CCAFS CLIMATE SMART COCOA BASELINE SURVEY REPORT -GHANA (INTRODUCTION OF STEPWISE CLIMATE SMART COCOA PRACTICES TO FARMERS)

WRITTEN AND COMPILED BY;

Mustapha Alasan Dalaa , Abdul-Razak Saeed, Eric Worlanyo Deffor, Manuel Holzer, Rich Kofi Kofituo, Richard Asare

CGIAR Research Program on Climate Change, Agriculture and Food Security CCAFS

LIST OF TABLES

LIST OF FIGURES

ABOUT CCAFS

The Climate Change, Agriculture and Food Security (CCAFS) program of the Consortium of International Agricultural Research Centers (CGIAR) seeks to marshal the science and expertise of CGIAR and partners to catalyse positive change towards climate-smart agriculture (CSA), food systems and landscapes, and position CGIAR to play a major role in bringing to scale practices, technologies and institutions that enable agriculture to meet triple goals of food security, adaptation and mitigation. The three main objectives of the program is to Sustainably increase agricultural productivity, to support equitable increases in farm incomes, food security and development, adapting and building resilience of agricultural and food security systems to climate change at multiple levels, and reducing greenhouse gas emissions from agriculture. In Ghana, the CCAFS program is being implemented in the cocoa sector by the International Institute of Tropical Agriculture (IITA) in partnership with the Rainforest Alliance.

ABOUT IITA

The International Institute of Tropical Agriculture (IITA) is a non-profit institution that generates agricultural innovations to meet Africa's most pressing challenges of hunger, malnutrition, poverty, and natural resource degradation. Working with various partners across sub-Saharan Africa, we improve livelihoods, enhance food and nutrition security, increase employment, and preserve natural resource integrity. The Climate Change Agriculture and Food Security (CCAFS) program in IITA-Ghana is determined to develop tailor-made stepwise climate smart management and finance packages to enhance the resilience and productivity of Ghanaian Cocoa farmers in the face of the adverse impacts of climate change on Cocoa production.

CITATION

Dalaa M, Saeed A, Deffor E, Holzer M, Kofituo R, Asare R. 2021. CCAFS Climate Smart Cocoa Baseline Survey Report-Ghana (Introduction of stepwise climate smart cocoa practices to farmers).CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

Introduction

Overview of CCAFS Project

The international Institute of Tropical Agriculture (IITA) and the Rainforest Alliance (RA) have developed improved practices for climate smart agriculture in the cocoa sector, summarized under the term climate smart cocoa (CSC) and being carried out as part of the CGIAR research program on Climate Change, Agriculture and Food Security (CCAFS). In phase 1 of the CCAFS project on CSC, climate exposure maps for Ghana's cocoa sector and site-specific recommendations for climate smart agricultural practices were developed and adopted in 2019 the Ghana COCOBOD as a basis for the creation of a national climate-smart cocoa standard. Furthermore, a stepwise investment pathway towards CSC was developed to provide farmers with tangible investment packages allowing them to optimize their resource use. This novel approach to climate resilience, adaptation and mitigation has a high potential to foster sustainable cocoa production in Ghana while positively impacting farmers' livelihoods. This approach can also serve as a model for other crops in the region. The current challenge is to mainstream the CSC practices across the sector, because the cocoa industry struggles to institutionalize CSA packages in training programs of companies and certification bodies. In addition to that, more data on the stepwise approach for climate smart cocoa is needed to be able to establish a business case for CSA investment in both, the adjust and cope zone. These challenges are being addressed in phase II of the CCAFS project on climate smart cocoa.

CCAFS II – CSC Project: Goals and Objectives

The second part of the CCAFS project aims to bring the methods and benefits developed under phase I into practice by 1) collaborating with public and private organizations to accelerate policy adaption aiming to institutionalize a climate

smart cocoa approach in extension delivery and voluntary standards across the country. 2) Generate Cost Benefit Analysis (CBA) data on the stepwise approach for the 4 different investment packages across the adjust and cope zones to enable private lending and create shared values for farmers and financial institutions. Private companies along the cocoa value chain have expressed interest to invest in CSC. However, it is difficult to acquire investment capital, as agriculture in general and in specific the cocoa sector is regarded as a high-risk investment sector, leading to high interest rates. To enable profitable loans, phase II of the CCAFS project will provide a solid business model based on detailed CBA data, catalyzing the cooperation between banks, private companies, and farmers. To that end, several pilots have been established through partnerships with cocoa-sourcing companies in Ghana. The pilots will generate evidence-based detailed CBA data and will be complemented with farmers' views on cost and benefits of pursuing the stepwise approach to climate smart agriculture in cocoa.

Baseline study on adoption rate of climate smart agricultural practices

As part of the efforts in developing a business case for climate smart cocoa, IITA and RA partnered with the public and private cocoa buying companies, PBC and Cargill respectively, to co-learn between industry and science on CSC. The collaboration comprises of the establishment of several pilot sites on cocoa farms belonging to the companies' cooperative groups, located in the adjust and the cope zones. On the pilot sites the different packages of the stepwise approach are implemented by farmers on different fields and supported by extension officers and IITA scientists. The pilot time frame is set for one year from the beginning of 2021. During the piloting, all costs and benefits will be recorded based on farmers' field activities being the basis for a comprehensive CBA. During this one-year piloting, the farmers engaged will also receive training on CSC

practices, for which the pilot sites serve as demonstration fields. The trainings which will take place over the course of the year, will be accompanied by surveys to investigate the adoption rate of CSC-practices. Surveys will be carried out at 3 different time points: a baseline (conducted in February 2021, midline (to take place in June) and an end-line survey (to take place in November). The aim of this report is to present and summarize the results from the baseline study.

Methodology

Sampling Approach

The study collected primary data. The purposive sampling technique was used since the study focused on cocoa farmers of project partners (PBC and Cargill) across the 5 districts who benefit from climate smart stepwise practices training. Data was collected across the 5 districts in February 2021. A total of 1002 respondents were interviewed in 16 communities across two agro-ecological climate impact zones (cope and adjust) in the Western North and

Ashanti regions of Ghana. Cocoa farmers belonging to cooperative groups of Produce Buying Company (PBC) and Cargill were purposively selected for the survey because these organizations are partners on the IITA CCAFS project in Ghana. In each of the 16 communities, the survey targeted all farmers under the IITA-PBC/CARGILL climate smart stepwise cocoa practices training and interviewed all farmers provided on the farmer list of the partners (PBC and Cargill). The distribution of farmers interviewed per community using a structured questionnaire can be found below.

