Conservation Farming Unit
CONSERVATION FARMING & CLIMATE SMART AGRICULTURE

CSAZ OUTCOMES SURVEY REPORT

2019/2020 AGRICULTURAL SEASON

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Key Outcomes survey findings for Year 4 of the CSAZ Programme - 2019/20 Farming season.

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ACRONYMS

ADP	Animal Draught Power
CA	Conservation Agriculture
CAPI	Computer Assisted Personal Interview
CF	Conservation Farming
CFU	Conservation Farming Unit
CEO	Camp Extension Officer
CSA	Climate Smart Agriculture
CSAZ	Climate Smart Agriculture Zambia
CSPro	Census and Survey Processing System
CT	Conservation Tillage
DACO	District Agriculture Coordinator
DFID	Department for International Development
FCDO	Foreign, Commonwealth & Development Office
FC	Farmer Coordinator
FISP	Farmer Input Support Programme
FO	Field Officer
FRA	Food Reserve Agency
HH	Household
M&E	Monitoring and Evaluation
MFL	MicroLoan Foundation
MS	Microsoft
MT	Minimum Tillage
RM	Results Measurement
SFO	Senior Field Officer (CFU officer in CFU Regions under the Regional Manager)
SPSS	Statistical Package for the Social Sciences
ToC	Theory of Change
TSP	Tillage Service Provider
VFZ	Vision Fund, Zambia

EXECUTIVE SUMMARY

The Conservation Farming Unit (CFU), under the sponsorship of the British Government's Department for International Development (now Foreign, Commonwealth & Development Office – FCDO), launched a 5-year Climate Smart Agriculture Zambia (CSAZ) in July 2016. The programme seeks to improve food security to over a million people by providing trainings to an outreach of over 200,000 farmers annually across four of the CFU's areas of operations; Central, Eastern, Western and Southern regions. The project is guided by at least three theories of change. The first is that if farmers are well trained in Climate Smart Agriculture (CSA) technologies, then they will adopt the technologies. The second is that if the private sector (agro-dealers and tractor owners and suppliers) are well mobilized, CSA technology adopters will realize even smooth and increased benefits of adoption. The third, the main theory covered by this study, is that if farmers adopt CSA technologies, then they will achieve improved livelihoods and food security.

An internal Outcomes survey was conducted by the CFU's M&E department. The study used a survey methodology to establish values for the following key project outcomes:

- Outcome Indicator 2.1: Margin of difference between the average production of adopters and that of conventional farmers (Disaggregated by tillage type)
- Outcome Indicator 2.2: Margin of difference between the average yield of adopters and that of conventional farmers (Disaggregated by tillage type)
- Outcome Indicator 2.3: Margin of difference between the proportion of time spent by women on On-farm activities.

The survey was carried out across 18 out of the 35 districts and in all the four areas of CFU operations in Zambia. The sample size was 633 adopting and 363 non-adopting farmers each representing a unique household. The survey came up with the following conclusions:

- ***Outcome Indicator 2.1: Margin of difference between the average production of adopters and that of conventional farmers (Disaggregated by tillage type)***
  - Hand hoe basin adopters are likely to harvest 25.0% more than comparable conventional hand hoe farmers.
  - ADP ripping adopters are more likely to harvest 140.0% more maize than the ADP ploughing conventional farmers.
  - Mechanised ripping farmers are likely to harvest 19.6% more maize produce than conventional tractor ploughing farmers.

- ***Outcome Indicator 2.2: Margin of difference between the average yield of adopters and that of conventional farmers (Disaggregated by tillage type)***
  - Basin farmers' average yield was 17.1% **higher** than that of hand-hoe ridgers/ diggers,
  - ADP ripping adopters' yield was 16.6% **higher** than that of ADP ploughing conventional farmers.
  - For Year 4, Mechanising adopters was in fact 6.7% **higher** than that of mechanising non-adopters.

- ***Outcome Indicator 2.3: Margin of difference between the proportion of time spent by women on On-farm activities.***
  - For the first time in the 4 seasons under CSAZ, women adopters are now spending less time towards on-farm activities and more time towards off-farm activities.
  - Adopting women are spending 3% less time for on-farm activities than conventional farming women.
  - Adopting women now spend 7% more time towards off-farm activities than conventional farming women.

Key lessons that can be drawn from this study are:

- ✓ The propensity to dis-adopt seems to be partly explained by duration of adoption; farmers that have adopted for more than one season are not inclined to dis-adopt as they would have come to a

practical conclusion that in fact conservation farming works and find no inclination to return to conventional ways.

- ✓ It is very important for individual households to be living witnesses of their own success as this leads to internally driven motivation and genuine adoption of CSA. Any externally driven motive for adoption can easily lead to greater-dis-adoption rates as soon as the external incentive is withdrawn
- ✓ With time, the number of plots under MT tend to increase as farmers realise more and more the benefits of adopting MT. Having adopters with some land under conventional shouldn't be a discouragement at all as reasons may not have anything to do with lack of conviction.

Key recommendations that should be seriously considered by the CFU as we are now in the second year are as follows:

- ✓ The CFU should come up with a way of celebrating continuity of adoption (perhaps in the way of having MORE field days dedicated to sustained adopters).
- ✓ The CFU End of Project Evaluation should look into whether the improvements in the household asset base are in any way attributable to the CSAZ intervention.

1.0 INTRODUCTION

This section gives a background to the Conservation Farming Unit (CFU) and the Department for International Development (DFID)'s sponsored Climate Smart Agriculture Zambia Programme (CSAZ). It details the Theory of Change (ToC) as related to the Outcomes (Post-Harvest) and gives the study objectives. The last part discusses the delimitations and challenges faced during the survey itself.

1.1 BACKGROUND OF THE CSAZ AND CFU

The Conservation Farming Unit (CFU), under the sponsorship of the British Government's Foreign, Commonwealth & Development Office (FCDO), launched a 5-year Climate Smart Agriculture Zambia (CSAZ) program in July of 2016. The program seeks to improve food security to over a million people by providing trainings to an outreach of over 200,000 farmers annually across four of the CFU's areas of operations: Central, Eastern, Western and Southern regions. The program is currently covering a total of 35 Zambian districts with 55 Field Officers (FOs) and 9 Senior Field Officers (SFOs) across the four regions. On average, each FO trains and/or oversees training of about 3,000 farmers three times annually. While these farmers are expected to be unique individuals, there has not been a deliberate policy stopping farmers from repeating trainings as it was felt that they would always have a genuine reason for being present in the same session as the one they attended before. The majority of trainees of CFU are small-scale farmers in the rural areas of Zambia. These trained farmers are in turn expected to practice one form or another of minimum tillage as they have been trained. The previous of such types of trainings were conducted during the 2019 round of trainings in preparations for the 2019/2020 season namely:

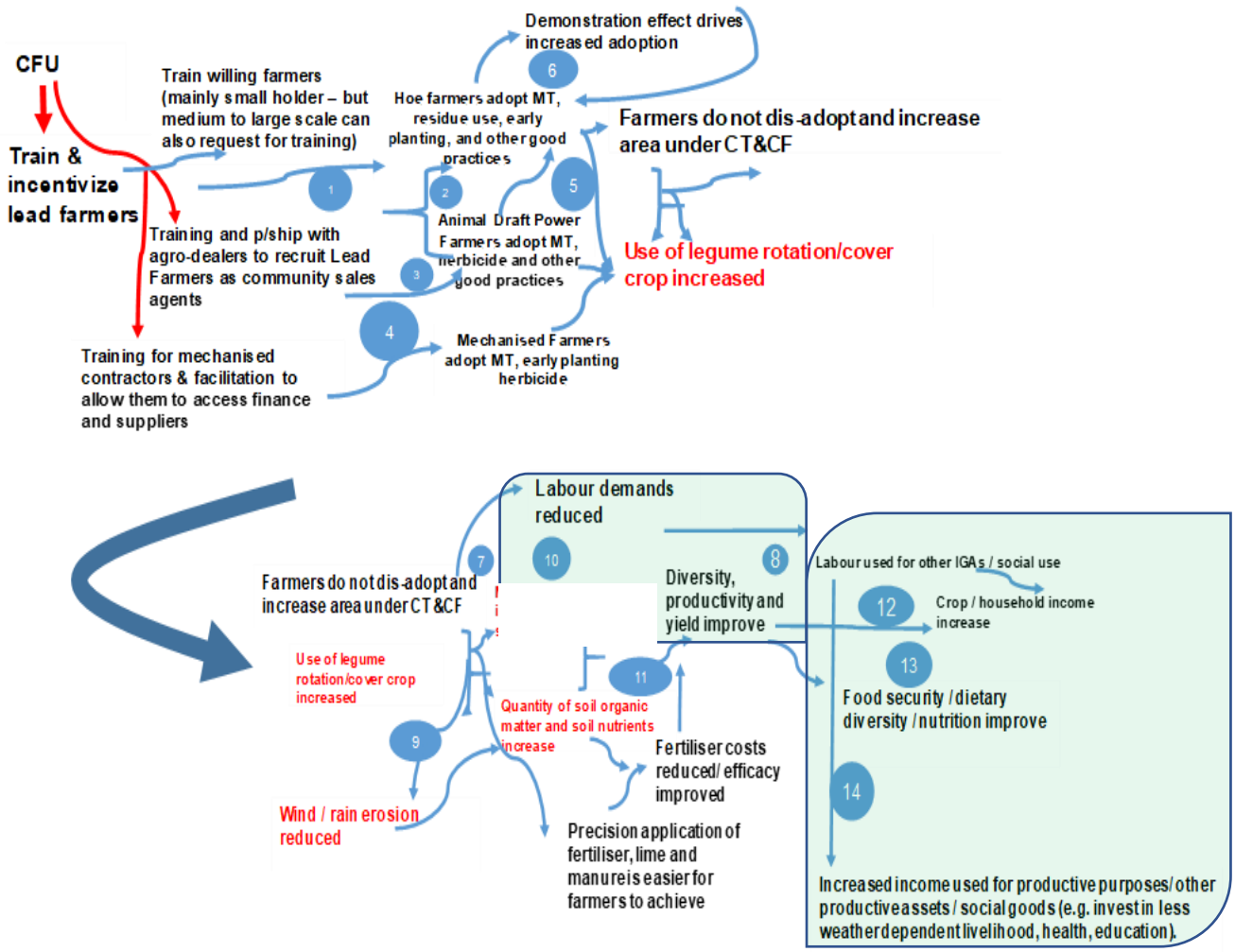
- ✓ Period 1-Land Preparation (with three sessions similar in content, to cater for more than the 30 farmers expected in one training session),
- ✓ Period 2-Nutrient application and seeding (three sessions as above),
- ✓ Period 3-Weed management (again with three sessions).

