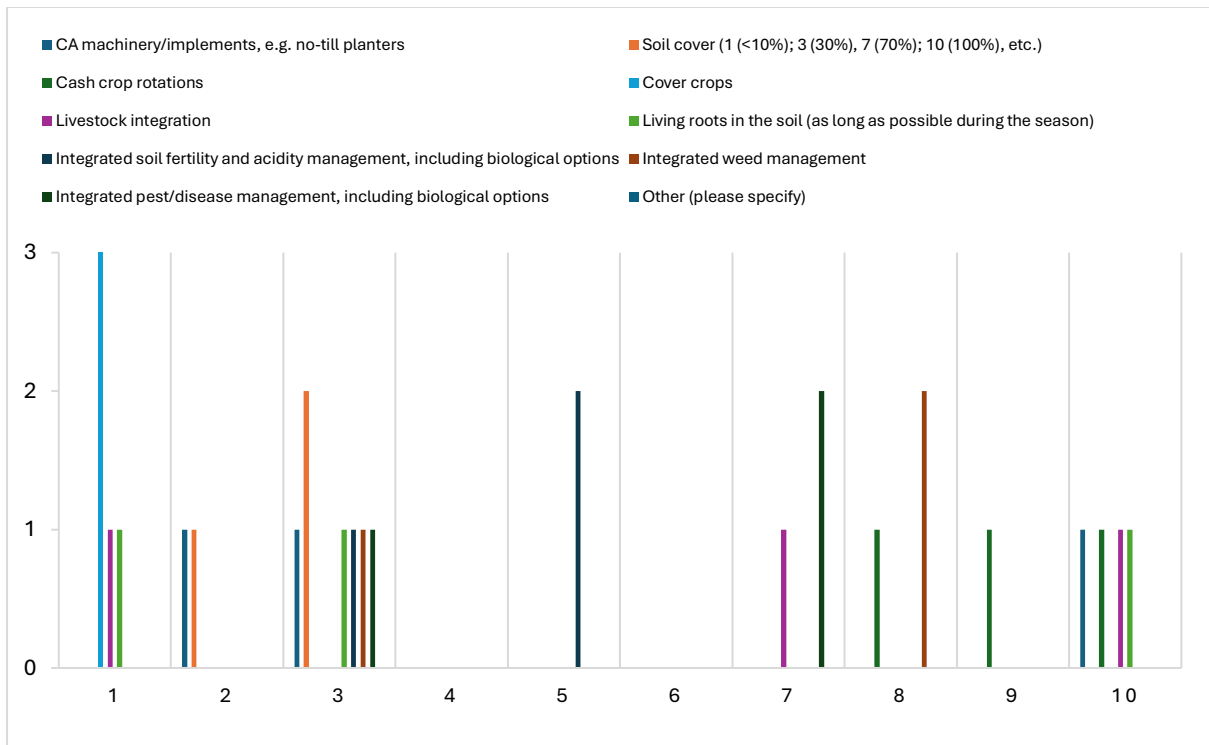
**Figure 35: Years farmers applied NT/CA practices before they stopped**

In terms of the number of years they each applied NT/CA practices before they stopped, one farmer indicated 2 years, the other indicated 3 years and the longest was 6 years (see Figure 35).



**Figure 36: Farmer's plan to stop with NT/CA**

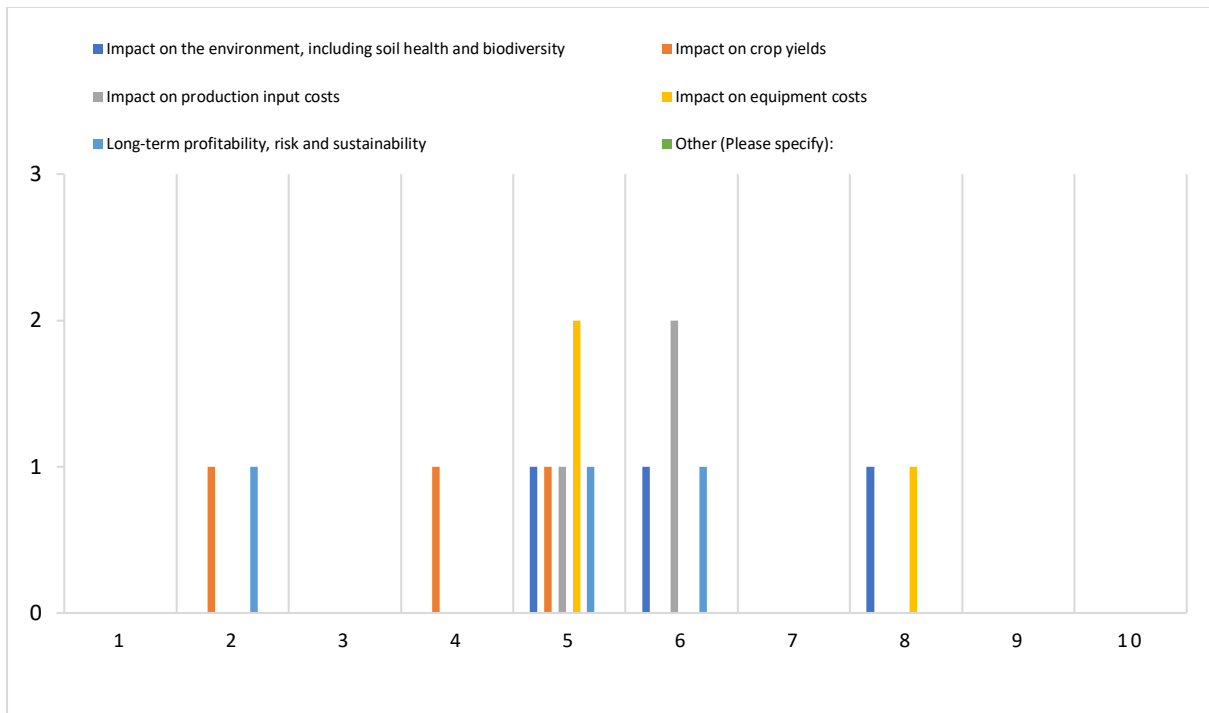
One farmer was sure to have stopped NT/CA permanently while the other was not sure whether they have stopped permanently or temporarily (see Figure 36).



**Figure 37: Rating of NT/CA practices that farmers applied**

**Note:** Farmers were asked to indicate the number of years they each applied NT/CA practices before they stopped on a scale of 1 to 10, 1 = “not applied”, 2 = “applied poorly”, 5 = “applied moderately well”, and 10 = “applied very well”. The graph reflects the farmers’ rating per practice.

Farmers were asked to indicate which NT/CA practices they implemented and provide a rating of how well they did so. Of all the 9 practices, all three farmers indicated that they had not applied the practice of cover crops; and that they applied the practice of soil cover poorly. The following practices were mostly applied moderately well: integrated soil fertility and acidity management, including biological options; integrated weed management; and integrated pest/disease management, including biological options. One farmer applied each of the following practices very well: cash crop rotations, cover crops, livestock integration, living roots in the soil (as long as possible during the season) (see Figure 37).



**Figure 38: Rating of farmers' perceptions or experiences with NT/CA**

**Note:** Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “negative” and 10 = “positive”. The bars reflect farmers’ rating of each factor.

Farmers were asked to indicate their perceptions or experiences with NT/CA. To this, the farmers’ responses were mostly distributed in the centre of the scale. Impact on crop yields was rated more to the left (negative) while impact on production input costs and on equipment costs were rated more to the right (positive) by the three farmers (see Figure 38).

There were varied responses to the factors that led farmers to stop NT/CA (see Figure 39). Looking at the results, 2/3 farmers rated the factor that “it didn’t work in my area due to unique soils and climate” to have had high influence. Lower crop yields, high costs and risk of reduced income during the transition period were also rated to have had a moderate impact by 2/3 farmers. Factors that were considered to have low influence on decision was “farmers in my area were negative and they/that convinced me to stop” and “lack of community or peer support groups, such as study groups”.