No.	Community	Number of Farmers Interviewed	Climatic Impact Zone
1	Achiasewa	40	Adjust
2	Adansi Koforidua	56	Adjust
3	Agogoso	79	Adjust
4	Ahyireso	40	Adjust
5	Ahokwa	101	Adjust
6	Dzobokrom	2	Adjust
7	Nyameyehene	65	Adjust
8	Odumase Nyamebekyere	48	Adjust
9	Abotareye	90	Cope
10	Agyatakrom	6	Cope
11	Atialeve	40	Cope
12	Badukrom	73	Cope
13	Daboase	77	Cope
14	Kessekrom	68	Cope
15	Sefwi Asafo	159	Cope
16	Sefwi Camp	58	Cope
	TOTAL	**1002**	

2.2 Questionnaire Design/Description

The survey used structured questionnaire in the data collection. The data collection tool was sectioned into four (4) major research areas namely 'Demographic Characteristics, Best Management Practices carried out by farmers, Access to Weather Information and use of Voluntary Standards'. The questions on 'Demographic Characteristics' covered variables such as sex of respondents, age, level of education, marital status, number of years respondent has undergone climate smart education and experience in farming. The questions on 'Best Management Practices' covered farmers access to training and practice of management practices such as pruning, weeding, cultural management practices, fungicide/pesticide application, fertility management practices and fertilizer application. Questions on 'Weather information' covered farmers' access to weather information and how these influence their production decisions. Questions on 'Voluntary standards' sought to know certification bodies respondents are aware of, the ones they practice and the benefits they obtain from these certifications.

2.3 Enumerator Training

Field extension officers of the piloting partners were engaged as enumerators and trained in the data collection tool after a prior assessment of their knowledge in climate smart stepwise cocoa farming. A post assessment training on climate smart stepwise cocoa farming was conducted for all enumerators (field extension officers) prior to the data collection. All enumerators were taken through a one-on-one online training to understand the tool and the meaning of all technical words used.

2.3.1 Piloting

Enumerators carried out a pre-test with the data collection tool after their training. This was conducted a week prior to the main data collection. Feedback was provided to all enumerators after the pre-test and all corrections were made before the main data collection started in the field.

2.4 Field Data Collection

Field data collection took place simultaneously in the two climate impact zones in the month of February 2021 with Covid-19 protocols fully observed. Field enumerators used the GeoFarmer mobile application designed by Anton Eitzinger of Alliance Bioversity-CIAT. Data collected was uploaded daily after enumerator's quality checks had been conducted. The GeoFarmer Application provided records on data collected on daily basis and basic analytical results.

2.4.1 Field Challenges

Most farmers are now engaged in multiple cash crop production and extra-income generating activities. This made access to farmers very difficult in some communities since they are engaged in multiple economic activities and mobilizing them for interviews was difficult and needed much more convincing to participate.

2.5 Limitation of Baseline Study

The baseline study could not cover questions on production of cocoa and the yield obtained by farmers per season. This could have helped to relate use of

management practices and certification to productivity of farmers. However, subsequent studies with same respondents will be geared towards this objective.

2.5 Study Area

The study area covered two (2) regions and five (5) districts in Ghana namely, Western North Region (Juaboso District, Sefwi Wiawso Municipal, Bibiani/ Anhwiaso/Bekwai Municipal) and Ashanti Region (Adansi South District, Atwima Mponua District). Juaboso District is one of the nine districts in the Western north region of Ghana. It is located between latitude 6˚6N and 7˚N, and longitude 2˚40 W and 3˚15W. The District shares borders with Bia and Asunafo North districts in the North, Asunafo South and Sefwi Wiawso District to the East, Aowin Suaman District to the south of the south and La Cote D'Ivoire to the west. The district has a surface area of 1924 square kilometers and serves as entry/exit point between La Cote D'Ivoire and the Republic of Ghana (http://www.ghanadistricts.com).

The Sefwi Wiawso Municipal is a district located in the Western North Region of Ghana. It is bordered by Juaboso and Bia District and by Aowin/Suaman to the South. It is bordered by Bibiani – Anhwiaso –Bekwai to the coast and Wassa Amenfi to the South-east. The Sefwi Wiawso District Assembly as the political and Administrative Authority is located at Sefwi Wiawso, the District Capital (http://www.ghanadistricts.com). The Bibiani-Anhwiaso Bekwai District is located in the Western North Region of Ghana. It covers about 8.6% (873 sq km) land area. The district lies between latitude 6° N, 3° N and longitude 2° W, 3° W. The district forms part of the equatorial rainforest and has moist semi-

deciduous forests producing various tree species. The annual mean temperature in the district is 2°C. The district experiences bimodal rainfall with averages between 1200mm and 1300mm annually (http://www.ghanadistricts.com). The Adansi South District is one of the thirty (30) Districts in the Ashanti Region of Ghana. The District lies within Latitude 40" North and 6 degrees 22" North and Longitude 1 degree West and 1 degree 38" West. It is on the Southern part of the region. Other Districts in the region sharing boundaries with it are Obuasi Municipal and Adansi North Districts to the North and North East respectively. The District also shares boundaries with Assin District in the Central Region to the South and to the East by Birim North and South Districts of the Eastern Region. (http://www.ghanadistricts.com). The Atwima Mponua District is located in the south-western part of the Ashanti Region and covers an area of approximately 894.15 square kilometres. The district shares boundaries with four (4) other districts, the Amansie West District to the south, Ahafo Ano South District to the north, Atwima Nwabiagya District to the East and Bibiani–Anwhiaso–Bekwai District of the Western Region to the west (http://www.ghanadistricts.com).

3 Findings

3.1 Demographic Data

Age, Experience and Household Size Sex and Marital Status

A total of 1002 cocoa farmers were surveyed for the baseline study comprising of 328 farmers from the Adjust zone and 674 farmers from the Cope zone. The average age of the surveyed farmers was 51 years. In the Adjust zone the average age is 52 years and for the cope zone, 50 years. The average household size was 6.9 and 4.8 persons in the adjust and cope zones respectively. Farmer experience is 22.19 years. This is presented in Table 1

below. The sex distribution across the two agro-ecological zones as presented in Table 2 below which shows that in the Adjust zone 35 % of the farmers were female and ≈65% were male cocoa farmers. For the Cope zone, 28% of those surveyed are female cocoa famers with ≈72% being male cocoa farmers.

With majority 79% of the cocoa famers in the Adjust zone 85% in the Cope zone having indicated to be married, they form the highest representation of marital status of the interviewees. 10% and 6% of the farmers in the Cope zone and Adjust zone indicated singlehood respectively (i.e. never been married). There were more widows/widowers recorded in the Adjust zone compared to those in the Cope zone. A few of the farmers in the two zones indicated they were co-habiting. See Table 2 for details.