The same set of trainings have started for the 2020/2021 season with Period 1 and 2 combined and yet to start Period 3 around October in all districts.

The core purpose of the technical training is to promote the CF practices to interested farmers across operational areas. Ideally a farmer needs to attend all three periods in order for them to gain the complete set of skills needed for full adoption. However, a farmer who goes on to attend at least period one and two and then practices (for year 1) minimum tillage would qualify to be called an adopter. An Adoption survey was conducted early this year to assess how many of the trained farmers had adopted the different forms of CF and if not, why not for those who might not have adopted. This survey (Post-Harvest) sought to find out what, if any, differences there were between adopters and non-adopters of the CF technology as far as productivity, yield and food security were concerned.

1.2 CSAZ THEORY OF CHANGE

Figure 1: CSAZ Theory of Change



The CFU's CSAZ Theory of Change (ToC) above outlines how training farmers leads to adoption and other higher indicators like yield increase and food security. The highlighted sections of the ToC were the subject matter for this Outcomes (Post-Harvest) Survey. The project is guided by at least three theories of change. The first is that if farmers are well trained in Climate Smart Agriculture (CSA) technologies, then they will adopt the technologies. The second is that if the private sector (agro-dealers and tractor owners and suppliers) are well mobilized, CSA technology adopters will realize even smooth and increased benefits of adoption. The third, the main theory covered by this study, is **that if farmers adopt CSA technologies, then they will achieve improved livelihoods and food security**.

The ToC breaks down the different categories of adopters and how these categories interact with each other. It follows from the ToC that trained farmers adopt the different levels of the technology (Minimum Tillage, Conservation Tillage and Conservation Farming) and over time adopt further by progressively moving from MT to CT and from CT to CF. For any of these levels, three (3) main types of tillage methods can be employed namely Hand-Hoe (Basins, overall digging with a hoe, or ridging), Animal Draught Power (ADP-Ripping or ploughing) and Mechanisation (Tractor Ripping or ploughing). In the survey, questions were raised in such a way as to already categorise both adopters and non-adopters into these three tillage types for ease of comparisons so that like and like were paired together. The survey also tried to establish to some extent, whether farmers have progressed from Minimum Tillage (MT) to Conservation Tillage (CT) and to Conservation Farming (CF) by asking what tillage

method they employed on the same field in question during the previous season and what type of crops were grown (to check for crop rotation).

1.3 STUDY OBJECTIVES

The main objective of this survey was to 'Establish the extent to which 2019 trained farmers who have adopted the technology of Conservation Farming (CF) have improved productivity and in turn become more food secure and acquired additional income as a result of increased on-farm produce (yields)'. This was accomplished by comparing productivity between comparable conventional farmers and CF adopters. Even though CF is being practiced by a wide range of farmers (small to medium, and large commercial farmers), the focus was on small scale farmers (cropping on less than 5ha) during the 2019/20 cropping season. Nevertheless, farmers cropping on larger tracks of land were also incorporated. Socio-economic aspects of farmers were also fused into the survey.

The specific objectives were as follows:

- ✓ Establish the composition of the households from which farmers come.
- ✓ Determine the assets owned by the farmers and the sources of income.
- ✓ Establish the average maize quantities harvested per household under each of the flowing categories of famers:
  - ➢ Hand-Hoe Tillage
  - ➢ ADP Tillage
  - ➢ Mechanized (Tractor Tillage)
- ✓ Using maize as a proxy, compare production and yields between comparable conventional and CA tillage types (i.e. Hoe conventional tillage to basins, Animal drawn ploughing to animal ripping, and Tractor ploughing to tractor ripping).
- ✓ For new adopters, try to establish the magnitude of change in months of food security across the years.
- ✓ Assess expenditure patterns of the same categories of households.
- ✓ Compute food consumption scores for the same categories of households as a proxy for nutrition and well-being.

1.4 DELIMITATIONS

The targeted respondents for this survey were the 2019/2020 CSAZ trained farmers who had adopted the CA technology and their neighbouring (comparable) non-adopters of similar socio-economic status across all the four (4) regions of the CSAZ programme as named above. In these 4 regions and out of a total of 35 districts, the survey was carried out in 18 randomly selected districts – Chibombo, Kapiri, Luanshya/Masaiti, Mpongwe, Serenje, Rufunsa, Chama, Chipata, Lundazi, Mambwe, Katete, Nyimba, Mumbwa, Shibuyunji, Pemba, Choma, Mazabuka and Chikankata. In addition, only Field Officers (FOs), Farmer Coordinators (FCs) and farmers from the sampled districts were eligible to participate in the survey.

1.5 CHALLENGES

The Outcomes Study faced several challenges. It is however important to note that none of the challenges encountered had any significant impact on the results of the survey. The first challenge faced was lack of exact comparable tillage methods within the same locality (finding a pair of an adopter and a non-adopter within a similar geographical location). The survey design was such that for each adopter there would be a non-adopter with comparable tillage methods and the same socio-economic standing. Sometimes adopters who used tractors for ripping had no non-adopters who used tractors for ploughing. This was because a tractor from one area would be organized to go and rip for CF farmers in another area which had no tractors. So, there would be no mechanised conventional farmers in such an area. There was not much that the study could do about this, hence it will be noticed that the sample size for conventional mechanised farmers will be low.

The second challenge was that in some cases fields that required measuring were too far away from the homesteads where the interviews were being conducted. This was common where farmers live in villages (community) and farms were far from the village because of lack of agriculture land as well as keeping animals like goats that tend to eat their crops. Plans were made to later on drive to such fields so that measurements could be taken.

2.0 STUDY METHODS

This survey was conducted in all four (4) regions of the CSAZ project (namely Central, Eastern, Western and Southern) in specific randomly sampled districts within these regions. The overarching methodological framework was sample survey and the data collection tool was a structured questionnaire in Computer Tablets using CSPro software. Qualitative methodologies such as open-ended discussions with Farmer Coordinators (FCs) and field observations were also used. Qualitative methods were conducted by the MRM team. The survey findings were analysed using the Statistical Package for Social Sciences (SPSS) before exporting data to MS Excel for graphing and tables.

2.1 STUDY TOOLS

The tools used in this study were:

- Structured computer-based questionnaire
- Open-Ended Discussions with FCs
- Field Observations

2.1.1 Structured Computer Based Questionnaire

The structured questionnaire, administered by the enumerators, was a systematic compilation of questions whose specific purpose was to determine the actual adoption practices, crop yield outcomes, assets acquired as a result of uptake of climate smart agriculture, general living conditions and standard and food security to mention a few, by farmers in the 2019/2020 farming season. The sampled adopting farmers came from the lists of adopters from the 2019/2020 season and was equally spread across all sampled districts. These were farmers who were trained by the CFU under CSAZ in the 2019/2020 season and subsequently adopted minimum tillage and climate smart agriculture. There was no need to sample untrained farmers as there was no list, however, conventional famers with similar socio-economic status within the same villages/areas were interviewed keeping in mind that most factors would be held constant from one farmer to the other such as soil properties and rainfall received. Furthermore, the questionnaire incorporated aspects of household composition and size in order to establish how many people in the household contribute to field agricultural activities as well as people living with disabilities therein.

2.2 SAMPLING

All the CFU regions were taken as part of the sources of data. Sampling was three-tiered: Random sampling of 18 out of the 35 districts within these regions was done in order for the survey to have an unbiased spread of information. From each sampled district, a random sample of Field Officers (FOs) and Farmer Coordinators (FCs) was first done before finally carrying out a further random sampling of farmers under each sampled FC. The sampled farmers all came from the register of unique farmers from sampled FCs' areas that had adopted the CSAZ technology as trained by the CFU in 2019. Non-adopters were identified

through the sampled adopters and the qualification was that they should be practicing a comparable and opposite non-CSAZ technology while also being within the same geographical area as the sampled farmers. Thus, an adopter who used ADP ripping would be compared with a household practicing conventional animal ploughing while a basin adopter would be compared with a farmer who used hoe ridging or overall digging and is in the same geographical area.

2.2.1 Geographical Sampling

As earlier mentioned, sampling was done randomly at all levels in the different areas. It was decided that the study would take place in all the four CSAZ areas (CFU Regions) so as to assure representatives by capturing any variations introduced by ecological and human resource factors.

Region and District Level Sampling

Table 1: Sampled Districts

Region	District	Number of Respondents	% of Sample
Central	Chibombo	24	2.4
	Kapiri	64	6.4
	Luanshya/Masaiti	26	2.6
	Mpongwe	68	6.8
	Serenje	84	8.4
	Rufunsa	52	5.2
Eastern	Chama	68	6.8
	Chipata	64	6.4
	Lundazi	76	7.6
	Mambwe	52	5.2
	Katete	66	6.6
	Nyimba	46	4.6
Western	Mumbwa	92	9.2
	Shibuyunji	22	2.2
Southern	Choma	52	5.2
	Pemba	24	2.4
	Mazabuka	66	6.6
	Chikankata	50	5.0
TOTAL		**996**	**100%**

As is shown in Table 1 above, the Outcomes Survey was carried out in all four CFU CSAZ regions. The second column shows the randomly sampled districts and then the third and fourth columns show total sample sizes randomly drawn from geographical area. Total sample size was 996 households.

2.3 DATA MANAGEMENT

Data was collected by 12 Research Assistants (RAs). These underwent an intensive four-day training workshop which included field trial runs and testing of the survey tool to be administered. Trial runs were carried out in Mumbwa district of Western Region. All RAs recruited were computer literate, possessing sufficient prior experience from participating in similar agricultural surveys.

The actual data collection was done using Computer Assisted Personal Interviewing (CAPI) software on Huawei Tablets and therefore all information obtained was electronic. The interviews were designed using CSPro 7.4 Software which ensured that data obtained was of the highest possible quality at that level. Quality assurance rules were built within the CAPI software and this included skipping to the next section if a question was non-applicable to the respondent, asking for data to be re-entered where contradictions were noticed, ensuring that the number of individual HH groupings (such as Under-5s, above 60s, etc.) reported does not exceed the total number of people in a household, ensuring that districts were within the correct region, etc.

The analysis tool used, SPSS, allowed for robust data management and analysis as it makes use of syntaxes in order to scrutinize the datasets obtained. SPSS enables us to generate different variables and perspectives from which to approach data analysis. Microsoft Excel was also incorporated into data analysis for enhanced visuals and graphic presentation of survey findings.