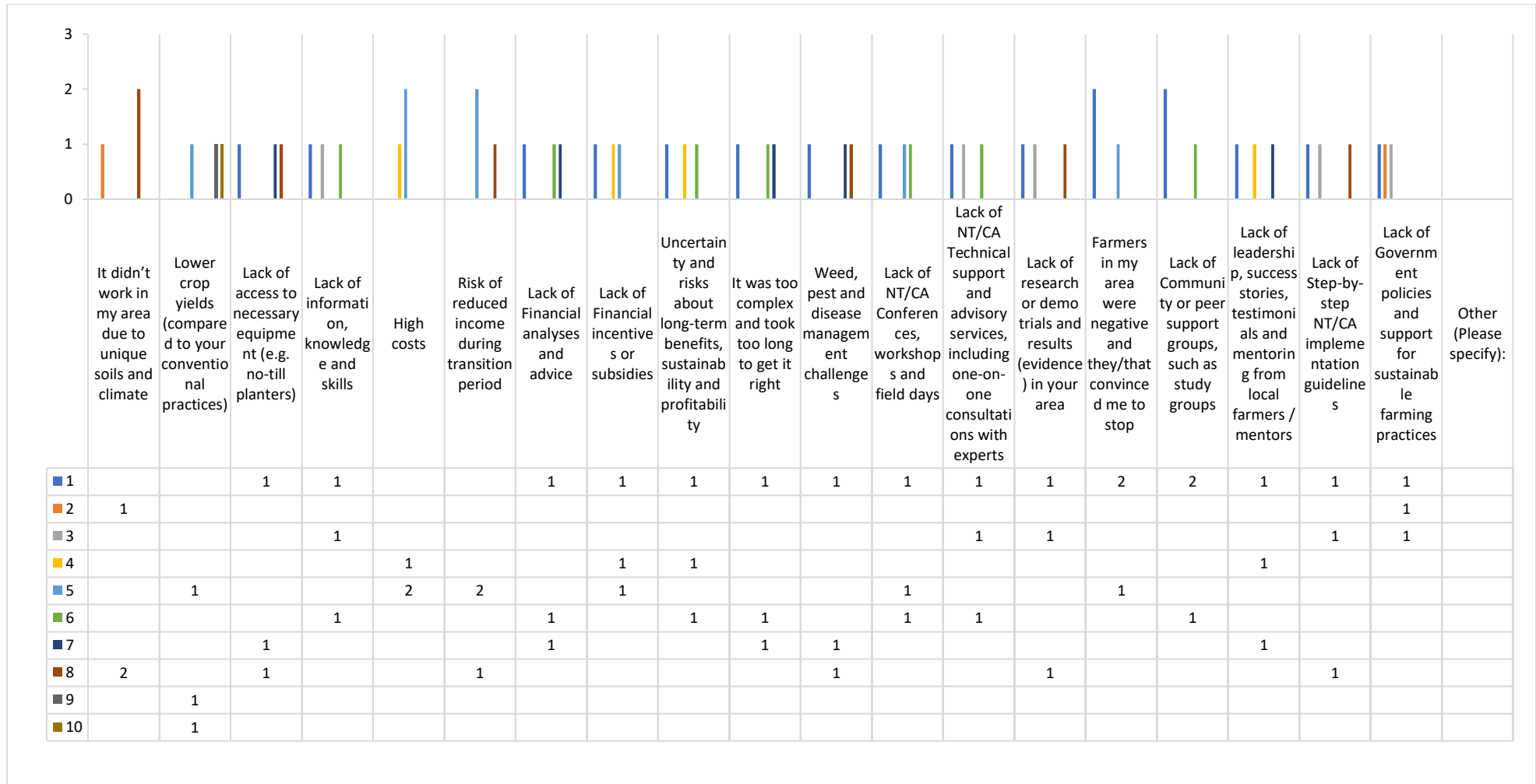


Figure 39: Rating the possible factors or reasons that led farmers to stop NT/CA

Note: Farmers were asked to indicate their answers on a scale of 1 to 10, with 1 = “low influence” and 10 = “high influence”. The bars reflect farmers’ rating of each factor.

## Chapter 5: Institutions' industry perceptions and sentiments concerning CA results

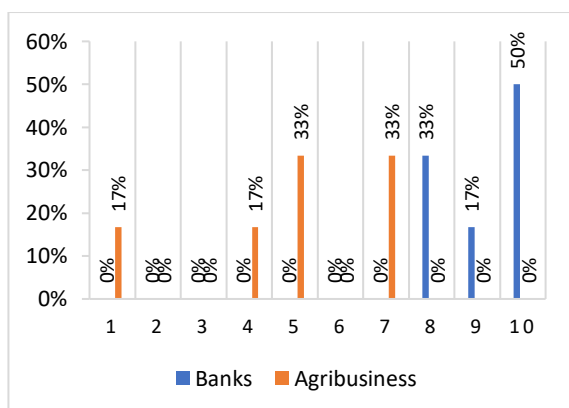
### 5.1 Result highlights

The results of this questionnaire included data from 6 individuals from 5 agribusinesses and 6 individuals from 5 banks (see also the figure regarding question 1 in Annex 5B). Feedback was received from the following agribusinesses and commercial banks:

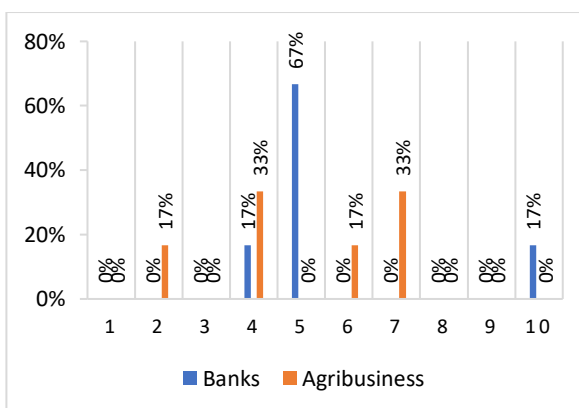
Banks	Agribusinesses
FNB	GWK
Landbank	NWK
Standard Bank	VKB
RMB	OVK
Nedbank	Senwes

The results show that all banks see CA as a priority for sustainable agriculture and environmental stewardship, while only 66% of agribusinesses see it as such (see Figure 40a). It was therefore not surprising that all financial institutions indicated an interest in advancing CA, and only 67% of agribusiness indicated an interest while 33% indicated maybe in future (see Annex 5B question 7a). In terms of support, all institutions except 33% of agribusinesses rated their awareness and eagerness to support CA at 5+/10 (see Annex 5B question 4).

At the time of engagement, most banks (84%) rated their expertise and capacity in supporting producers pertaining to CA as 4 and 5/10, with the rest rating 10/10. Agribusinesses were equally split on low and high margins (see Figure 40b).



**Figure 40a: Companies' perception of CA as a priority for sustainable agriculture and environmental stewardship**

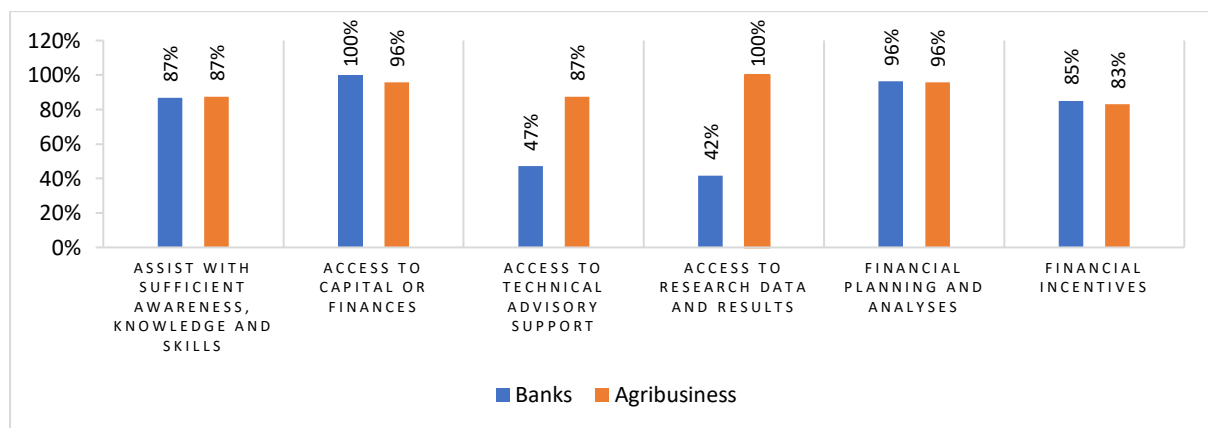


**Figure 40b: Companies' expertise and capacity in supporting producers pertaining to CA**

**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or little” and 10 = “very high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

When asked how they contribute to supporting producers to adopt CA practices, banks rated access to capital and finance as their top avenue followed by the provision of financial planning and analyses. To this, agribusinesses highlighted access to research data and results as their top avenue followed by both access to capital or finances and financial planning and analyses as well (see Figure 41 and Annex 5B question 3.1).