Table 1: Age, Experience and Household Size

Variable	Adjust	Cope	Total
Experience (Mean in Years)	21.14	22.69	22.19
Household Size (Mean)	4.81	6.90	6.22
Age (Mean in Years)	52.48	50.32	51.02

Table 2: Sex, Marital Status by Agro-Climatic Zone

Sex	ZONE		
	Adjust	Cope	Total
Female	115	191	306
	35.1	***28.3***	***30.5***
Male	213	483	696
	64.9	***71.6***	***69.5***
Total	328	674	1002
	100.00	**100.00**	**100.00**
Marital Status			
Divorced	13	4	17
	3.96	***0.6***	***1.7***
Has partner but non-married	7	5	12
	2.1	***0.7***	***1.2***
Married	260	573	833
	79.3	***85.0***	***83.1***
Single	20	68	88
	6.10	***10.1***	***8.8***
Widow/Wid-ower	28	24	52
	8.5	***3.6***	***5.2***
Total	328	674	1002
	100.00	***100.00***	***100.00***

First row has frequencies and second row has column percentages

Education Status

The educational background for the surveyed cocoa farmers across the Agro-Climatic Zones are presented in Table 3 In the Adjust zone almost 32% of the farmers reported to have attained secondary level of education, followed by 30% with basic (JHS/MSLC) level education. The results also

show that some 22% of the cocoa farmers in the Adjust zone have no formal education, and with less than 2% of the farmers have university level education. In the case of farmers in the Cope zone, majority (38%) have Primary level education followed by 25% with JHS/MSLC level education. Some 4% of surveyed farmers in the Cope zone have University level education, farmers with no education constituted about 20% of the total sample in the zone. Tables 3 and 4 presents the data on farmers' education.

Table 3: Education Level by Zone

Education	ZONE		
	Adjust	Cope	Total
JHS	98	165	263
	29.9	**24.5**	**26.3**
No Education	73	135	208
	22.26	20.03	20.76
Post-Graduate	1	4	5
	0.30	**0.6**	**0.5**
Primary	44	253	297
	13.4	**37.5**	**29.6**
SHS	106	86	192
	32.3	**12.8**	**19.2**
University	6	31	37
	1.83	**4.6**	**3.7**
Total	328	674	1002
	100.00	**100.00**	**100.00**

First row has *frequencies* and second row has *column percentages*

Table 4: Education by Sex

Education	Sex		
	Female	Male	Total
JHS	80	183	263
	26.1	**26.3**	**26.3**
No Education	90	118	208
	29.4	**16.95**	**20.8**
Post-Graduate	0	5	5
	0.0	**0.7**	**0.50**
Primary	90	207	297
	29.4	**29.7**	**29.64**
SHS	43	149	192
	14.1	**21.4**	**19.2**
University	3	34	37
	0.98	**4.9**	**3.7**
Total	306	696	1002
	100.00	**100.00**	**100.00**

First row has frequencies and second row has column percentages

Farm Size of Cocoa Farmers

The average farm size for the surveyed cocoa farmers in the two Agro-Climatic zones are presented in Figure 1. In the Adjust zone, the average farm size for main cocoa farm for main cocoa farms reported by farmers was 1.8 ha, while the average hectare for main cocoa farms in the Cope zone was 2.2 ha. Overall, average farm size for main cocoa was 2.1 ha for the combined data, 1.09 ha and 1.05 ha second or third farm respectively.

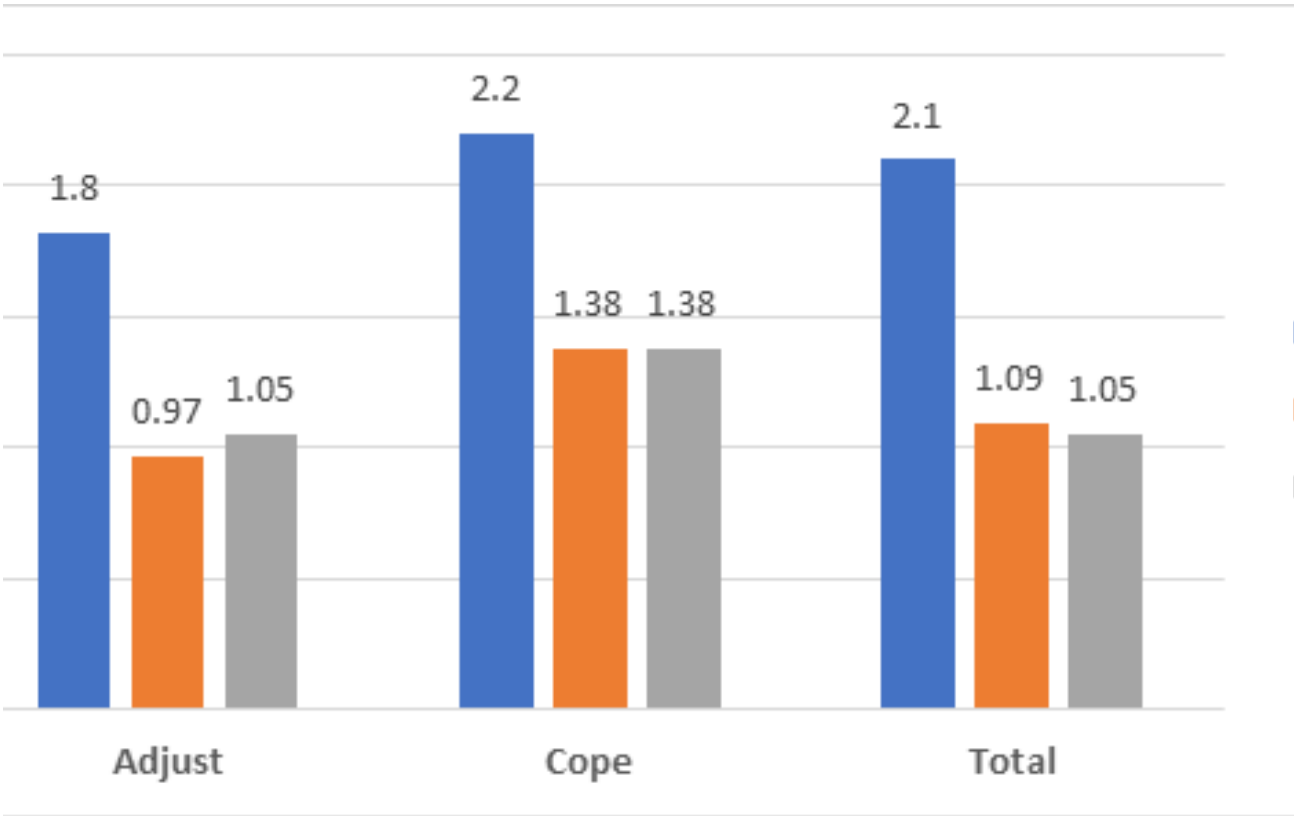


Figure 1: Average Farm Size

From the total of 1002 farmers sampled from the two zones, 995 responded to the question on weather. Out of this number, 65% indicated they had received weather information while 35% have not received any weather information to help with their farming.