3.0 SURVEY FINDINGS

Section three focuses on the actual results obtained from the survey. It highlights the composition of the households (HH) from the farmers trained and subsequently adopted climate smart agriculture in the year during the 2019/2020 season as well as comparable farmers who did not adopt climate smart agriculture, the sex of the household head (HH head) and disabled persons within those households. The section also looks at access to draught power that farmers had, various forms of service provision and general nutritional diversity in households. Main sources of income, main expenditure points, various crop sales and attendance of CFU trainings and field days are also part of the results generated from the survey. The size of field plots cultivated by both farmers practicing CF and those not practising CF was determined by measurement around the field plots using GPS devices. Therefore, this report will present the number and size of plots that a household has converted to and produced from CF in comparison with households that have non-converted plots and their corresponding yields. Asset ownership focused on several components of both household and farm implements that are owned regardless of whether or not they are directly related to and appropriate for CF practices. First however, focus will be put on secondary data on the CSAZ outputs to date so as to give readers an insight into the training of farmers during the 2019/20 (Year 4 of the project) training period.

3.1 Trainings and Adoption Overview

3.1.1: Trained Farmers 2019/20

Staff turnover at DFID brought in new ideas about how results should be computed. Data from farmers who, in spite of attending trainings during the financial year, were first trained before the start of the CSAZ project was from hence forth, not to be analysed as the project has to show only farmers first trained within the CSAZ funding period. For that reason, the adoption report mainly focussed on such farmers.

Table 2: Farmers Trained under the CSAZ in Year 4(2019/20)

Log Frame Output Indicator 2.1 – number of farmers trained in climate smart agriculture practices		
2019 Target	**Achieved**	**% of target achieved**
269,000 (Of which women: 45% disabled: 1.4%)	Global =272,512 CSAZ Only = 264,167 (48.8% women and 0.9% disabled)	101.3% above global target 98.2% of CSAZ Only

3.1.2 Adoption Overview

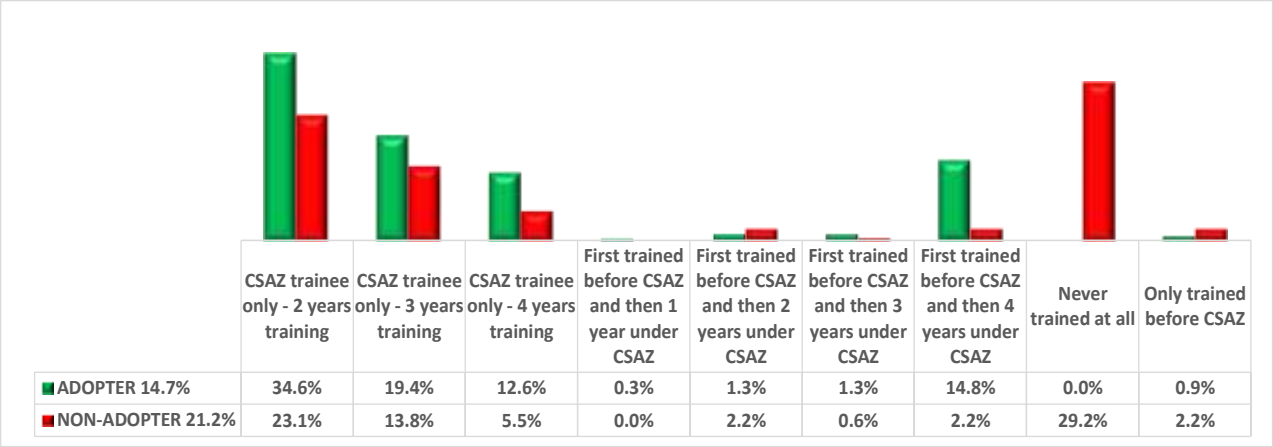
Prior to the post-harvest survey, an adoption survey had been conducted and produced a couple of findings. The survey established that:

- ✓ Out of the 163,610 adopting farmers this season, the total number of new adopters during the period under review was 107,150 farmers (13.1% women). Sustained Adopters came to a total of 56,460. Around 0.9% adopting trained farmers were disabled.
- ✓ Area of land under MT was 196,954 Ha surpassing the set milestone of 181,210 Ha by nearly 9%.
- ✓ Area of land under CT however was below the set milestone of 108,700 Ha by reaching 56,146 Ha as maintenance of soil cover was greatly challenged due to drought years coming one after another making residue retention almost impossible.
- ✓ The third pillar of CSA, the practice of crop rotation (CF) had an annual target of 54,300 Ha but this target was also not achieved as area of land under CF reached 27,849 Ha, again falling short of the target by nearly 49% as economic and climatic factors were not quite conducive as preference was put more on immediate food security issues than long-term soil fertility drives.

3.2 Profiling Sampled Farmers.

3.2.1. Adopters and Non-Adopters.

Figure 2: Proportion of Adopters and Non-Adopters



	CSAZ trainee only - 2 years training	CSAZ trainee only - 3 years training	CSAZ trainee only - 4 years training	First trained before CSAZ and then 1 year under CSAZ	First trained before CSAZ and then 2 years under CSAZ	First trained before CSAZ and then 3 years under CSAZ	First trained before CSAZ and then 4 years under CSAZ	Never trained at all	Only trained before CSAZ
ADOPTER 14.7%	34.6%	19.4%	12.6%	0.3%	1.3%	1.3%	14.8%	0.0%	0.9%
NON-ADOPTER 21.2%	23.1%	13.8%	5.5%	0.0%	2.2%	0.6%	2.2%	29.2%	2.2%

Even though the study was targeted at adopters and non-adopters there was need to take a deeper look at the profiles of the adopters/ non-adopters in terms of when (if at all) they were trained by the CFU. This is in line with the new DFID thinking that sometimes seeks to remove farmers first trained before CSAZ from analysis. Figure 2 shows that among adopters, the sample consisted of 34.6% of the adopters being CSAZ

trainees only, and these had attended two years training in the lifetime of the CSAZ. The Figure also shows that 14.8% of the adopters were first trained before CSAZ but have been attending CSAZ trainings for the past 4 seasons. It will be interesting in Section 4 of this report to see if years of training has any bearing on production and productivity. It is also clear from figure 2 that the non-adopters are dominated by farmers who have either never been trained or trained for less than three seasons. Never the less, the existence of farmers who have not adopted but have been trained will be interesting if they took up some good agricultural practices from trainings onto their conventional fields. It may be interesting to investigate the relationship, if any, between non-adopter productivity and training by the CFU.

Figure 3: Proportion of Non/Adopters

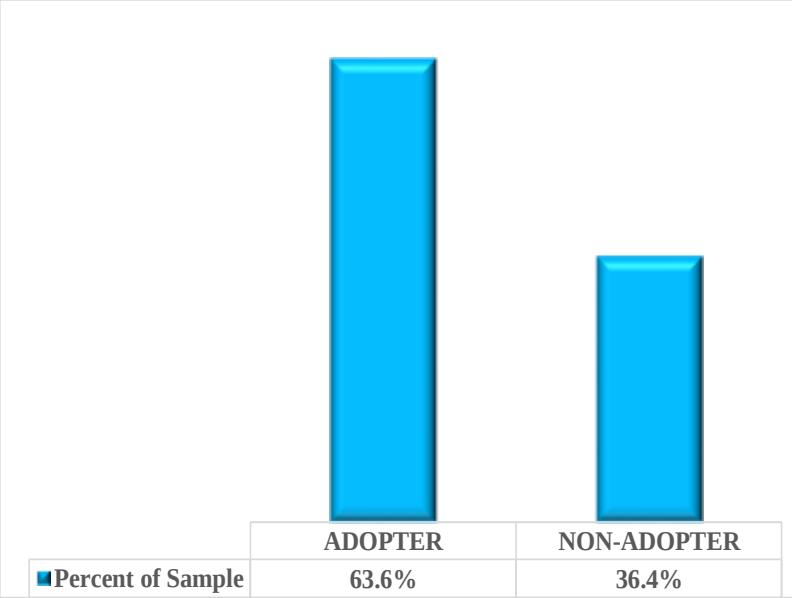
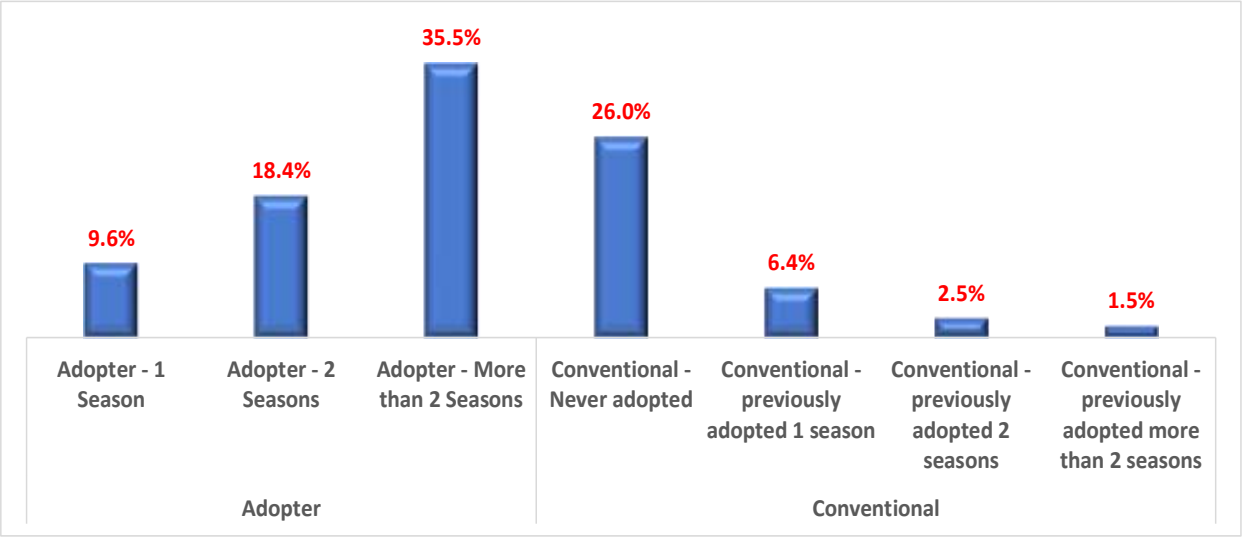


Figure 3 removes the in-depth profiles of adopters. Out of the 996 sampled farmers, 63.6% (633) farmers were adopters and the rest were non-adopters. It was of interest here to also look at duration of adoption so that current conventional farmers that at one point became adopters before falling off this season can stand out and if need be (in the next chapter of this report), have their production investigated separately from those that NEVER adopted. This thinking produced results shown in Figure 4 below.