Interestingly, although agribusinesses contribute through financial planning and analyses (with a 96% rating), none of them have a long-term financial plan in place; 67% of banks, however, have a long-term plan in place while 33% do not (Annex 5B question 3.2). Most agribusinesses provide and have access to technical advisory support; however, it seems that banks do not have technical support available to support producers (see also Annex 5B question 2.1).

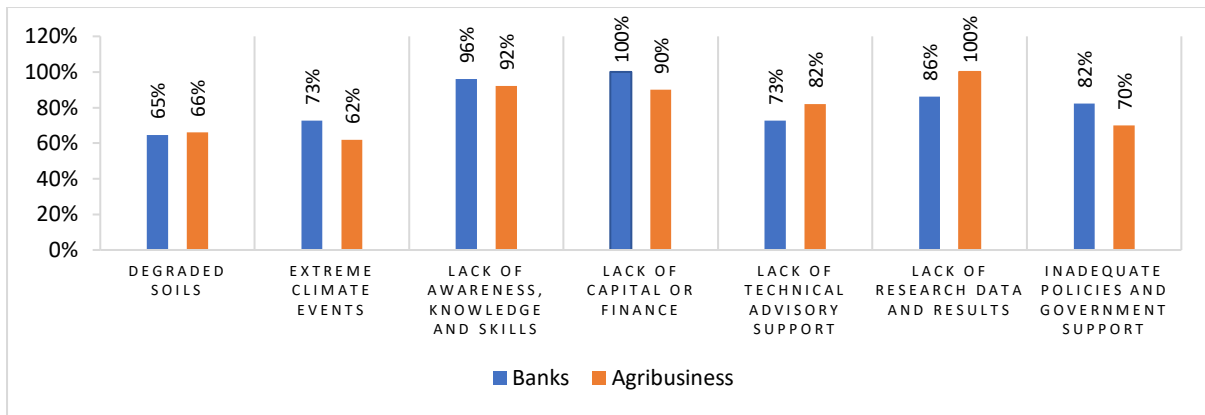


**Figure 41: Form of companies’ contribution to support producers in adopting CA practices**

**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “low” and 10 = “high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

In response to factors that are considered of most importance to these institutions, banks consider environmental considerations (e.g. sustainability goals and commitments, climate change, drought risks) as the most important factors to their interest in advancing CA, while agribusinesses consider economic considerations (e.g. potential cost savings, market opportunities) and access to financial incentives or funding opportunities as factors of most importance.

Interestingly, potential risks or uncertainties associated with adoption are of least importance to banks while regulatory and policy requirements or compliance obligations are of least importance to agribusinesses (see Annex 5B question 7b).

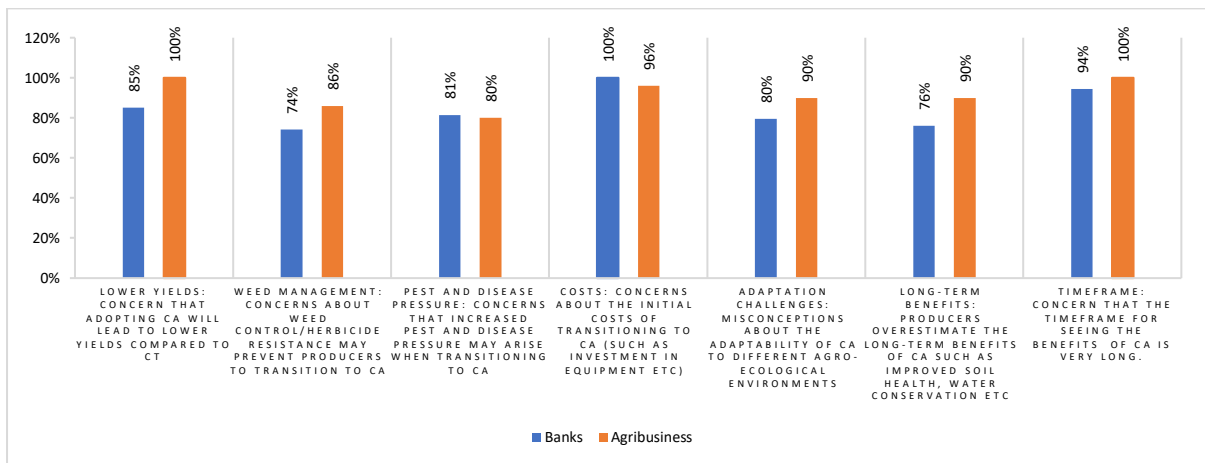


**Figure 42: Perception on the barriers or challenges to adopting CA practices**

**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “low” and 10 = “high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

According to banks, lack of capital or finance is the main barrier or challenge to adopting CA while agribusinesses perceive it to be the lack of research data and results (see Figure 42). Interestingly, both perceive the lack of awareness, knowledge and skills as the second biggest barrier or challenge.

Degraded soils and extreme climate events are perceived to have the least barrier or challenge to CA adoption. Similarly, banks perceive costs: concerns about the initial costs of transitioning to CA (such as investment in equipment, etc.) as a key concern about CA while agribusinesses see it as both lower yields: concern that adopting CA will lead to lower yields compared to CT and timeframe: concern that the timeframe for seeing the benefits of CA is very long (see Figure 43).



**Figure 43: Perceived concerns about CA practices**

**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “low” and 10 = “high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

In terms of profitability, 87% of agribusinesses perceive that CA is much more profitable than CT while the rest perceive that there is no difference in profitability or that CT is much more profitable. Banks, however, are of the perception that CA is much more profitable (see Annex 5B question 11b).

Moreover, all agribusinesses capture production cost data of their clients while only 17% of banks do and 83% do not (see Annex 5B question 11a).

## 5.2 Discussion

The purpose of this questionnaire was to ascertain an industry perspective as to the sentiment and experiences concerning NT/CA and the transition to it, both historically and in the future. The following inputs were received.

### *Prioritisation, interest, awareness and eagerness to support CA*

- Looking at the dynamics of the responses, all banks see CA as a priority, are aware and eager to support it, and have an interest in advancing it. Translating this support into operational support, however, is challenging and lacks evidence.
- Only 17% rated their expertise and capacity in supporting producers pertaining to CA as very high, 37% as average (5/10), and the rest (17%) as very low. This indicated a possible gap in financial institutions expertise and capacity to support farmers implementing and adapting CA.
- It is therefore not surprising that 50% of these banks have very few norms against which they evaluate CA. This could also give ground to the low to average expertise and capacity in the financial institutions.
- Most of the 67% of agribusinesses that see CA as a priority are the same ones that also indicated very high awareness and eagerness to support it as well as interested in advancing it. Most of them also have very high expertise and capacity in supporting producers on CA.
- However, in general, the results suggest that most banks have lower expertise and capacity to support CA than agribusinesses.

### *Institutional contribution & support*

- Banks mostly contribute in supporting producers to adopt CA practices through access to capital or finance, financial planning and analysis and financial incentives. They support the least through access to technical advisory support and access to research data and results.
- Interestingly, the areas that banks contribute the least are well supplemented by agribusiness. In that (other than financial aspects) agribusinesses indicate a strong contribution through access to research data and results and access to technical advisory support. This could also be linked to their strong expertise and capacity.
- Both institutions value assistance with sufficient awareness, knowledge and skills, equally. Hence, they have a strong rating as it pertains to awareness and advancement of CA.

### *Financial support & long-term financial planning*

- Both banks and agribusinesses contribute significantly through access to capital or finances. This is a positive contribution to advancing CA.
- It is, however, surprising that all agribusiness do not have a long-term financial plan in place to assist producers in converting to CA. This could suggest that their contribution is short-term, project related, or that they may not have a long-term goal and the resource capacity to provide such a long-term plan.