Table 5: Received weather information (numbers in bracket are percentages)

Response	ZONE		
	Adjust	Cope	Total
No	83	264	347
	(25.8)	**(39.3)**	**(34.9)**
Yes	239	409	648
	(74.2)	**(60.8)**	**(65.1)**
Total	322	673	995
	(100.0)	**(100.0)**	**(100.0)**
		100.00	**100.00**

Numbers in brackets are percentages

Timing of Weather information for implementing BMPs/CSC practices

The baseline survey gathered data on the influence of weather information on implementing BMPs/CSC practices. The results are presented in Table 6. It shows that although majority of the cocoa farmers are of the view that the weather information was timely, a small number (5.4%) had challenges with the timing of the weather information. The reasons adduced by farmers regarding the timing of the weather information are presented in Table 7, most of the farmers indicated they did not adequately understand explanations that come with the weather information. Others indicated they got the weather information late.

Table 6: Influence of Weather Information on implementing any of the BMPs/CSC practices (First row has frequencies and second row has column percentages)

Response	ZONE		
	Adjust	Cope	Total
No	13	22	35
	(5.4)	**(5.4)**	**(5.4)**
Yes	227	389	616
	(94.6)	**(94.7)**	**(94.6)**
Total	240	411	651
	(100.0)	**(100.0)**	**(100.0)**

Table 7: Reasons why weather information was not useful to farmers

Reasons	Freq.	Percent
Got the information on weather late	20	23.81
I did not adequately understand explanations giving on the weather information	58	69.05
The weather parameters broadcast on the media are not useful	6	7.14
Total	**84**	**100.00**

About 96% of the surveyed farmers indicated the weather information they receive impacts the farming activities. Only 4% stated otherwise. The trend

is the same across the two Agro-Climatic zones. In terms of impact of weather information on most of the farmers indicated that weather information has helped them to plan their farms ("good farm planning"), others indicated receiving weather information has helped in reducing the incidence of pest and disease on their farms. See Tables 8 and 9 for details. In Table 10 reasons provided by farmers on the impact of weather information farming activity is presented. Good farm planning and reduction in pest and disease are the main benefits expressed by the cocoa farmers. Lower yield was the main reason provided by farmers who indicated the weather information had not impacted their farming activities. See Table 10 and Table 11 for details.

Table 8:Weather Information your Productivity (First row has frequencies and second row has column percentages)

Response	ZONE		
	Adjust	Cope	Total
No	11	13	24
	(4.8)	**(3.7)**	**(4.2)**
Yes	218	335	553
	(95.2)	**(96.3)**	**(95.8)**
Total	229	348	577
	100.00	**100.00**	**100.00**

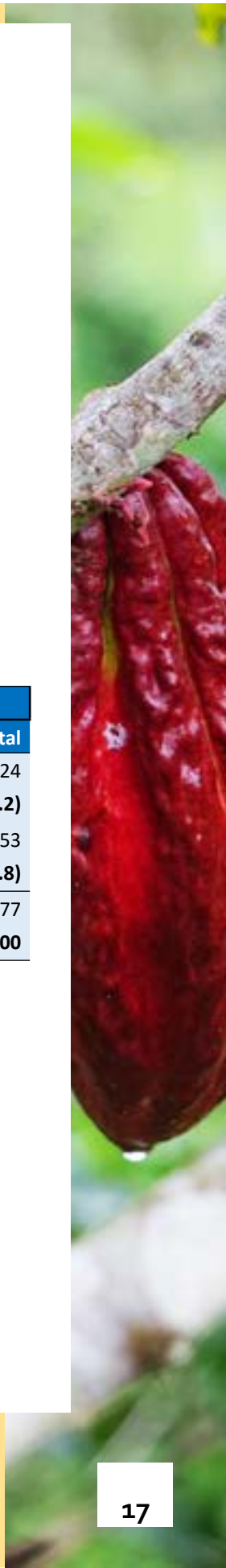


Table 9: Weather Information and Productivity (First row has frequencies and second row has column percentages)

	ZONE		
	Adjust	**Cope**	**Total**
Increased yield	122	101	233
	(55.7)	**30.15**	**40.3**
Reduced pest and disease	127	158	285
	(57.9)	**(47.2)**	**(51.4)**
Good farm planning	195	308	503
	(89.0)	**(91.9)**	**(90.8)**
Total	444	567	1011
	(202.7)	**(169.3)**	**(182.5)**
Cases	219	335	182.49
Valid cases:	554		

Table 10: Negative Impact on Yield

	ZONE		
	Adjust	**Cope**	**Pooled**
Yield remained same	15	12	27
	(100.0)	**(66.67)**	**(81.82)**
Lowered yield	122	101	14
	(55.7)	**(30.15)**	**(42.42)**
Total	17	24	41
	(113.3)	**(133.3)**	**(124.24)**
Cases	15	18	33
Valid cases:	33		

Table 11: Reasons why farmers did not have access to weather data

	ZONE		
	Adjust	Cope	Total
No access to internet	2	66	68
	2.4	**25.0**	**19.6**
Do not listen to News on Radio and TV	17	68	85
	20.4	**25.76**	**24.5**
Do not read Newspapers	64	130	194
	77.11	**49.24**	**55.9**
Total	83	264	347
	100.0	**100.0**	**100.0**
Cases	83	264	347
Valid cases:	347		

Table 12: Best Medium to receive information

Medium	ZONE		
	Adjust	Cope	Total
Cellphone or internet	16	9	25
	4.9	**1.3**	**2.5**
Newspaper	0	1	1
	0.0	**0.15**	**0.10**
Personal Contact	40	142	182
	12.3	**21.10**	**18.2**
Radio or Television	270	521	791
	82.8	**77.4**	**79.2**
Total	326	673	999
	100.00	**100.00**	**100.00**

First row has frequencies and second row has column percentages

Table 13: Best Medium to receive information

Medium	ZONE		
	Adjust	Cope	Total
Cellphone or internet	16	9	25
	4.9	**1.3**	**2.5**
Newspaper	0	1	1
	0.0	**0.15**	**0.10**
Personal Contact	40	142	182
	12.3	**21.10**	**18.2**
Radio or Television	270	521	791
	82.8	**77.4**	**79.2**
Total	326	673	999
	100.00	**100.00**	**100.00**

First row has frequencies and second row has column percentages

3.3 Training and implementation of Climate Smart Agriculture

87% of interviewed farmers have received training on best management practices including climate smart production approaches, no gender imparities were observed. The training rate was about 11% higher in the cope zone where 91.0% of farmers had been trained, compared to 70.0% in the Adjust zone. 13% of the interviewed farmers indicated they had not previously received any training in best agricultural practices. 82.1% of these farmers mentioned that trainings could be time consuming and therefore, disincentivized their participation. The remaining interviewees indicated that they had not been invited to any such trainings.