3.2.2 For How Long Has a Household Been Practicing CSA?

It was important for the survey to find out the duration of practicing CSA since indeed the CFU has been championing this technology for a considerable number of years and the sampling had not really been biased towards those that had practiced for a specified number of seasons. Figure 4 below shows the results.

Figure 4: Duration of Practicing CSA

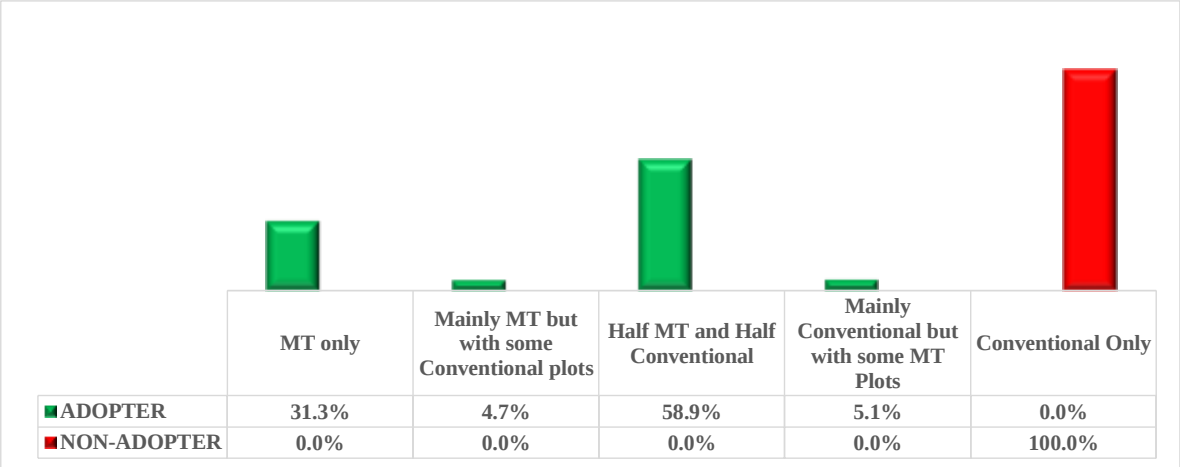


Out of the 996 respondents, most of the adopters had practiced minimum tillage (MT) for more than one season (53.9% of the sampled farmers) while 26.0% of the sampled farmers had never practiced minimum tillage during any season. Note that among conventional farmers, 10.4% of the sampled farmers are conventional farmers who had actually practiced MT at one time or another except for the season under review. Note how farmers that once adopted become fewer as past adoption seasons increase. Could this suggest that if the CFU finds a way of assisting farmers adopt for more years, dis-adoption might not be a viable option for many? It will be of interest to compare yields of such dis-adopters with those of farmers that never adopted so as to investigate the residual effect of having been an adopter at one time or another.

3.2.3. Tillage types among Adopters/Non-Adopters

Respondents were asked which tillage method they used during the 2019/20 season for plots that they reported in spite of their adoption status. It was realised that being an adopter does not mean that **all** household plots are now under minimum tillage.

Figure 5: Tillage Type Combinations in Current Season



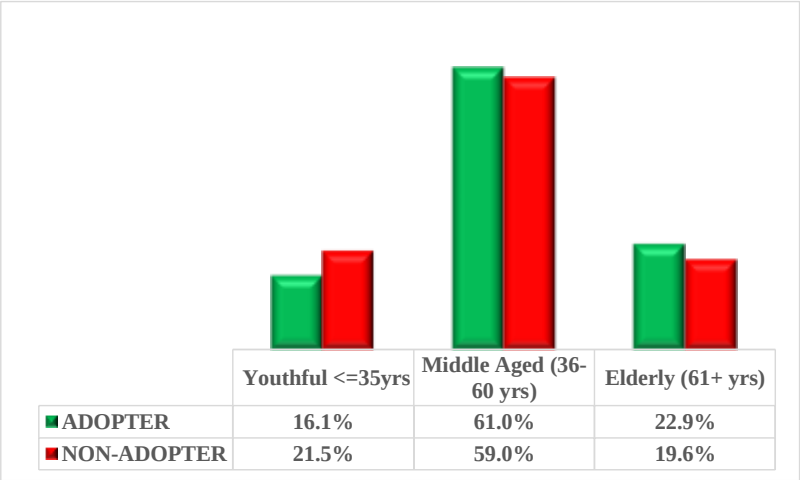
	MT only	Mainly MT but with some Conventional plots	Half MT and Half Conventional	Mainly Conventional but with some MT Plots	Conventional Only
ADOPTER	31.3%	4.7%	58.9%	5.1%	0.0%
NON-ADOPTER	0.0%	0.0%	0.0%	0.0%	100.0%

Figure 5 shows that among adopters, the most popular approach is to put 50% of total plots under MT and the 50% under some conventional system. This was done by nearly 59% of all adopters. When FCs were asked why these adopters would leave half of their total land holding under conventional, the most popular response was that farmers are actually gradually moving away from conventional systems and the study finds most adopters having reached the 50-50 level. They noted that in subsequent season, it is expected to find the majority of adopters in the category of "Mainly MT with few plots under Conventional". The second most popular reason was that adopters know that when they do MT they have to exercise greater crop care as this is the most attractive plot they will have. So conventional plots are usually done hurriedly with land preparation taking place at the last moment or very late into the rainy season. Sometimes resources (especially Farmer Input Support Programme - FISP) come late and these late resources are invested towards conventional plots. Never the less, note that in Figure 5, **MT-Only** accounts for 31.3% of adopters and this is a high figure.

3.3 Household Characteristics and Demographics.

This was a survey aimed at investigating socio-economic indicators of yield, production, and proxy indicators of household wellbeing. It is therefore proper to look at issues of household head age, gender and marital status of the head of household, as well as disability within household.

Figure 6: Age Category of HH Head

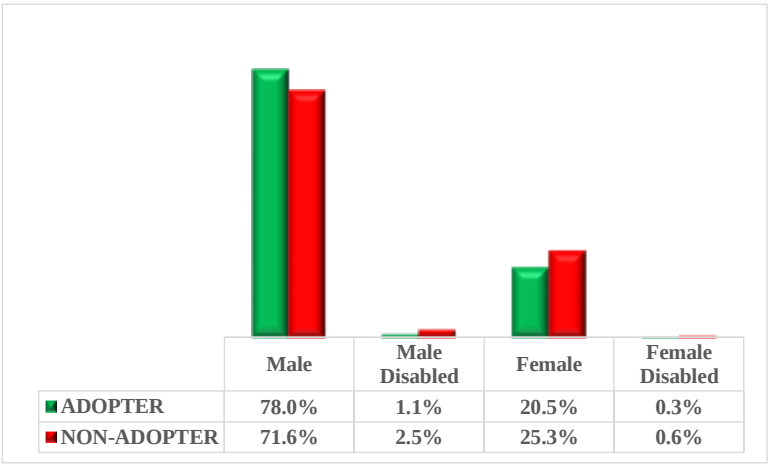


	Youthful <=35yrs	Middle Aged (36-60 yrs)	Elderly (61+ yrs)
ADOPTER	16.1%	61.0%	22.9%
NON-ADOPTER	21.5%	59.0%	19.6%

Figure 6 shows that most of the sampled household heads are of a mature age for both adopters and conventional farmers. Age of household head may therefore not be a factor in understanding any difference in production and productivity between the two comparison groups.

3.3.1 Gender and Disability of Household head.

Figure 7: Gender and Disability of HH Head

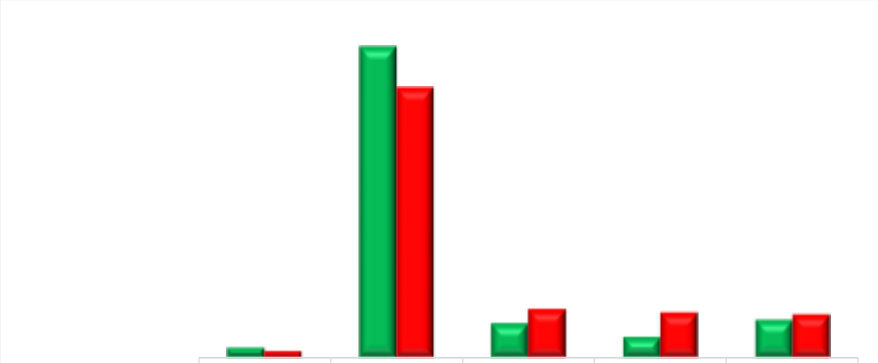


	Male	Male Disabled	Female	Female Disabled
ADOPTER	78.0%	1.1%	20.5%	0.3%
NON-ADOPTER	71.6%	2.5%	25.3%	0.6%

From Figure 7, out of a sample size of 996 responsive interviewees, most households were male headed (78% among Adopters and 71.6% of conventional farming households) with less than 30% (20.5% among Adopters and 25.3% of conventional farming households) being headed by females. It will may be of interest to establish why conventional female headed households do not feel compelled by their already vulnerable socio-economic status to take up CSA. Due to challenges associated with finding household heads that are disabled, the proportion of disabled heads is shown in Figure 7 to be low.

Figure 8 shows that overall, the most dominant marital status of HH head was married-monogamous. Amongst adopters, 74.9% of HH heads were married monogamously followed by widowed at 9.2%. The least were singles/never married who were at 2.5% of the total adopters. The results are similar among conventional farmers where 65% of them were in monogamous marriages but those in polygamous marriages were the second highest at 11.8%. Again, the question is why would conventional farming widows that are usually thought (being female and widows) to be most at risk of socio-economic pressures not quickly become adopters?