- While 33% of the banks do have a long-term financial plan, it would be interesting to investigate reasons why they do not.

#### *Technical advisory support*

- Seeing that banks indicated technical advisory support as their least avenue of support, it is reasonable to see 83% of them indicate that they provide very low technical advisory support to CA. This implies a gap in the banking sector and the potential for collaboration and support services.
- On the contrary, agribusiness have relatively higher technical advisory support than expected. These results are consistent with earlier findings.

#### *Factors that are considered of most importance to institutions*

- Contrary to expectation, banks' top concern is environmental consideration while that of agribusiness is tied between economic considerations and access to financial incentives or funding opportunities.
- This implies that environmental consideration is key to banks unlocking perhaps financial or capital support. Hence, earlier findings revealed that all banks are interested in advancing and prioritising CA for sustainable agriculture since it caters for environmental considerations. This is a reasonable position as environmental benefits translate into economic and financial benefits.
- Agribusinesses have significantly high considerations for producer preferences or demand for sustainable practices, since they deal with them (as clients) on a daily basis. This relationship with producers lays a strong foundation and opportunity for future efforts to introduce, implement and adapt CA among producers.
- Agribusinesses value potential risks or uncertainties associated with adoption more than banks. This factor is, however, of least importance to banks relative to other factors. Agribusinesses' first-hand experience and understanding of producer's contexts and risks are valuable for future collaboration and implementation of CA.

#### *Main barrier or challenges to adopting CA*

- These results support existing literature in that access to capital or finance and lack of research data and results are among key barriers or challenges to adoption. This implies that in addition to financing, institutions also need evidence based initiatives to facilitate adoption, and hence a link to or collaboration with relevant research institutions.
- The lack of awareness, knowledge and skills were also ranked highly as a barrier to adoption indicating the essential role of awareness creation, knowledge generation and sharing, and skill transfer and enhancement to aid the adoption and adaptation of CA into local contexts.
- Degraded soils and extreme climate do not necessarily pose a barrier or challenge to adoption as such. This might imply that both institutions perceive it as an opportunity or motivation for adoption to mitigate further challenges.

#### *Concerns about CA*

- Banks are most concerned about the possible financial dip after adopting CA, while agribusinesses are most concerned about a possible production dip. Both have a concern about profitability.
- It is not surprising that both institutions are significantly concerned about the timeframe of benefits. This is an interesting finding as it highlights one of the main drivers of scepticism in

literature, where a great concern lies in how long the initial transition phase will take and to what extent it might affect farm profitability.

### Profitability

- The majority of respondents from both institutions perceive that CA is much more profitable than CT. This implies that, while institutions have concerns about CA and highlight certain barriers to adoption, they agree (by perception) that CA is much more profitable.
- It is also reasonable to assume that this perception is evidence-based as most of these institutions capture production costs data. This question is explored in a different objective of this study, where production accounts of a range of producers and categories of adoption are compared and analysed.

## 5.3 Annexure 5A: Questionnaire outline

1. To gather information effectively, it is important to specify the **respondent's affiliation** and ensure clarity in the questionnaire. Please indicate your affiliation by selecting one of the following options:
  - Bank
  - Agribusinesses
  - Service providers such as consultants, accountants, etc.
  - Other
2. Does your company provide **technical support** for conservation agriculture practices?
  - Please provide a score out of 10, with 1 = no or very little, 10 is very high.

Do you have **norms against which you evaluate** CA applications?

  - Does Please provide a score out of 10, with 1 = no or very little, 10 is very high.
3. Does your company provide **financial support** for conservation agriculture practices?
  - Please provide a score out of 10, with 1 = no or very little, 10 is very high.

Do you have a **long-term financial plan** in place to assist producers in converting to conservation agriculture?

  - Please provide a score out of 10, with 1 = no or very little, 10 is very high.
4. How would you rate your company's **awareness and eagerness** for conservation agriculture?
  - Please provide a score out of 10, with 1 = no or very little, 10 is very high.
5. How would you rate your company's **expertise and capacity** in supporting producers pertaining to conservation agriculture?
  - Please provide a score out of 10, with 1 = no or very little, 10 is very high.
6. Does your company see conservation agriculture as a **priority for sustainable agriculture** and environmental stewardship?
  - Please provide a score out of 10, with 1 = no or very little, 10 is very high.
7. **a.** Does your company have an interest in advancing conservation agriculture? Yes, No or maybe in the future.

b. If yes or maybe in future, what **factors** would you consider to be **most important**? Give each a score out of 10.

Factor	Score out of 10 (10 = biggest influence)
Economic considerations (e.g., potential cost savings, market opportunities)	
Environmental considerations (e.g. sustainability goals and commitments, climate change, drought risks)	
Regulatory and policy requirements or compliance obligations	
Producer preferences or demand for sustainable practices	
Availability of technical support or expertise	
Access to financial incentives or funding opportunities	
Potential risks or uncertainties associated with adoption	
Others: Please list	

c. Please state **any other factors** that influence your company's level of interest or commitment to conservation agriculture (now or in future) and **provide a score out of 10**.

8. a. What are the perceived **concerns about** conservation agriculture? Give each a score out of 10.

Factor	Score out of 10 (10 = biggest challenge)
Degraded soils	
Extreme climate events	
Lack of awareness, knowledge, and skills	
Lack of capital or finances	
Lack of technical advisory support	
Lack of research data and results	
Inadequate policies and government support	
Others: Please list	

9. a. Are there specific **concerns or misconceptions about** conservation agriculture that you became aware of and that you would like to raise? Give each a score out of 10.

Factor	Score out of 10 (10 = biggest concern and misconception)
Lower yields: Concern that adopting CA will lead to lower yields compared to CT	
Weed Management: Concerns about weed control/herbicide resistance may prevent producers to transition to CA	
Pest and Disease Pressure: Concerns that increased pest and disease pressure may arise when transitioning to CA	



Costs: Concerns about the initial costs of transitioning to CA (such as investment in equipment etc)	
Adaptation Challenges: Misconceptions about the adaptability of CA to different agro-ecological environments	
Long-Term Benefits: Producers overestimate the long-term benefits of CA such as improved soil health, water conservation etc	
Others: Please list	

**b.** Please state **any other factors** that are **concerns about** conservation agriculture that you became aware of and that you would like to raise and **provide a score out of 10.**

**c.** What do you think is the **fundamental reason** why CA is **not working on farm level?** Please **provide a score out of 10.**

**10. a.** How can financial institutions or agribusinesses contribute to **supporting producers in adopting** conservation agriculture practices? Give each a score out of 10.

Factor	Score out of 10 (10 = biggest support)
Assist with sufficient awareness, knowledge and skills	
Access to capital or finances	
Access to technical advisory support	
Access to research data and results	
Access to financial planning and analyses	
Access to financial incentives	
Others: Please list	

**b.** Please state **any other factors** that are **concerns about** conservation agriculture that you became aware of and that you would like to raise and **provide a score out of 10.**

**11. a.** Do you **capture production cost** data from your clients (whether it be CT, NT, CA practices)?

- Yes (proceed to next question)
- No (skip last questions and submit)

**b. If yes,** on a scale of 1 to 10, please indicate your **perception of the profitability** of conservation agriculture (CA) compared to conventional tillage (CT), where:

- Please provide a score out of 10, with:
  - 1 indicates that CT is much more profitable than CA,
  - 5 indicates no difference in profitability,
  - 10 indicates that CA is much more profitable than CT.