Table 14 Previous training on BMP/ CSC grouped by climate impact zones (first line: frequencies, second line in bold: column percentages)

Response	ZONE		
	Adjust	Cope	Total
No	59	58	117
	(20.0)	**(9.0)**	**(11.8)**
Yes	261	613	874
	(80.0)	**(91.0)**	**(88.2)**
Total	320	671	991
	100.0	**100.0**	**100.0**

Table 15 Previous training on BMP/CSC grouped by gender (first line: frequencies, second line in bold: column percentages)

The adoption rates of good agricultural practices by farmers that received training are depicted in Table 16. Pruning, weeding and cultural management are implemented by more than 90% of the farmers, in both the adjust and cope zone. Pesticide and fertilizer application present higher adoption rates in the cope zone with 97.7% and 73.4% respectively, compared to rates of 75.5% and 58.6% in the Adjust zone. However, 19.5% of trained farmers carry out soil fertility management in the Adjust zone whereas in the cope the adoption rate of this practice is only about 1.5%. There are no major gender disparities for almost all the practices except for fertilizer application, where 58.6% of women compared to 73.4% of men apply fertilizer.

Table 15: Adoption rate of BMP/ CSC practices, grouped by climate impact zones (first line: frequencies, second line in bold: column percentages)

Practices	Zone		
	Adjust	Cope	Total
Pruning	257	604	861
	(98.5)	**(98.5)**	**(98.5)**
Weeding			
Cultural managen			
Fungicide and Insec applicati			
Fertility managen			
Applicati fertilizer			

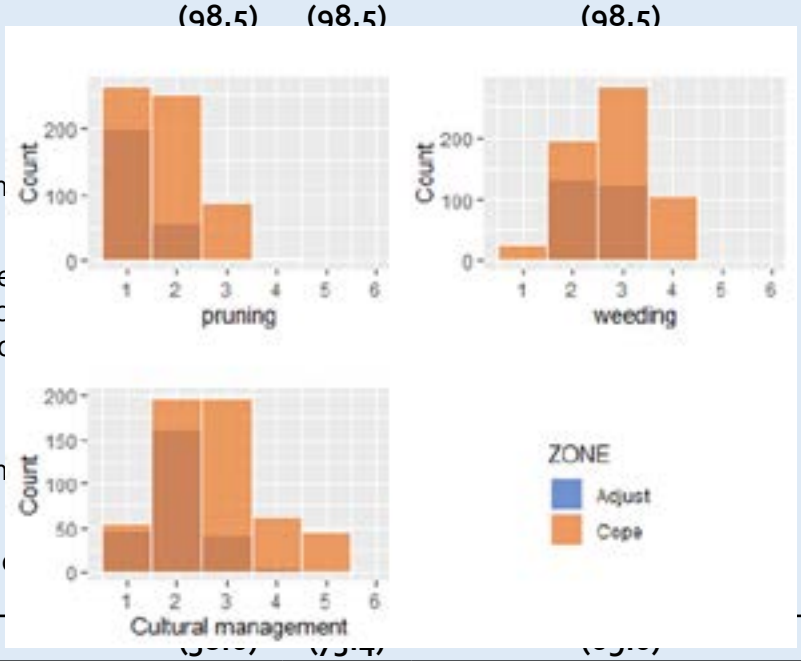


Table 16: Adoption rate of BMP/ CSC practices, grouped by gender (first line: frequencies, second line in bold: column percentages)

Practices	Gender		
	Female	Male	Total

Pruning	265	596	861
	(99.3)	**(98.2)**	**98.5**
Weeding	269	607	876
	(100)	**(100.0)**	**100.0**
Cultural management	263	603	866
	(98.5)	**(99.3)**	**99.1**
Fungicides and insecticide application	241	555	796
	(90.3)	**(91.4)**	**91.1**
Fertility management	15	45	60
	(5.6)	**(7.4)**	**6.9**
Application of fertilizer	153	450	603
	(57.3)	**(74.1)**	**69.0**

Best management practices such as pruning, weeding, and cultural management should be carried out several times throughout the year. In Figure 2 the frequencies of these practices are depicted, showing that farmers annually pruned their cocoa trees 1 to 2 times, weeded 2 to 3 times and carried out cultural management 2 to 3 times. However, the result indicates that farmers in the cope zone have a tendency to have a higher repetition rate. The most frequently used fertilizers are Asaase Wure, Sidalco Liquid and Cocoa Nit, they are used by 52.1%, 19.2 and 15.8 farmers, respectively. In the Adjust zone Asaase Wure was

the most predominant fertilizer, used by 83.0% of farmers that indicated the use of fertilizer, while in the cope zone only 41.6% of farmer were using Asaase Wure as also CocoNit and CocoFeed were popular products with 25.6% and 21.1% of farmer applying them on their fields. Only 60 Farmers used organic fertilizers and this was poultry droppings.