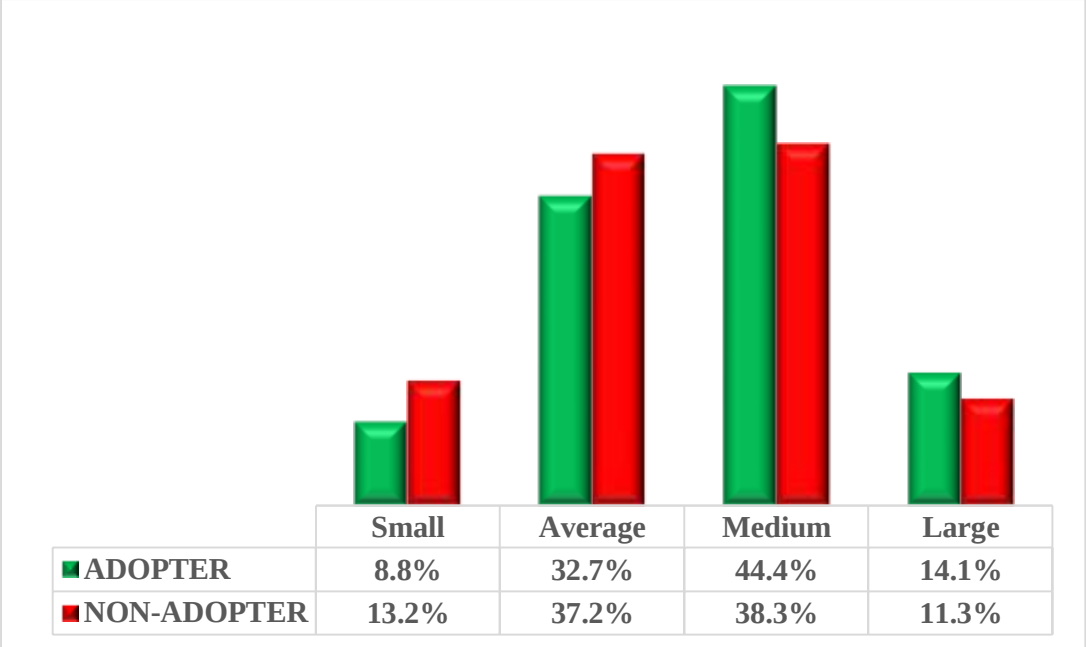
Figure 8: Marital Status of HH Head



	Single/ Never married	Married-Monogamous	Married-Polygamous	Divorced/ Separated	Widowed
ADOPTER	2.5%	74.9%	8.4%	5.1%	9.2%
NON-ADOPTER	1.7%	65.0%	11.8%	11.0%	10.5%

3.3.2 Household Size and Labour Availability.

Figure 9: HH Size Category



	Small	Average	Medium	Large
ADOPTER	8.8%	32.7%	44.4%	14.1%
NON-ADOPTER	13.2%	37.2%	38.3%	11.3%

Household size has a bearing both on household labour as well as household food consumption and general economy. Figure 9 shows that there is not much difference between sampled adopters and conventional farmers in terms of household size. Most households are either Medium sized (7-10 members) or Average

sized (4 – 6 members). Fewer households are small (1-3 members) but large (above 10 members) are also there and more so in rural areas where extended families are almost the norm. Of course, none of these figures should be taken to represent any causality.

The main issue is whether HH labour size could have a bearing on production as it may be assumed that the more mouths a household has to feed, the more the urgency to produce more using whatever technologies at the disposal of rural economies.

3.3.4 Asset Holding - All Farmers

In any rural economy where livelihoods are based mainly on agriculture, the asset base is usually a key determinant for understanding productivity. For that reason, the study focused on an array of assets. Some assets were basic (e.g. housing) and high on the list were the somewhat complex assets for high yielding agriculture livelihoods. Table 3 below shows the three categories of assets that this study looked at. The bracketed figure for each category is the total possible score for each category.

Table 3: Some Assets Relevant for Agric Livelihoods

Asset Category	Physical Asset	Assest Weight
Basic Household Asset (7)	Modern House	2
	Bed-with mattress	2
	HH Furniture (sofa)	1
	HH Entertainment	1
	Cell Phone	1
Basic Agriculture Assets (17)	Cattle	4
	Shoats	2
	Plough	1
	Chaka Hoe	2
	Knapsack Sprayer	2
	Scotch Cart	3
	Magoye ripper	3
Advanced Agriculture Assets (22)	Tractor	5
	Tractor ripper	5
	Boom Sprayer	4
	Generator	3
	Small vehicle/van	5

It was decided that the assets be put into three categories for purposes of simplifying understanding. The first category is what could be expected of any household that has some semblance of surviving well in contemporary world. These are however given different weights and thus a radio (entertainment) would not be compared with having a modern house (roof of asbestos or iron sheets).

The second category are assets that help advance basic agriculture productivity. Shoats (sheep and goats) are put in this category as they can be sold with ease when the need for agric-inputs arises.

The third category is a rather more ambitious category where it is expected that to come out of poverty, a household would need to practice agriculture as a business and thus they would have acquired assets that push them beyond mere survival to become a viable business. The CFU has, for that reason, been engaging

Financial Service Institutions and Suppliers of agriculture implements and linking them to farmers for loans. Some farmers have been purchasing such assets on their own using own cash.

The Index scores for each category were standardised as shown in Table 4 below.

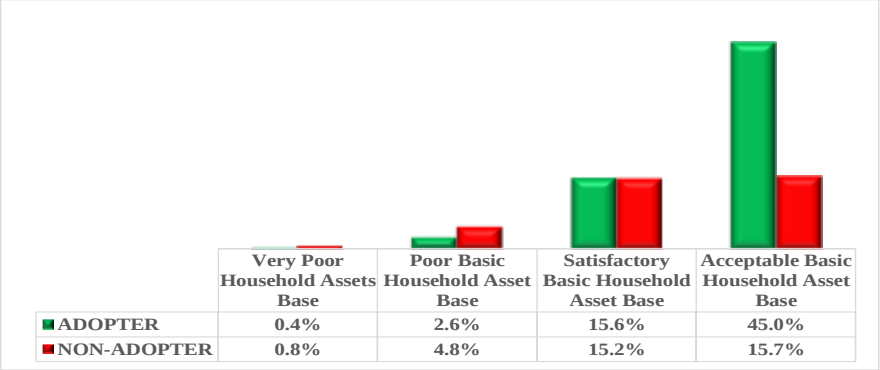
Table 4: Interpreting the Index Scores

Basics Household Score Category		Basic Agriculture Assets Score Category	Advanced Agriculture Assets Score Category
Index Rage	Category		
Below 1%	Very Poor HH	Household too poor for agric livelihoods	Household ill equiped for advanced Agric
1 to 40%	Poor	Very Basic Agriculture Assets Base	Very Basic Advanced Agriculture Assets
41 to 79%	Satisfactory	Satisfactory	Satisfactory
Above 79%	Acceptable	Acceptable	Acceptable

It may be said that the first classification is quite harsh. But the point is to ensure that the message is communicated to anyone who has hopes of intervening for **developmental** purposes and not mere humanitarianism. Households scoring ZERO cannot be serious development candidates, they are really only fit for humanitarian aid. Very very poor households can indeed be brought upwards, but it takes more time, more effort and more money

Results of the study show a rather fascinating story. Figure 10 is for the first category.

Figure 10: Basics Household Assets Category



The percentages shown in all the Figures starting with Figure 10 are percent of total sample (996). As would be expected in this modern day, very few households can be categorised as being in the "Very Poor Household Asset Base" category. These Figures (a reminder once more) should not be taken to suggest any causality. This issue could have been addressed by the CSAZ External Impact Evaluation Consultancy had there not been some timing/methodological complications faced.

Figure 11 moves a step further to look at those assets that form the minimum foundation of agriculture livelihoods, such as cattle, plough/ripper and goats.

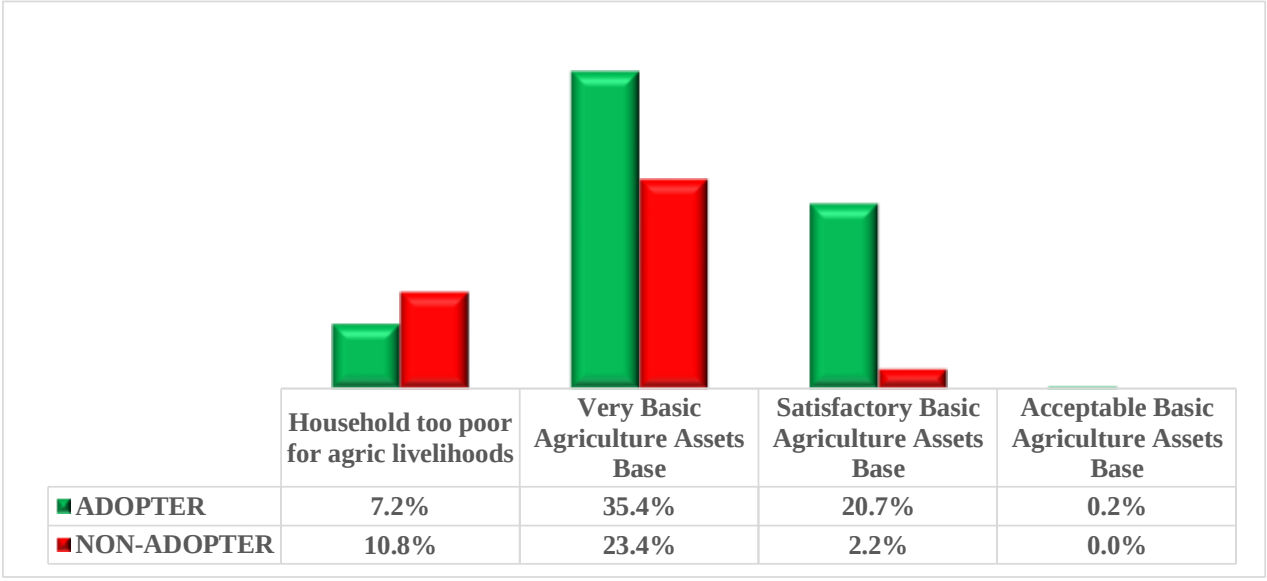
Making Progress with Conservation Farming

Lameck Nyirenda from Kasuntha Village in Lundazi is a hard-working farmer who has always been able to provide for his family through his farming activities, producing 30 - 60 bags of maize on his farm using conventional farming methods. He had always had aspirations of adding on to his family's well-being but each year that passed his harvest was becoming difficult to reach the subsequent year.

His opportunity for growth came with his introduction to Conservation farming Unit in 2016. He was sceptical at first and so took a little while to want to try the technologies. Finally, in 2018 he gave it a try after field days and encouragement from radio broadcast. Due to practicing effectively, he was able to have 222 bags of maize in the 2018/19 season.

Selling his farm produce made his family realise his dream of moving from a smaller grass thatched hut to the bigger house with a corrugated roof that he built. He is now able to plan upcoming planting seasons by purchasing his fertilizer well before the season and is food secure from one farming season to the next.