**c.** Please provide your perspective on **the relevance and potential benefits** of production cost data.

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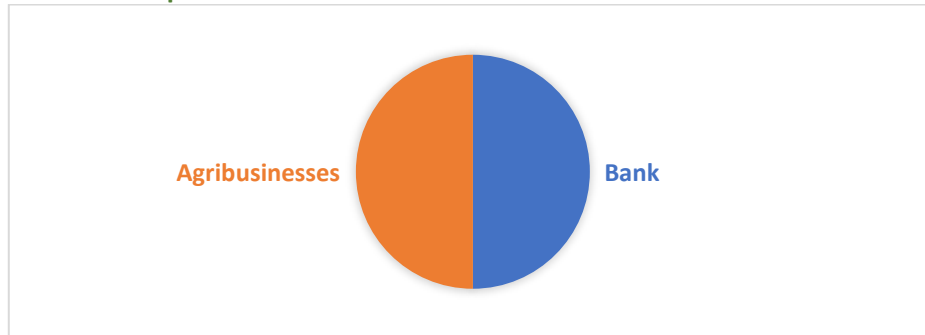
## 5.4 Annexure 5B: Result details

n: Agribusiness = 6

n: Banks = 6

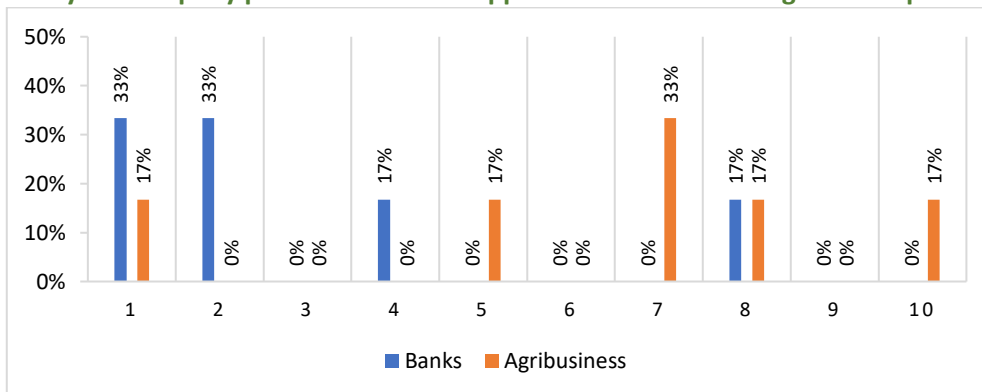
n: total = 12

### 1. Distribution of responses



There is an equal distribution of the number of questionnaire responses from both agribusinesses and banks.

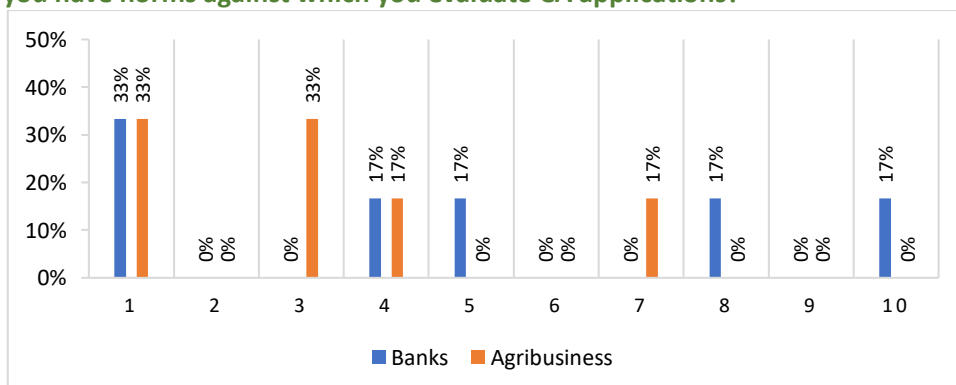
### 2.1 Does your company provide technical support for conservation agriculture practices?



**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or very little” and 10 = “very high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

Most banks say they provide no or very little technical support for agriculture practices while most agribusinesses provide reasonable to very high technical support.

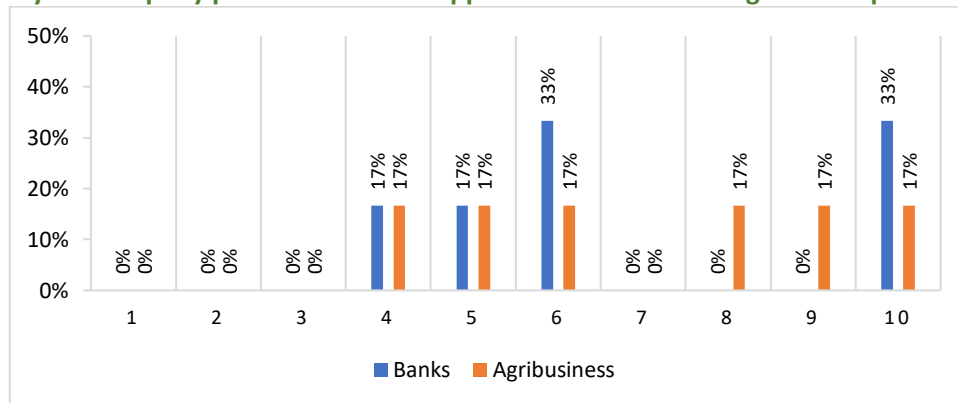
### 2.2 Do you have norms against which you evaluate CA applications?



**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or very little” and 10 = “very high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

In terms of norms against CA application is evaluated, most banks and agribusinesses no to very little norms. Some banks, however, lean more to the right wherein they very high norm against CA application.

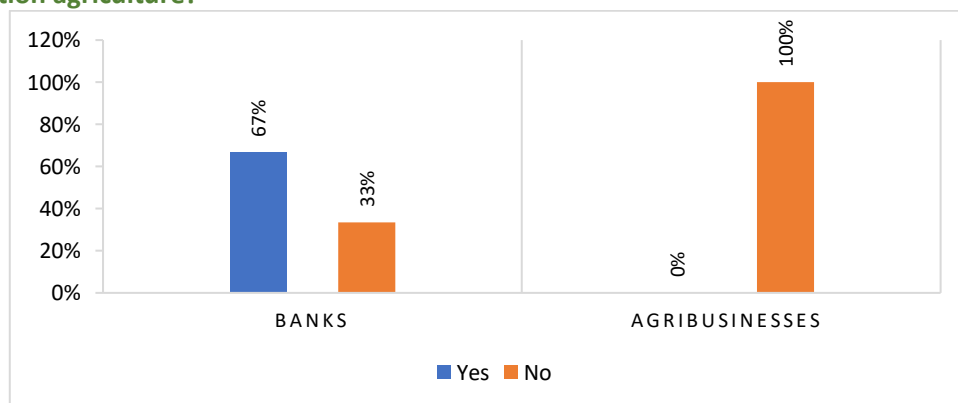
### 3.1 Does your company provide financial support for conservation agriculture practices?



**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or very little” and 10 = “very high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

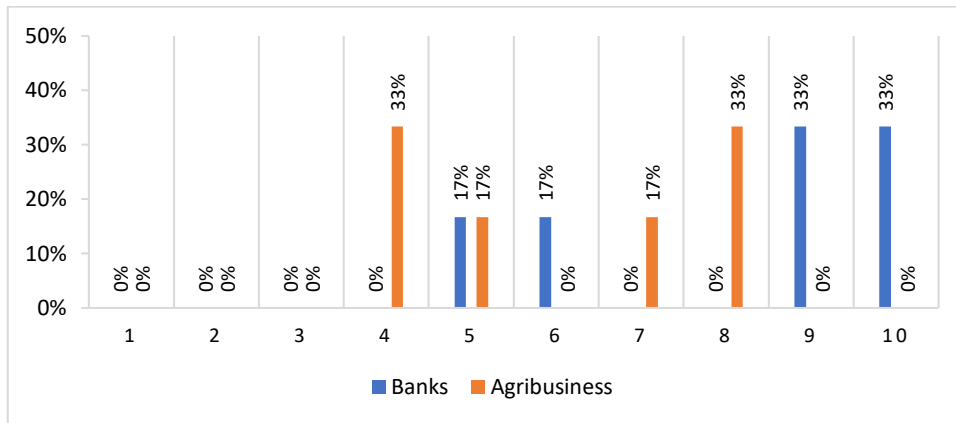
Both banks and agribusinesses provide financial support for CA practices but agribusinesses provide more financial support for than banks; with ratings that lean strongly to the right indicating very high support.

### 3.2 Do you have a long-term financial plan in place to assist producers in converting to conservation agriculture?



All agribusinesses (100%) responded to not have a long-term financial plan in place to assist producers in converting to CA while 67% of banks said they do have such plan in place.