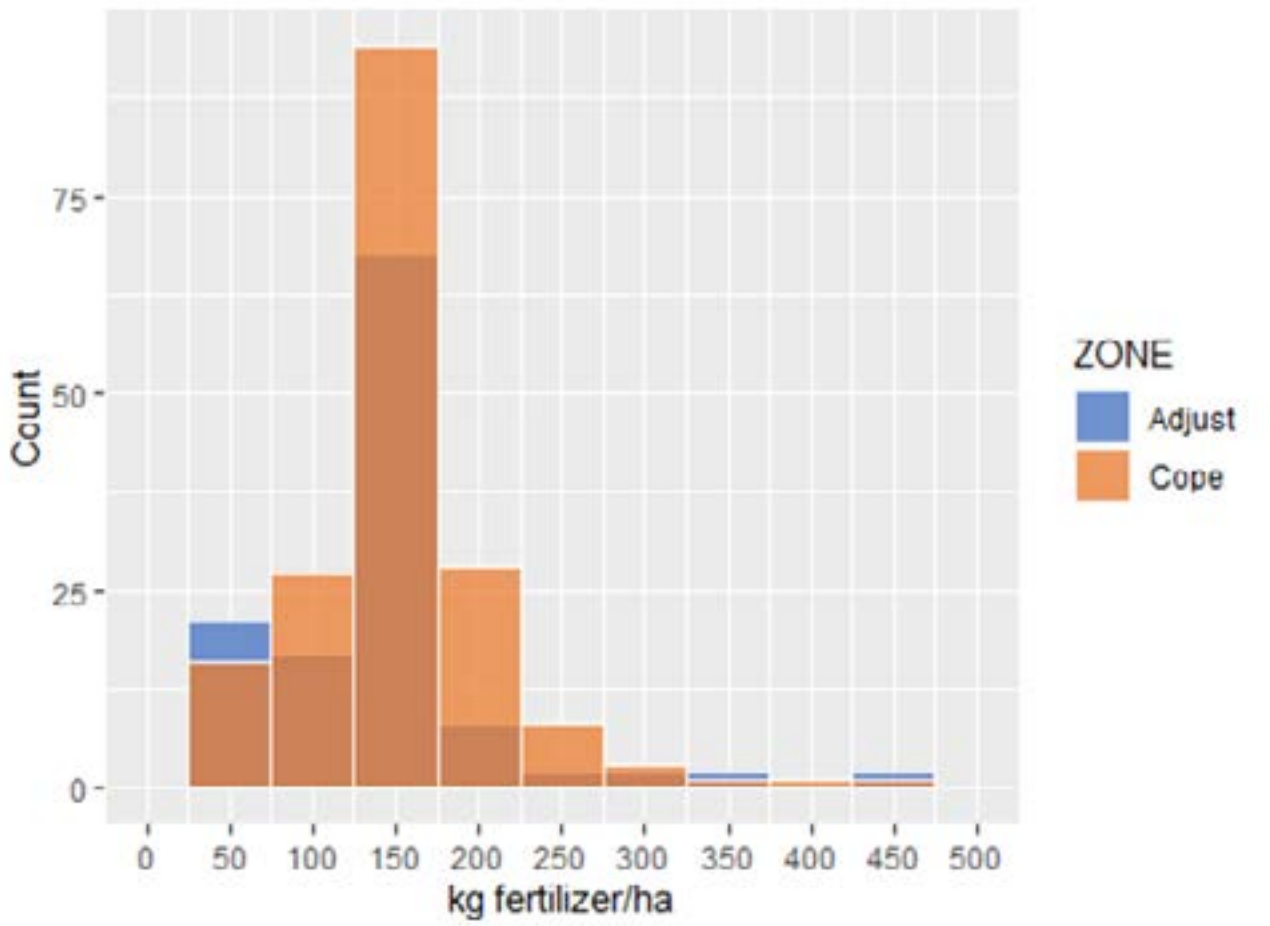


Figure 2 Shows how much the farmers repeat pruning, weeding and cultural management during one year. This are overlapping histograms, In blue the results for the Adjust zone in orange the results for the cope zone

g

Table 17 Lists the most popular fertilizers. First row: number of farmers that use the product, 2. Row: Percentage of farmers that indicated to apply pesticides and the given product.

	Zone		
Fertilizer product	Adjust	Cope	Total
Asaase Wura	127	187	314
	(83.0)	**(41.6)**	**(52.1)**
Sidalco liquid	1	115	116
	(0.7)	**(25.6)**	**(19.2)**
Cocoa Nit	0	95	95
	(0.0)	**(21.1)**	**(15.8)**
CocoFeed	0	31	31
	(0.0)	**(6.9)**	**(5.1)**
Aduanepa	2	12	14
	(1.3)	**(2.7)**	**(2.3)**

In Figure 3, the application rate of the Asaase Wure fertilizer is depicted in a histogram. It clearly shows that most farmers apply amounts that are too low compared to the 370 kg/ ha that are recommended by the fertilizer production company[1]. The fertilizer rates of Asaare Wure are similar in both agroecological climate zones. The average fertilizer rates are 144 kg/ha and 151 kg/ha respectively.

1 https://www.yara.com.gh/crop-nutrition/fertilisers/other-fertilisers/asaase-wura/