Figure 11: Basic Agriculture Assets Category

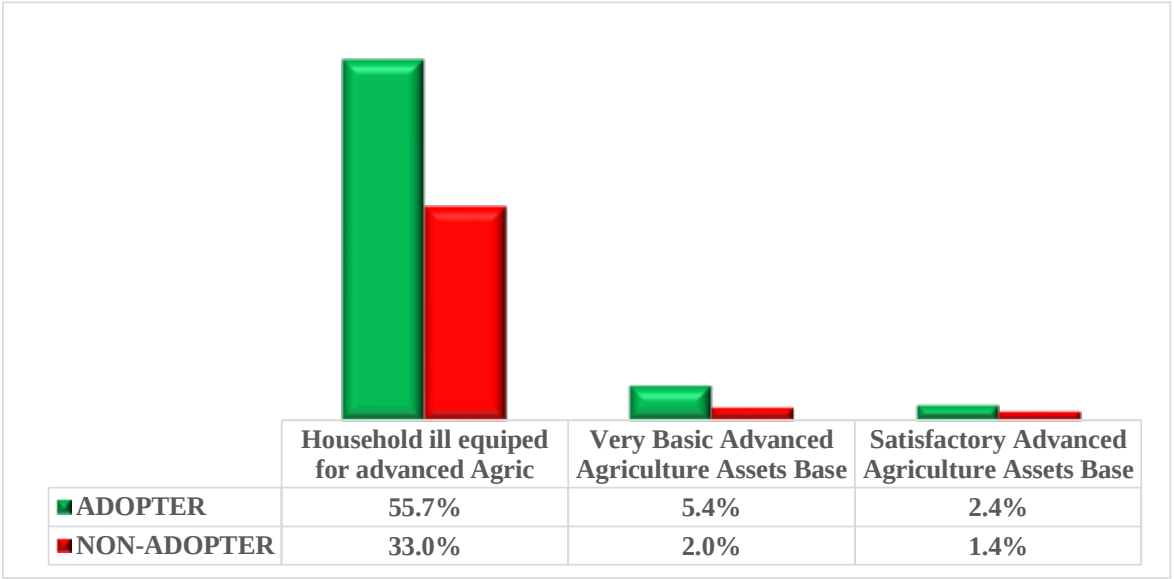


	Household too poor for agric livelihoods	Very Basic Agriculture Assets Base	Satisfactory Basic Agriculture Assets Base	Acceptable Basic Agriculture Assets Base
ADOPTER	7.2%	35.4%	20.7%	0.2%
NON-ADOPTER	10.8%	23.4%	2.2%	0.0%

The question that cannot be answered at this stage is whether Adopters were at the same level as their conventional farming counterparts before being adopters or adoption led to acquisition of such crucial yet basic agriculture assets.

Figure 12 makes the results even more uncomfortable particularly for those below 1% index score.

Figure 12: Advanced Agriculture Assets Category



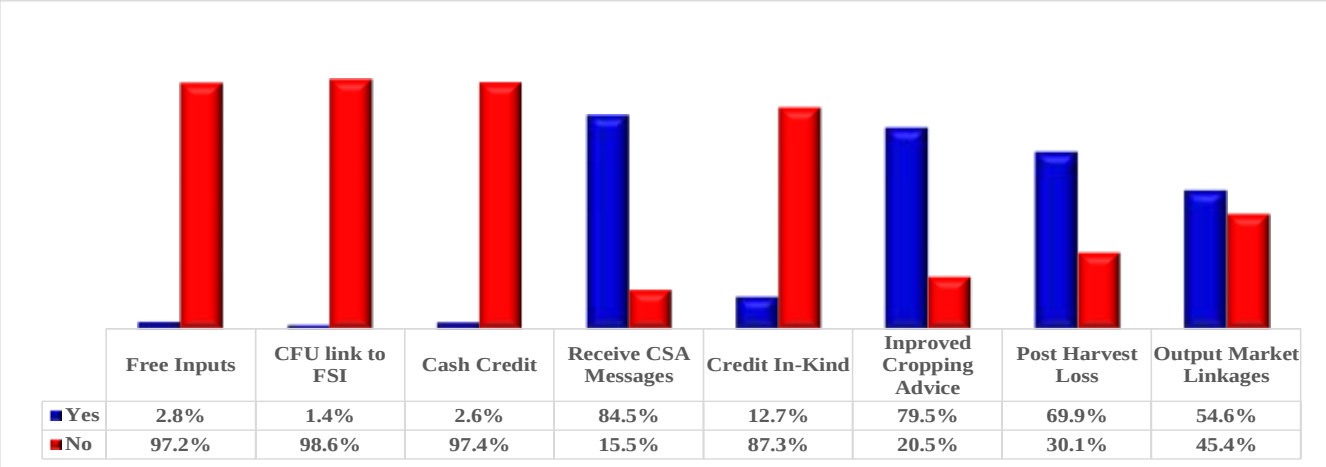
	Household ill equiped for advanced Agric	Very Basic Advanced Agriculture Assets Base	Satisfactory Advanced Agriculture Assets Base
ADOPTER	55.7%	5.4%	2.4%
NON-ADOPTER	33.0%	2.0%	1.4%

It would appear that most households are, in terms of advanced agriculture assets ownership, quite ill equipped to participate in **farming as a viable business**. Individual household food security for survival is very possible and, as will be shown in the next section, small holders actually produce a surplus at their own level. But the assets they have (majority of households) are not for advanced level agriculture that could see

the Zambian agriculture sector contributing more than the current (2019) 2.74%.[1] It will be important in the next section to do some further analysis as to the extent to which each category of asset holding is related to agriculture production and yield.

3.3.4 Provision of Support Services to Farmers

Figure 13: Did farmer receive any advice on improved/ recommended cropping practices prior to the cropping season?



	Free Inputs	CFU link to FSI	Cash Credit	Receive CSA Messages	Credit In-Kind	Inproved Cropping Advice	Post Harvest Loss	Output Market Linkages
Yes	2.8%	1.4%	2.6%	84.5%	12.7%	79.5%	69.9%	54.6%
No	97.2%	98.6%	97.4%	15.5%	87.3%	20.5%	30.1%	45.4%

Support services to farmers is broad and ranges from free inputs or farm implements from a formal organisation or government, cash/in-kind credit for purchase of inputs or farm implements, to any advice on improved/recommended cropping practices prior to the cropping season. All 996 sampled households were asked questions relating to support services. Responses to some key services such as linkages to Financial Service Institutions (FSIs) were mainly negative most probably because the CSAZ started these a bit late and may not have as yet made any meaningful impact on the ground. In addition, FSIs work selectively for example Vison Fund Zambia only chose to work with farmers in Western region and Microloan Foundation (MFL) is working with farmers only in Eastern region. It is however worth noting that some of those interventions that started late such as community radio messaging, the Viamo messaging platform, as well as market linkages have apparently started being felt on the ground.

[1] https://www.statista.com/statistics/457737/share-of-economic-sectors-in-the-gdp-in-zambia/

4. INDEPTH ANALYSIS

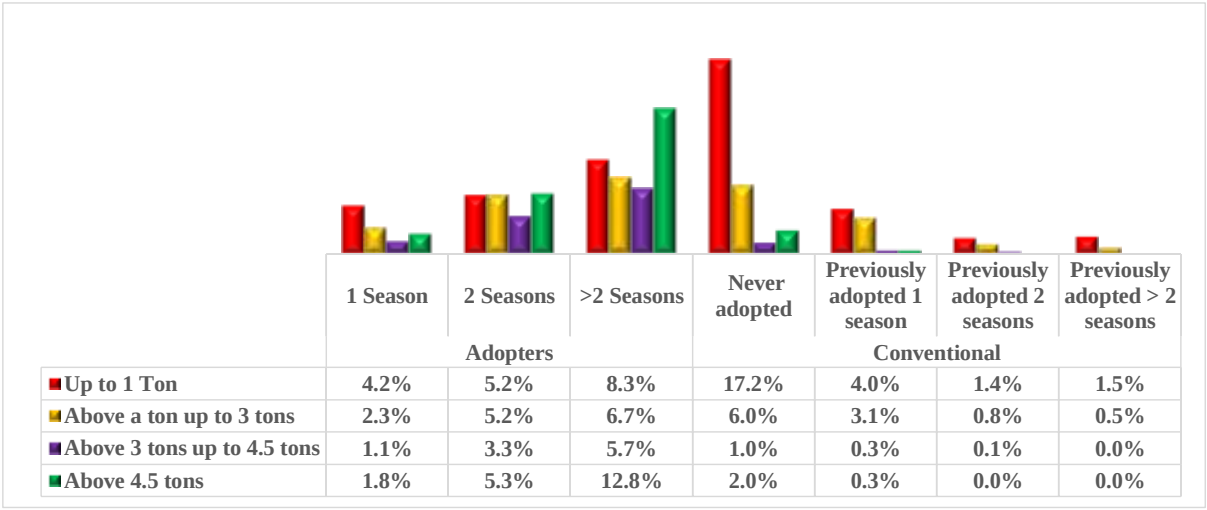
The section discusses issues related to production and yield. Indicator values for the three Logframe Outcome indicators will be presented. The overarching issue here is to establish whether there are any noticeable differences between adopters and non-adopters at the end of Year 4 of the CSAZ Project.

4.1 Production

While data for all crops produced by farmers was collected to investigate diversity in crop production, only maize was used as a proxy to gauge production and yield. This section will first discuss the findings on households' production and yield before computing the respective Logframe indicators.

4.1.1 Production among CSA and Conventional Farmers

Figure 14: Cereal Production Levels by Different Types of Adopting HHs.

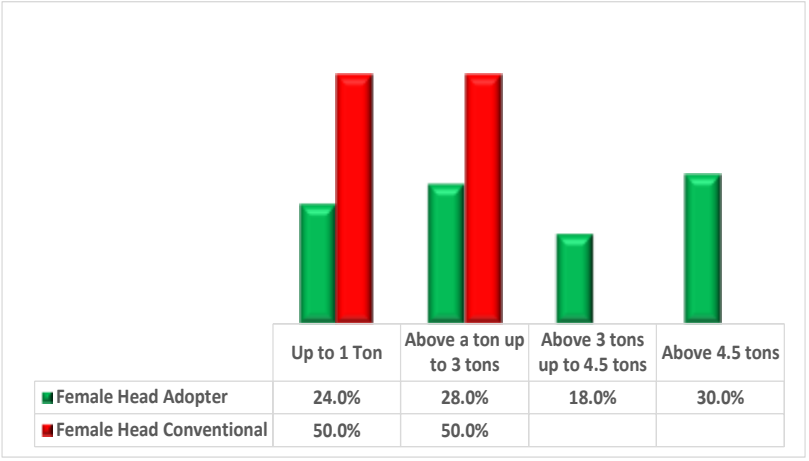


	1 Season	2 Seasons	>2 Seasons	Never adopted	Previously adopted 1 season	Previously adopted 2 seasons	Previously adopted > 2 seasons
	Adopters			Conventional			
Up to 1 Ton	4.2%	5.2%	8.3%	17.2%	4.0%	1.4%	1.5%
Above a ton up to 3 tons	2.3%	5.2%	6.7%	6.0%	3.1%	0.8%	0.5%
Above 3 tons up to 4.5 tons	1.1%	3.3%	5.7%	1.0%	0.3%	0.1%	0.0%
Above 4.5 tons	1.8%	5.3%	12.8%	2.0%	0.3%	0.0%	0.0%

Total households' production ranged from zero to well above 30 tons. As shown in Figure 14, while households producing above 4.5 tons of cereal are not among the majority this season, it is notable that that level of production is more likely among adopters (12.8%) than among non-adopters (2.0%). Corollary, households whose maize production is only up to a ton are more likely to be found among conventional farmers that never adopted (17.2%) than among any other current adopters and dis-adopters.