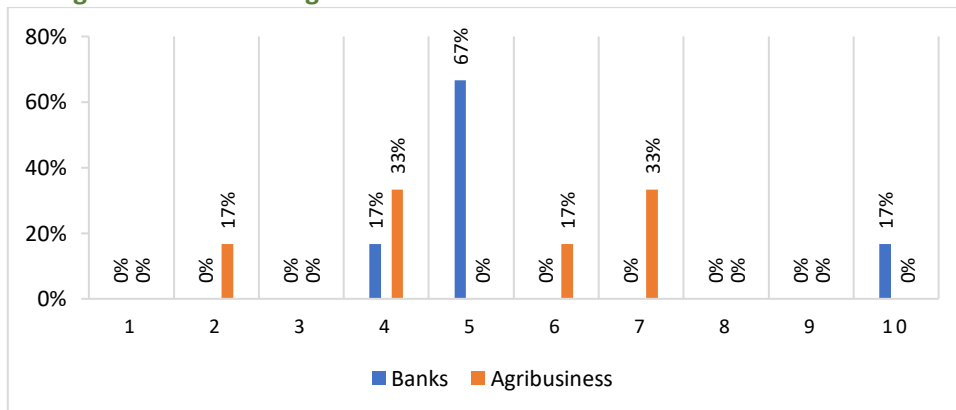
**4. How would you rate your company's awareness of and eagerness to support conservation agriculture?**



**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or very little” and 10 = “very high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

Both banks and agribusinesses have a reasonable to very high awareness and eagerness to support CA. However, agribusinesses more than banks; with rating that lean strongly to the right while those of banks are more distributed at the centre of the scale.

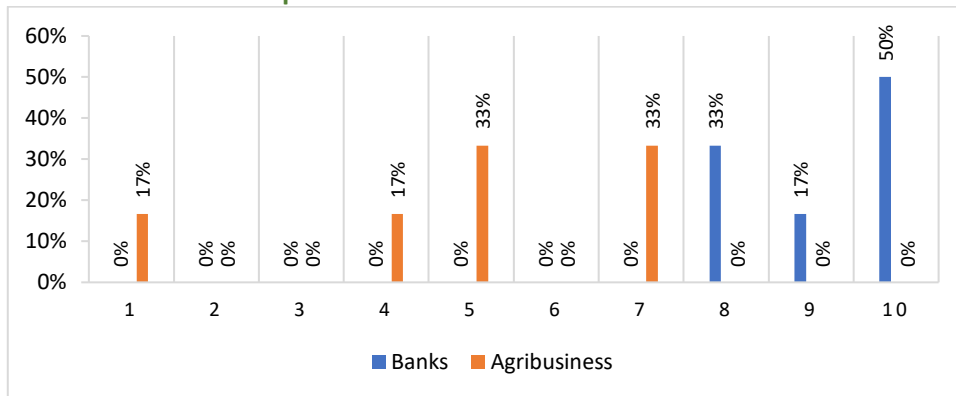
**5. How would you rate your company's expertise and capacity in supporting producers pertaining to conservation agriculture?**



**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or very little” and 10 = “very high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

Agribusinesses have an equal distribution between no/very little and very high expertise and capacity in supporting producers pertaining to CA. Banks lean more to the left with no/very little expertise and capacity; only one bank rated to have very high expertise and capacity.

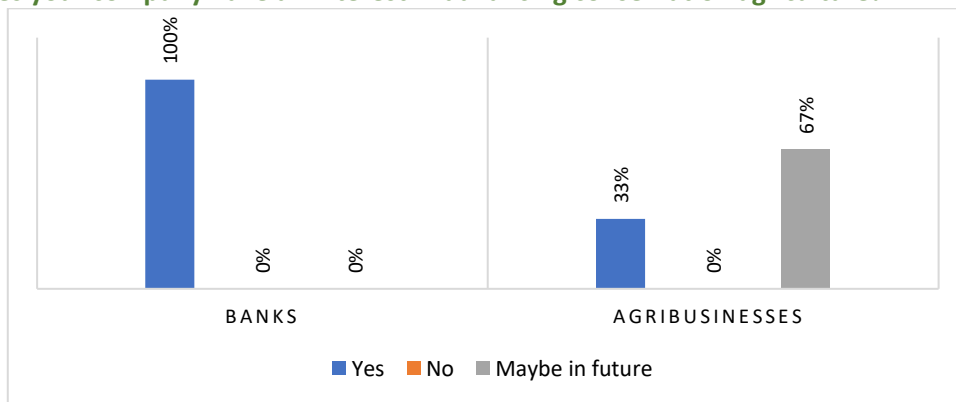
**6. Does your company see conservation agriculture as a priority for sustainable agriculture and environmental stewardship?**



**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “no or very little” and 10 = “very high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

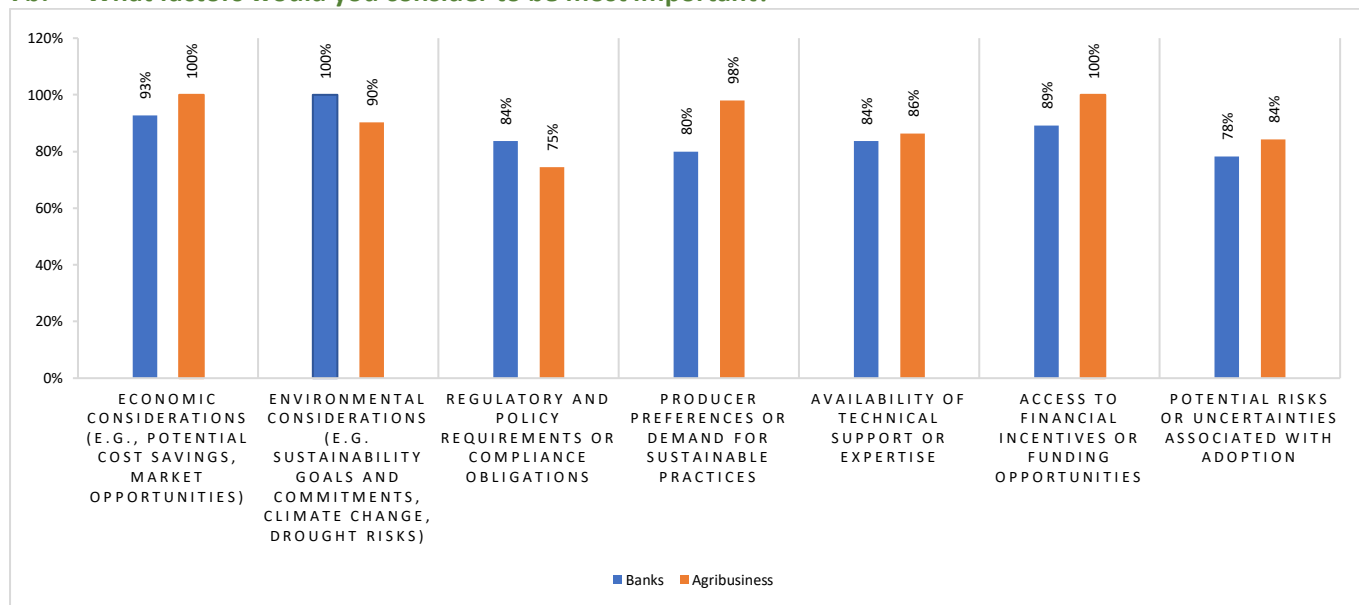
Other than few agribusinesses that do not see CA as a priority for sustainable agriculture and environmental stewardship, majority do. All banks agree to seeing it as a priority.

**7a. Does your company have an interest in advancing conservation agriculture?**



All banks (100%) have an interest in advancing CA while 67% of agribusinesses do not currently have than interest and suggest maybe in future.