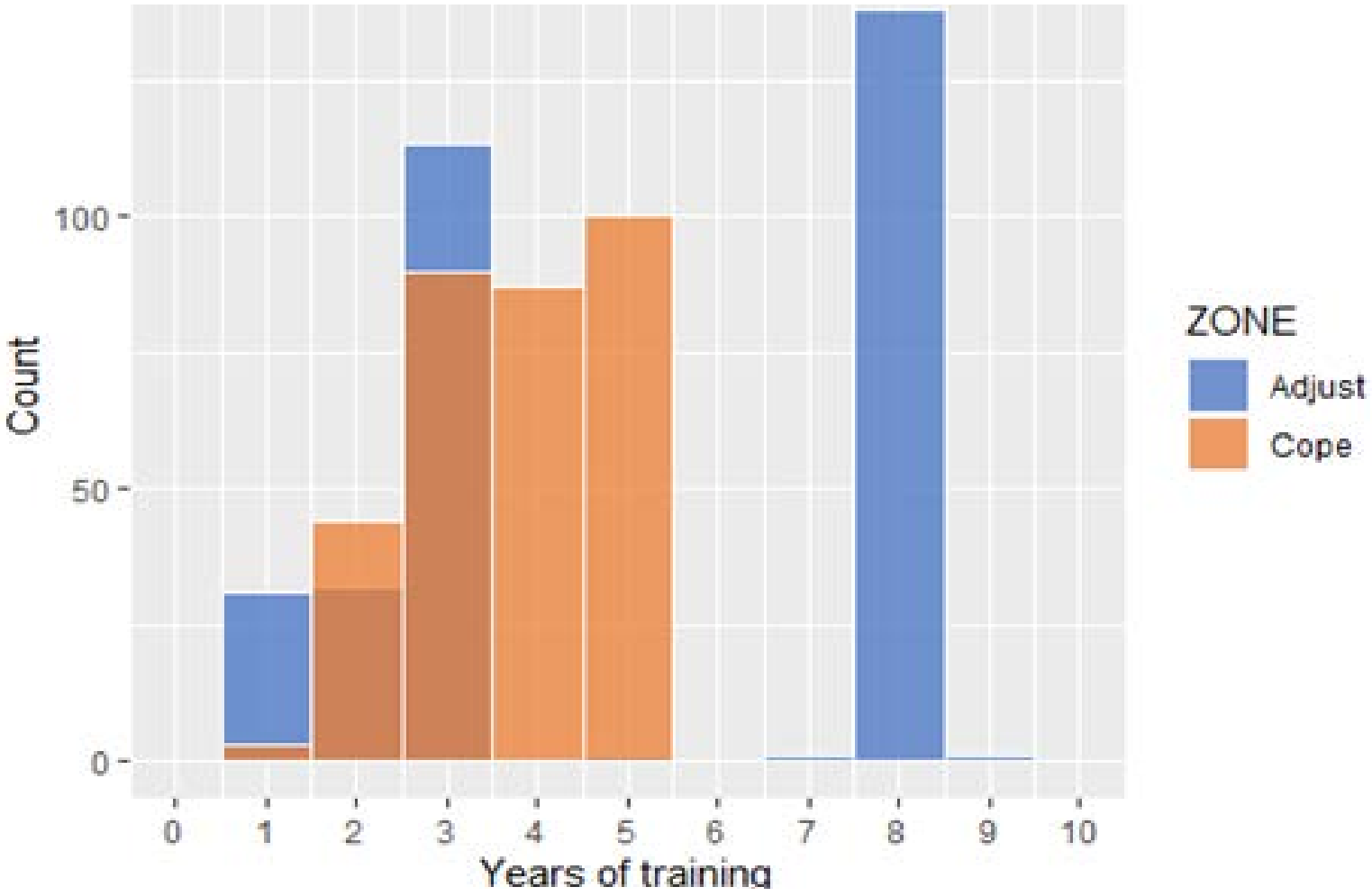


Figure 3: Overlayed frequency distribution of the fertilizer application rates kg/ha of Asaase Wure for the Adjust zone (blue) and the Cope zone (orange)

In table 18 and 19 the most popular fungicides and insecticides used are listed. In the Adjust zone, Nordox is a popular fungicide while in the cope zone, it is Ridomil, Ridomil Gold, Kocide and Fungikill that are broadly used. When it comes to insecticides Confidor, Akate Master and Aceta Star are the most important products. In the cope zone, insecticide use seems to be much higher. In example, in the cope zone 23.4% of farmers that indicated the use of pesticides use Confidor whereas in the Adjust zone only 12% make use of this product. This disparity

is also recorded for other insecticide products. The rather low percentages for the use of different pesticide products are due to the large number of different products that are used while only the 5 most important products are listed.

Table 18 Lists the most popular fungicides. First row: number of farmers that use the product, 2. Row: Percentage of farmers that indicated to apply pesticides use the given product.

	Zone		
Fungicide Product	**Adjust**	**Cope**	**Total**
Nordox	141	38	179
	(71.6)	**(6.8)**	**(22.5)**
Ridomil	5	41	46
	(2.5)	**(7.4)**	**(5.8)**
Ridomil Gold	0	37	37
	(0.0)	**(6.7)**	**(4.6)**
Kocide	0	33	33
	(0.0)	**(5.9)**	**(4.6)**
Fungikill	0	14	14
	(0.0)	**(2.5)**	**(1.8)**

Table 19 Lists the most popular insecticides. First row: number of farmers that use the product, 2. Row: Percentage of farmers that indicated to apply pesticides use the given product.

	Zone		
Insecticide product	Adjust	Cope	Total
Confidor	29	130	159
	(12.0)	(23.4)	(20.0)
Akate Master	4	123	127
	(4.5)	(22.2)	(16.0)
Aceta Star	2	118	120
	(1.6)	(21.3)	(15.0)
Galil	0	87	87
	(0.0)	**(15.7)**	**(10.1)**
Actara	11	52	63
	(0.0)	**(9.4)**	**(7.9)**

Farmers derive different benefits from the implementation of CSA. In Table 21, these results are summarized, showing that 60% of interviewed farmers report an increased yield, 44.3% less pest and disease, 50.8% improved bean quality, 37.6 % an improved environment and 23% increased climate resilience and adaptation. However, if farmers' benefits from the Adjust zone are compared to those in the Cope zone, it is observed that more farmers in the Cope zone derive benefits from CSA.

Table 20 Benefits derived from BMP/ CSA grouped by the adjust and the cope zone. First line: nominal count, Second line: column percentage of farmers that received training in BMP/ CSA and observe the benefits

Benefits from BMP/CSA Adjust	Zone		
	Cope	Total	
Yield increased	153	448	601
	(58.6)	**(73.1)**	**(68.8)**
Reduction in pest and disease	71	373	444
	(27.2)	**(60.8)**	**(50.8)**
Improved bean quality	125	384	509
	(47.9)	**(62.6)**	**(58.2)**
Improved environment	53	324	377
	(20.3)	**(52.9)**	**(43.1)**
Resilience and adaption to climate change	72	158	230
	(27.6)	**(25.8)**	**(26.3)**

Voluntary standards

93 % of the interviewed farmers have been trained or are still undergoing some form of training in voluntary Standards (see Table 22). In the Adjust zone 314 farmers (95.7%) are part of the UTZ certification schemes and 6 farmers participate in the UTZ-Rainforest Alliance scheme, while in the Cope zone UTZ and UTZ-Rainforest Alliance are joined by 325 (48.2%) and 287 (42.6%) farmers respectively. In average farmers have received training through the certification scheme since 4.9 and 3.8 years in the adjust and cope zone respectively. The distribution of the years of training is depicted in Figure 4.

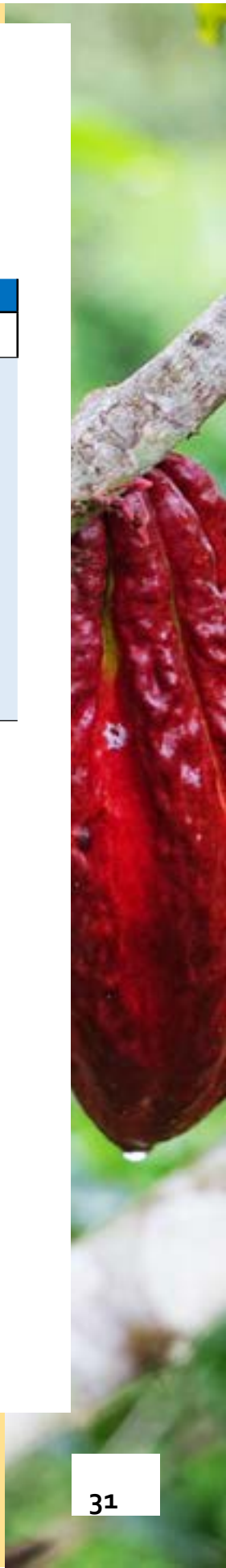


Table 21 Certification Standards interviewed farmers have joined. First line: nominal count, Second line column percentage of farmers that are part of an certification scheme

Certification standard Adjust	Zone		
	Cope	Total	
UTZ	314	325	639
	(95.7)	(48.2)	
UTZ-Rainforest Alliance	6	287	293
	(1.8)	(42.6)	
Total (UTZ + UTZ-RA	320	612	932
	(97.5)	(90.8)	

Figure 4 Overlayed frequency distribution of the years of training farmers have received under their certification scheme in the Adjust (blue) and the Cope (orange) zone.