It was also of interest to look at female headed households on their own and see production patterns among adopters and conventional farming households.

Figure 15: Female Headed Households and Production

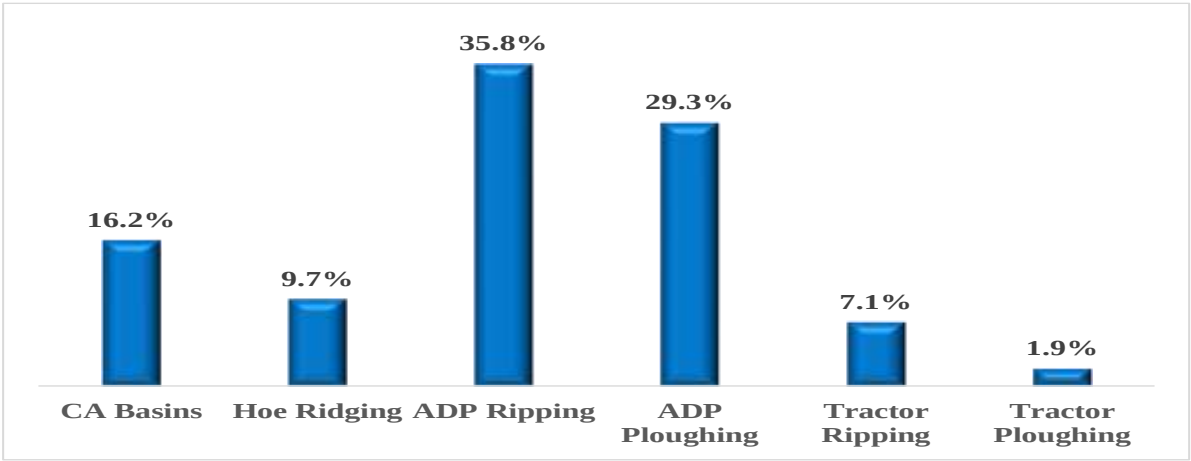


	Up to 1 Ton	Above a ton up to 3 tons	Above 3 tons up to 4.5 tons	Above 4.5 tons
Female Head Adopter	24.0%	28.0%	18.0%	30.0%
Female Head Conventional	50.0%	50.0%		

Figure 15 shows that conventional households headed by females are more likely to be found with a total production of only up to three tons. On the other hand, households headed by female adopters are more capable of reaching a production of above 3 tons with around 30% of such households even reaching above 4.5 tons of total household production.

The next sub-section looks at the Logframe Indicators (Outcome Indicators 1 – 3). In order to be more accurate, the study asked farmers to show them their best maize plot of a particular tillage type depending on what they were sampled for (Basin farmers/ hand-hoe ridging conventional farmers, ADP rippers/ADP ploughing, etc.). This maize plot was then measured and the production figures from that same plot was then used to compute both production and yield. Farmers whose plots were not measured have been removed from this analysis as we seek to preserve data quality. A total of 734 farmers representing all the tillage types were eligible for this analysis and their distribution is as shown in Figure 15 below. The percentages shown are as a percent of the total sample (734).

Figure 16: Distribution of Farmers by Type of Tillage (n=734)



4.1.2 Outcome Indicator 2.1: Margin of difference between the average production of adopters and that of conventional farmers (Disaggregated by tillage type)

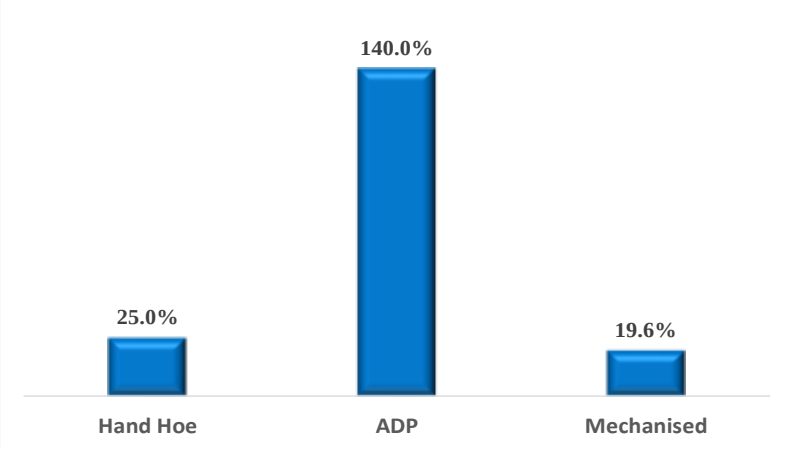
The above discussion has shown that being an adopter **does** lead to increased production. It is important therefore to establish the indicator values for the relevant Outcome Indicator. The method for computing this indicator (since the first financial year up to date) remains the same. Average production of a particular type of Conventional farmers is subtracted from Average production of comparable Adopting farmers. This difference is then divided by the average production of conventional farmers and expressed as a percentage. Table 5 shows the average production by type of tillage method and this is what has been used to produce Figure 15 (Logframe Outcome Indicator 1).

Table 5: Average production by type of tillage method

	Basins	Hand Hoe	ADP Rip	ADP Plough	Tractor Rip	Tractor Plough
Mean	2,576.12	1,207.01	5,660.76	2,509.50	9,199.85	6,171.43
Median	1,350.00	1,080.00	3,888.00	1,620.00	7,749.00	6,480.00
Mode	810.00	270.00	1,620.00	1,620.00	3,780.00	3,240.00
Minimum	108.00	108.00	54.00	95.00	300.00	700.00
Maximum	16,740.00	3,240.00	19,710.00	20,520.00	20,520.00	15,120.00

The choice for which measure of central tendency (mean, median, or mode) was made considering the vast differences between the minimum and maximum. It was considered that the Median is the most appropriate "average" to use.

Figure 17: Margin of Difference – Production by type of MT



In terms of what households have actually harvested/ brought home for use (consumption or trading) from the comparable best fields, the margin of difference is highest among farmers using animal draft power. ADP ripping adopters are more likely to harvest 140% more than the average maize harvest of ADP ploughing conventional farmers. While the dominance of MT tillage methods is clear from Figure 16, note however that Mechanised ripping farmers are comparably the lowest as they are only likely to harvest 19.6% more than conventional tractor ploughing farmers. Hand hoe basin adopter farmers are likely to harvest 25% more maize produce than comparable conventional hand hoe farmers.

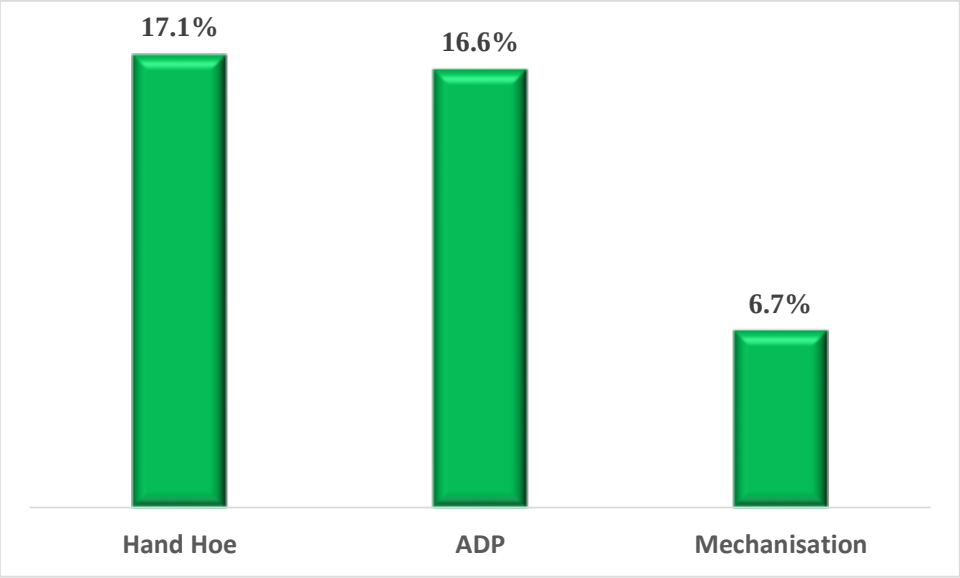
4.2 Yield

To deal with the issue of unreliable land area sizes that are usually reported by households, the survey took GPS area measurements of plots. Care was made to ensure that basin adopters' fields would be compared to hand-hoe ridging non-adopters' fields, while ADP ripped fields (adopters) would also be compared with ADP ploughed fields (non-adopters), the same for mechanisation. As is necessary for such a test, outliers were removed. Table 6 shows the average production by type of tillage method and this is what has been used to produce Figure 18 (Logframe Outcome Indicator 2).

Table 6: Average Yield by type of tillage method

	Basins	Hand Hoe	ADP Rip	ADP Plough	Tractor Rip	Tractor Plough
Mean	3.7149	3.6570	4.6718	3.7813	5.0666	4.9200
Median	3.2304	2.7584	4.1538	3.5640	5.3136	4.9800
Mode	2.03[a]	2.20[a]	4.32	2.08[a]	2.18[a]	3.24[a]
	a. Multiple modes exist. The					

Figure 18: Margin of Difference – Yields by type of MT



Results show that yield differentials are highest among hand hoe diggers and the gap is reduced as agriculture becomes more advanced. Notably, even though some farmers that are well resourced practice basin MT, most hand hoe farmers (Basins and ridgers) are resource-constrained farmers with limited access to draft power. In addition to being equally resource constrained, conventional hand hoe diggers/ridgers do not usually reach the optimum depth nor the nutrient and moisture capturing capabilities that basins avail for MT adopters, they do not plant on time and get that crucial nitrogen flush, they mostly use recycled seed, they usually do not place fertiliser in the plant stations as Basin

adopters are trained to do (but wait for the plant to first germinate), etc. Even chronologically, by the time hand hoe ridgers finish turning over every inch of soil on their plot, a conscientious basin digger is most likely completing the first round of weeding. In short there is so much drainage of the few available resources such that by the time there is talk of yield, basin adopters are already far ahead.