### 7b. What factors would you consider to be most important?



**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “low” and 10 = “high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

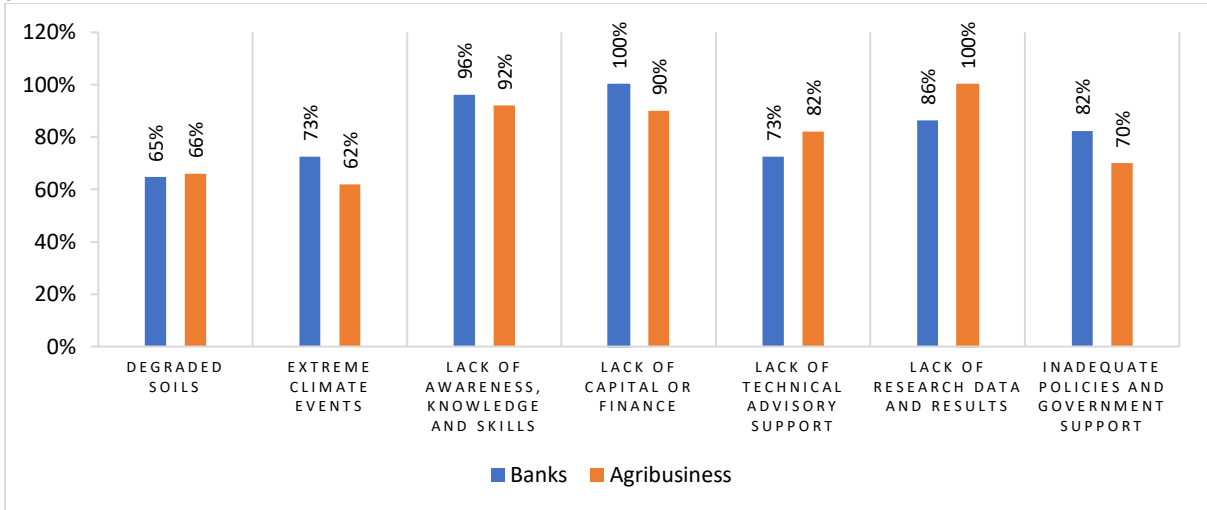
Banks consider environmental consideration (e.g. sustainability goals and commitments, climate change, drought risks) as the most important factor to their interest in advancing CA, while for agribusinesses it is economic considerations (e.g. potential cost savings, market opportunities) and access to financial incentives or funding opportunities. Interestingly, potential risks or uncertainties associated with adoption are of least importance to banks while regulatory and policy requirements or compliance obligations are of least importance to agribusinesses.

### 7c. Please state any other factors that influence your company's level of interest or commitment to conservation agriculture (now or in future) and provide a score out of 10

Banks		Agribusiness	
Comments	Rating	Comments	Rating
It is essential for the sector to build climate resilience because it is both a recipient of climate change and a contributor. Future sustainability both environmental and financial is vital going forward and financiers have a pivotal role to play in this regard	Not provided	Lack of government support to Agri-sector.	10
Principles of Sustainable Banking (PSB) In 2013, Land Bank joined the UNEP FI, and in February 2018, it was invited to partake in the UNEP FI Principles for Responsible Banking (PRB) project, aligning with its role as a leading South African Agricultural Development Bank deeply integrated with the natural environment. Recognizing the vital importance of a healthy social and environmental backdrop for its operations, the PRB initiative was a strategic fit for Land Bank to reinforce its commitment to sustainable finance, corporate responsibility, and the broader economic, environmental, and social sustainability goals. The PRB framework enhances the Land Bank’s mission by transforming previously peripheral issues, such as environmental and social concerns, into central elements of its business model. This shift not only	10	Practical application on irrigation without decreasing the depth of the water profile in the ground.	10

aims for financial sustainability but also integrates a comprehensive approach to managing economic, social, environmental, and governance factors, driving the bank towards more profound accountability and stewardship in impacting society and the environment positively. By embedding these principles into core business practices rather than viewing them as mere corporate social responsibilities, Land Bank commits to being accountable to all stakeholders, including Parliament, thereby fostering societal development and environmental preservation as a state-owned financial institution.

**8a. What do you perceive as the barriers or challenges to adopting conservation agriculture practices?**



**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “low” and 10 = “high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

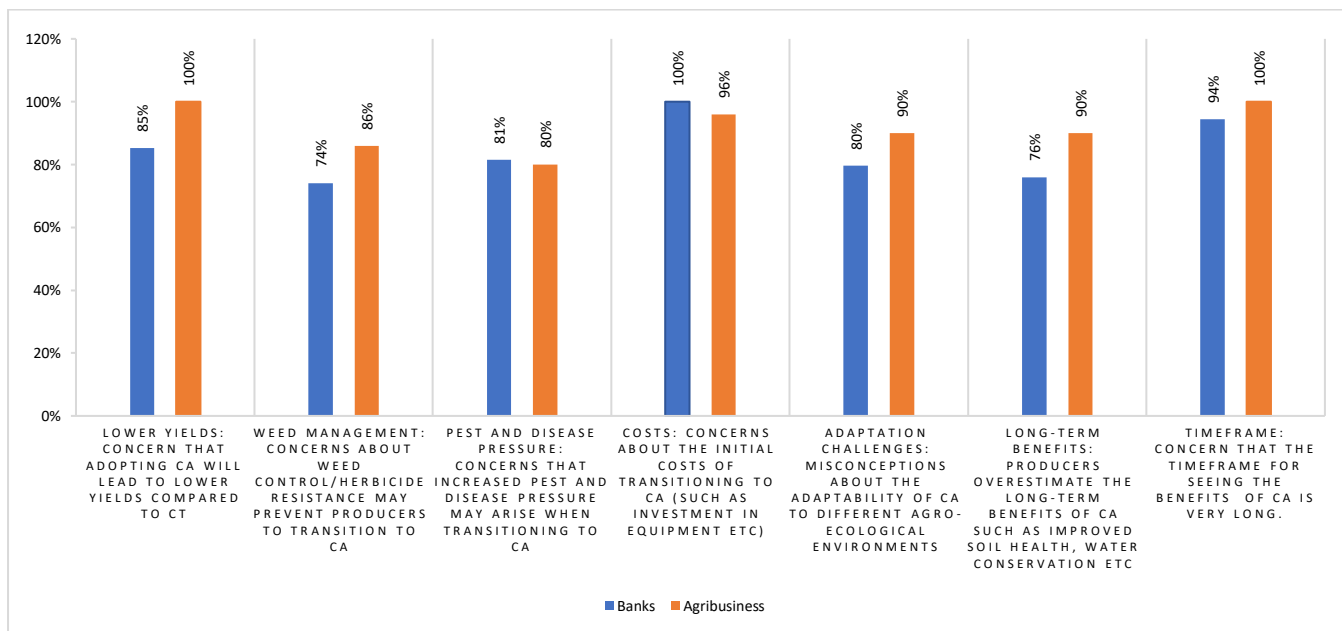
Most banks perceive the lack of capital or finance as main barrier or challenge to adopting CA while agribusinesses perceive that to be lack of research data and results. Interestingly, both banks and agribusiness see degraded soils and extreme climate events as the two least barrier or challenge to CA adoption.

**8b. Please state any other factors that you perceive as the barriers or challenges to adopting conservation agriculture practices and provide a score out of 10.**

Banks		Agribusiness	
Comments	Rating	Comments	Rating
Poor management practices will produce similar results under conservation agricultural practices.	10	Inability to pass the cost on to the end-consumer.	10
There is a concern that in changing over things get worse before they get better - this is a barrier or fear to start on the journey. We do need better economic data - linking up the dots between changing to conservation agriculture and the financial benefits are key if we are to succeed and fast track the uptake.	Not provided		

education, access to resources, supportive policies, and tailored solutions that consider local contexts and farmer needs.	7		
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**9a. What are the perceived concerns about conservation agriculture?**



**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “low” and 10 = “high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

Banks perceive costs: concerns about the initial costs of transitioning to CA (such as investment in equipment etc.) as a key concern about CA while agribusinesses see it as both lower yields: concern that adopting CA will lead to lower yields compared to CT and timeframe: concern that the timeframe for seeing the benefits of CA is very long. Banks perceive weed management: concerns about weed control/herbicide resistance may prevent producers to transition to CA as a factor of least concern. Agribusinesses consider pest and disease pressure: concerns that increased pest and disease pressure may arise when transitioning to CA as factor of least concern.