84 % of farmers that have received price premium, received an amount between 100 and 500 Ghanaian Cedis (GHS) for their entire yield (see figure 5). The other 16% received higher premiums, not shown in figure 5 as they are considered as outliers. The average price premium a farmer received was 130 GHC and 329 GHC in the adjust and cope zone, respectively. It should be noted that in the Adjust zone the proportion of farmers that did not receive any premium was much higher as compared to the cope zone. Nevertheless, 90% of farmers in the adjust- and 99.9% of farmers in the cope zone find the certification beneficial and 99.7% of all farmers interviewed would recommend their certification scheme to other farmers.

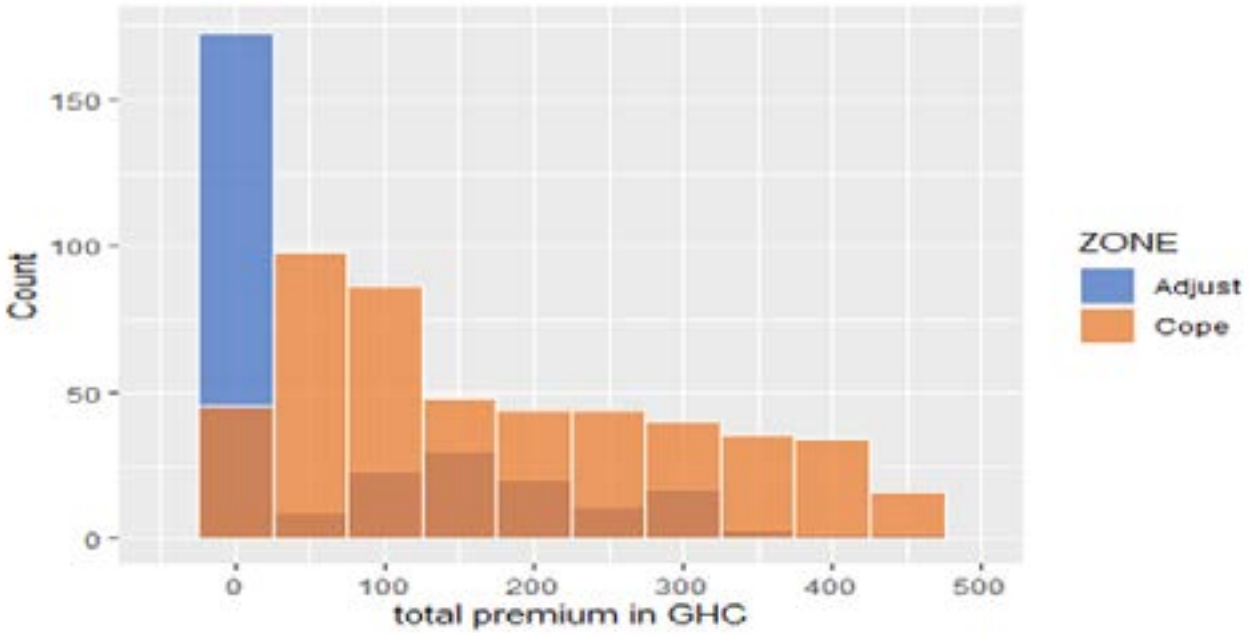
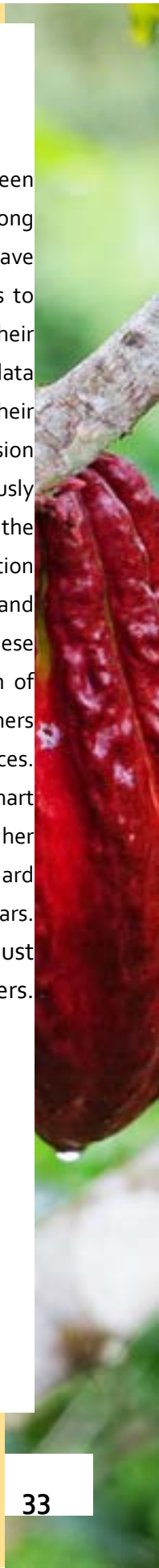


Figure 5 Overlayed frequency distribution of the total price premium farmers became for their entire yield in the Adjust (blue) and the Cope (orange) zone.

Conclusion

The average cocoa farmer of the survey was about 50 years old, was married, was part of a household between 4 and 7 members. All education levels from no education to senior high school education were present among the surveyed farmers, with a few possessing university degrees. Generally, farmers from the adjust zone have attained higher education compared to the cope zone. Most farmers reported having had timely access to weather information and most of them further indicated that access to weather data positively impacts their farming mainly because it enabled better farm planning. Farmers also stated that the access to weather data increased their yield and reduced pest incidences. However, a similar number of farmers also stated that their yield decreased during the last year, despite access to weather data. For most farmers (≈80%) radio or television is the best medium to receive weather data. The results of this study show that most farmers have previously received training on best management practices or climate smart agriculture, 80% in the adjust and 91% in the cope zone. This finding is probably attributed to the fact that most farmers are part of a voluntary certification standard which include farmer trainings. Practices such as pruning, weeding and cultural management and pesticide application are very prevalent among the surveyed farmers, as over 90% of farmers engaged in these activities. Nonetheless, adoption of fertility management is low in the Adjust and Cope zone. Adoption of fertilizer application practices was high among farmers in the two zones. About 58 % percent of the farmers in the Adjust zones had adopted, 73% of farmers in the cope zone adopting fertilizer application practices. The farmers in the cope zone report more frequently that the best management practices and climate smart agriculture is resulting in benefits for their farm. For example, 73.1% of farmers in the cope zone recorded higher yields whereas in the adjust zone only 58.6%. The 93% of farmers that joined a voluntary certification standard are either part of UTZ or UTZ-Rainforest alliance and have received some form of training in the last 1 to 8 years. Although, farmers in the cope zone received on average higher premiums compared to farmers in the adjust zone, almost all farmers find the certification scheme beneficial and would recommend it to others.



References

Adansi South District Assembly profile. Retrieved from http://www.ghanadistricts.com on 05/06/2021

Atwima Mponua District Assembly profile. Retrieved from http://www.ghanadistricts.com on 05/06/2021

Bibiani-Anhwiaso Bekwai Municipal Assembly profile. Retrieved from http://www.ghanadistricts.com on 05/06/2021

Juaboso District Assembly profile. Retrieved from http://www.ghanadistricts.com on 05/06/2021

Sefwi Wiawso Municipal Assembly profile. Retrieved from http://www.ghanadistricts.com on 05/06/2021

CGIAR RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security CCAFS

CONTACT

CCAFS Cocoa Team

+233303931023

Mustapha Dalaa
M.Dalaa@cgiar.org

RichKofiKofituo
R.Kofituo@cgiar.org

RichardAsare
R.Asare@cgiar.org