The more sophisticated the land preparation technology, the more likely a farmer is to have some higher level of resources and assets suitable for agriculture livelihoods at their disposal (they either have cattle/tractor or can afford to hire). This alone puts ADP (and sometimes mechanised farmers where both have a tractor) on a balanced resource base. What usually gives adopters a head start is timeliness in land preparation, the depth of rip lines, and the timeliness and precision of both nutrient application as well as moisture trapping capacity of rip lines. Observations on the ground have been that the majority of mechanised MT practitioners actually hire tractor tillage service providers (TSPs) who sometimes come late (usually then the first rains are already upon farmers) and become overwhelmed with the upsurge in the demand tillage services. All this go to explain the picture that comes out in Figure 18.

4.3 Why CSAZ Technologies are Better than Conventional Technologies.

When section 4.1 and 4.2 above are read together, it becomes clear (like in all other years) that a farmer that takes up the teachings from the CSAZ programme would have secured themselves some meaningful climate resilient agricultural livelihood. The following are the experiences of farmers:

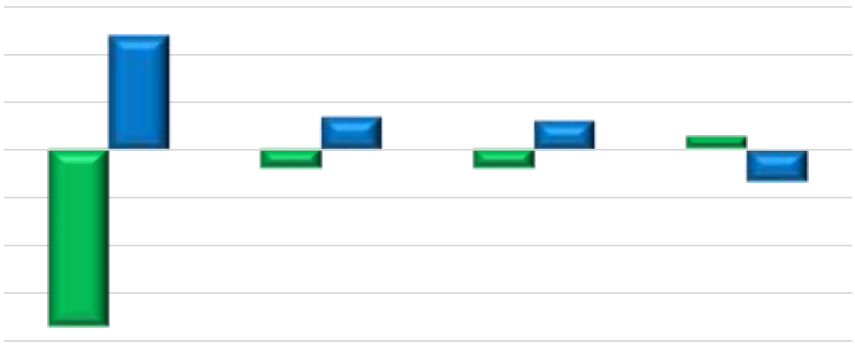
- ✓ By opening MT Basins or Rip lines in more or less the same positions each year (equivalent of mechanised tramline farming), concentrates successive application of nutrients particularly P and adjuvants in the planting rows rather than dispersing them for the benefit of weeds.
- ✓ For large numbers of farmers obviates the need to wait for nature (rainfall) to trigger land preparation.
- ✓ Disentangles crop establishment by separating land preparation, planting, fertilisation and weed control into discrete activities – simplifies management.
- ✓ Advances time of planting and enables farmers to complete seeding after heavy downpours when there is sufficient moisture to germinate and emerge the crop.
- ✓ Enables more accurate seeding at recommended depths.
- ✓ Enables more accurate measurement and placement of fertiliser.
- ✓ Multiplies early rainfall capture in crop rows, critical for successful crop establishment through runoff from undisturbed inter-rows.
- ✓ Extends the survivability of emerged crops during lengthy dry spells.
- ✓ Enables much more efficient utilisation and measurement of manure, lime and other adjuvants by restricting application to MT Basins or ADP and Mechanised Rip lines prior to planting.

4.4. Outcome Indicator 2.3

Margin of difference between the proportion of time spent on On-Farm activities

This is a qualitative indicator. The indicator is computed by establishing how much time adopters and non-adopters spent on On-farm activities for a defined set of activities (land preparation, weeding, and harvesting for On-Farm activities compared to social events, village meetings, and pursuit of other local livelihood options for Off-farm activities). The adopter's on-farm time is then subtracted from the non-adopters' on-farm time and expressed as a proportion of the non-adopters' time. A positive (+) percentage on on-farm differences would show that adopting female farmers are spending less time on On-farm activities while a negative (-) achievement shows that they are spending MORE time on on-farm activities than non-adopting women farmers. Corollary, a positive (+) percentage on off-farm differences would show that adopting female farmers are spending more time on Off-farm activities while a negative (-) achievement shows that they are spending less time on off-farm activities than non-adopting women farmers. Ideally, adoption should lead to freeing up time from on-farm activities and theoretically being diversified towards off-farm livelihood activities so that should a climate induced shock hit farming related livelihood gains, then since there already is diversification, adopters become resilient. Figure 19 shows the results.

Figure 19: Margin of difference in time spent by women on On-farm and Off-farm activities



	(CSAZ Y1)	(CSAZ Y2)	(CSAZ Y3)	(CSAZ Y4)
	Margin of Difference			
On-farm	-37%	-4%	-4%	3%
Off-Farm	24%	7%	6%	-7%

In the past three seasons, observations have been that adoption was making women adopters spend more time towards on-farm activities than conventional counterparts. This baffled many readers as the argument was that theoretically this was an ***impossibilia***. But the point was continuously made that in fact when a person adopts, the initial years are both pleasing (for the first time, production actually takes a giant leap upwards) as well as putting a strain on them. The strain in the first year comes from the fact that the first-year land preparation now starts soon after harvest for the first time in their farming life

and then there is early planting and finally, they have to contend with weeds that are no longer buried under especially by the plough. In the second/or even third year, the pleasing results from the upward leap in production leads to investing even more time towards this new-found gold mine (their land has suddenly become highly productive when put under MT) and bring more land under MT (thereby repeating what happened in first year of adoption). By the fourth season, events have played themselves out and there is not much widespread bringing of new land area under MT; the plant stations are more or less established and weed management has improved (as weeds might also begin to become lessor). This explains the results seen from this season's data. It will be very encouraging for the reader to go to the 2016/17 similar report and compare the narrative with what has been said in the sentences above.

4.5 COVID – 19 Effects on Rural Economy/ Livelihoods

Figure 20: The Year (2020) Everyone Wore a Mask

AWARENESS

All the farmers met are aware of the Corona Virus Pandemic and the health measures as stipulated in the health guidelines. When asked prevention methods responses were all on point: regular washing of hands with soap; use of hand sanitizers; not shaking hands when greeting social distance; wearing of face masks sneezing and coughing on folded elbow. Awareness within the communities is high mainly due to closure of schools due the COVID-19 but also because of incessant radio announcements, and health stuff sensitizing communities at each point, and other issues cited below.

HEALTH IMPACT

The pandemic has not directly affected farm activities as none of the respondents (and their household), community members nor extended families have been infected.

ECONOMIC/OTHER IMPACT

The immediate impact has been on school going children who have been out of school for more than 5 months. This translated to higher food consumption as kids would spend 7 days a week alternating from eating, playing, and sleeping. Starch was not an issue but high costs food stuffs such as cooking oil put

a strain on family budgets. Families may not easily recover economically as they ended up using money that could have been invested towards livelihoods.

COVID-19 fears and restrictions have prevented potential buyers who offer higher farm-gate prices from reaching the farmers. This has caused a few local buyers to fix the prices quite low and exploit the farmers arguing that they have to transport to distant markets. There was also a general atmosphere of fear that any day COVID-19 might come into the villages “from towns” (people in the villages take COVID-19 to be a “towns people’s disease”). Some farmers could not therefore comfortably easily go to town to buy important items such as empty bags used when selling their produces due to fear of contracting COVID-19. Agricultural gatherings such as field days, trainings, shows, exhibitions and others were cancelled and hence farmer exposure to new farming technologies and marketing possibilities was reduced. Farmers also expressed fears of rushed Period one and Two trainings since Farmers' trainings were delayed.

5. CONCLUSIONS, LESSONS LEARNT, AND RECOMMENDATIONS

From the fourth Post-Harvest/ Outcomes survey under the CSAZ project, several pertinent issues could be drawn from the findings.

5.1 CONCLUSIONS

This subsection focusses on drawing out conclusions that can furnish us with values for Outcome indicators as per the CSAZ Logical framework. The major conclusion from this study is that CSA provides farmers with an opportunity to improve agricultural livelihoods as well as wellbeing. With reference to the Outcome indicators in the CSAZ Logframe, from survey findings we can conclude that:

- ***Outcome Indicator 2.1: Margin of difference between the average production of adopters and that of conventional farmers (Disaggregated by tillage type)***
  - Hand hoe basin adopters are likely to harvest 25.0% more than comparable conventional hand hoe farmers.
  - ADP ripping adopters are more likely to harvest 140.0% more maize than the ADP ploughing conventional farmers.
  - Mechanised ripping farmers are likely to harvest 19.6% more maize produce than conventional tractor ploughing farmers.
- ***Outcome Indicator 2.2: Margin of difference between the average yield of adopters and that of conventional farmers (Disaggregated by tillage type)***
  - Basin farmers' average yield was 17.1% **higher** than that of hand-hoe ridgers/ diggers,
  - ADP ripping adopters' average yield was 16.6% **higher** than that of ADP ploughing conventional farmers.
  - For Year 4, Mechanising adopters' average yield was 6.7% **higher** than that of mechanising non-adopters.

- ***Outcome Indicator 2.3: Margin of difference between the proportion of time spent by women on On-farm activities.***
  - For the first time in the 4 seasons under CSAZ, women adopters are now spending less time towards on-farm activities and more time towards off-farm activities.
  - Adopting women are spending 3% less time for on-farm activities than conventional farming women.
  - Adopting women now spend 7% more time towards off-farm activities than conventional farming women.

5.2 LESSONS LEARNT

Four major lessons clearly emerge from what has been observed this study. These are:

- ✓ The propensity to dis-adopt seems to be partly explained by duration of adoption; farmers that have adopted for more than one season are not inclined to dis-adopt as they would have come to a practical conclusion that in fact conservation farming works and find no inclination to return to conventional ways.
- ✓ It is very important for individual households to be living witnesses of their own success as this leads to internally driven motivation and genuine adoption of CSA. Any externally driven motive for adoption can easily lead to greater-dis-adoption rates as soon as the external incentive is withdrawn
- ✓ With time, the number of plots under MT tend to increase as farmers realise more and more the benefits of adopting MT. Having adopters with some land under conventional shouldn't be a discouragement at all as reasons may not have anything to do with lack of conviction.
- ✓ MT-CF Minimizes guesswork, simplifies the application of GAP and is suited to the establishment and husbandry of a wide range of rainfed annual grains. MT-CF is a simple, practical and more efficient farming system.
- ✓ Yield increases and productivity gains generate cash surpluses which catalyze demand for private sector services, create opportunities for bulk marketing of commodities and farmer to farmer mechanized and ADP MT service provision – contracting.

5.3 RECOMMENDATIONS

The survey findings led us to the following recommendations:

- ✓ The CFU should come up with a way of celebrating continuity of adoption (perhaps in the way of having some field days dedicated to sustained adopters).
- ✓ The CFU End of Project Evaluation should look into whether the improvements in the household asset base are in any way attributable to the CSAZ intervention.