**9b. Please state any other factors that are concerns about conservation agriculture that you became aware of and that you would like to raise and provide a score out of 10.**

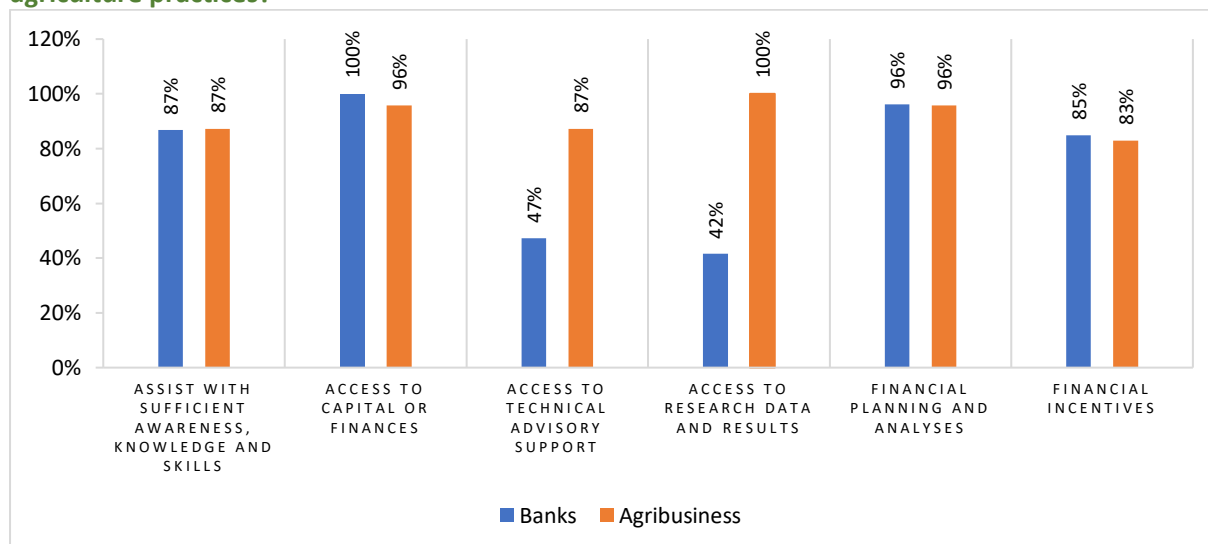
Banks	
Comments	Rating
The traditional view of a neat farm needs to change.	7
As with anything it also comes down to implementation and discipline / management. CA is not a silver bullet but if done correctly has many advantages.	Not provided
Adoption of CA often requires new equipment and changes in farm management practices, which can be costly upfront. Small-scale farmers, in particular, may find the initial investment prohibitive without financial support or incentives. Traditional farming methods are deeply rooted in many cultures. Changing these practices can be met with resistance from community members who are sceptical of new methods or unsure of their long-term benefits.	8



**9c. What do you think is the fundamental reason why CA is not working on farm level? Please provide a score out of 10.**

Banks		Agribusinesses	
Comments	Rating	Comments	Rating
Farmers do not experiment and run proper trials on their farms to see what works for them. An all or nothing approach is not working.	10	Perceived as an additional cost that cannot be passed on to the end consumer.	10
Financing the so-called J-curve.	Not provided	Knowledge Scared to change	Not provided
If we are able to link up the dots - i.e. financial and environmental benefit that flows from CA, then the uptake will escalate. If CA is linked to risk and more importantly seen as successful in managing risk, then it will be adopted at pace.	10	Risk of lower yields while having to invest capital.	8
Knowledge	Not provided		
Many farmers operate under tight margins and cannot afford to wait for long-term gains or assume the risk of initial yield drops. Additionally, the upfront costs and need for new knowledge or equipment create significant entry barriers.	9		

**10a. How can your company contribute to support producers in adopting conservation agriculture practices?**



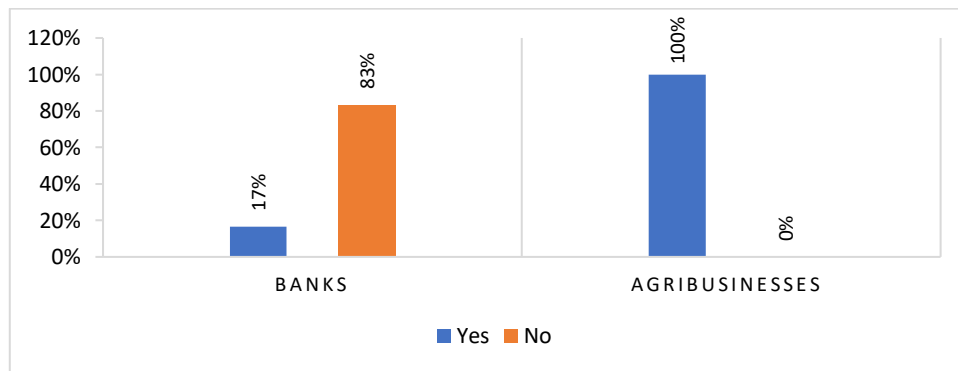
**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “low” and 10 = “high”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

According to banks, they can contribute to supporting producers in adopting CA practices through providing access to capital or finance. Agribusiness can contribute through access to research data and results. It seems banks are least committed to contributing through access to research and data results while agribusinesses are least committed to contributing through financial incentives.

**10b. Please state any other factors you believe your company can contribute to support producers in adopting conservation agriculture practices and provide a score out of 10.**

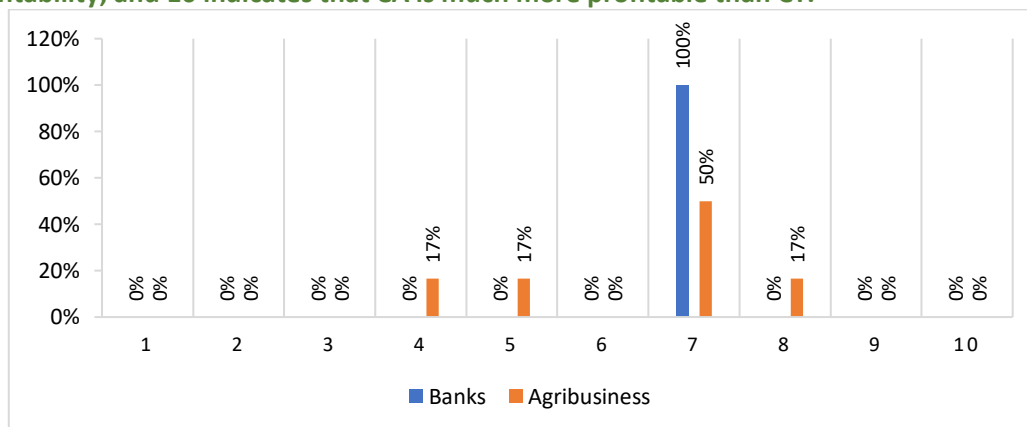
Banks	
Comments	Rating
Financial structures linked to the sale of carbon credits.	Not provided
Possibly the inclusion of a sustainability index into our risk modelling / risk rating for a client. This is a work in progress but if justified it makes sense to do so as this could impact the interest rate charged.	Not provided
Share good news stories - let those that are successful with CA share experiences.	Not provided
Organizing Community Learning Events.	7
Machinery and Equipment at Blended Finance.	8

**11a. Do you capture production cost data from your clients (whether it be CT, NT, CA practices)**



All agribusinesses (100%) capture production cost data from their clients while 83% of banks do and 17% do not.

**11b. Perception of the profitability of conservation agriculture (CA) compared to conventional tillage (CT), where: 1 indicates that CT is much more profitable than CA; 5 indicates no difference in profitability; and 10 indicates that CA is much more profitable than CT.**



**Note:** Companies were asked to indicate their answers on a scale of 1 to 10, with 1 = “CT is much more profitable than CA”, 5 “no difference in profitability”, and 10 = “CA is much more profitable than CT”. The blue bars reflect the percentage rating for agribusinesses and the brown for banks.

Most agribusinesses perceive that CA is much more profitable than CT while some perceive that there is no difference in profitability and or that CT is much more profitable. Banks perceive that CA is much more profitable, however, only one bank gave this perception.

**11c. Please provide your perspective on the relevance and potential benefits of production cost data**

**Banks**

- Production cost data is important as far as profitability is concerned. However, comparing production costs in a study group setup is less relevant as the production practice differs along the continuum of the conversion.
- Critical asset in the strategic and operational toolkit of any business. Effective management of this data can lead to substantial improvements in efficiency, market positioning, and ultimately, profitability.

**Agribusinesses**

- The most relevant item in the whole study.
- Provides a basis to analyse the cost of different production techniques.
- To measure is to know. Farmers knowing their cost are more feasible in the long-term.
- The production cost data allows to get an idea of what is the norm in an area and what practices work best. Benchmarking between producers can also be done.