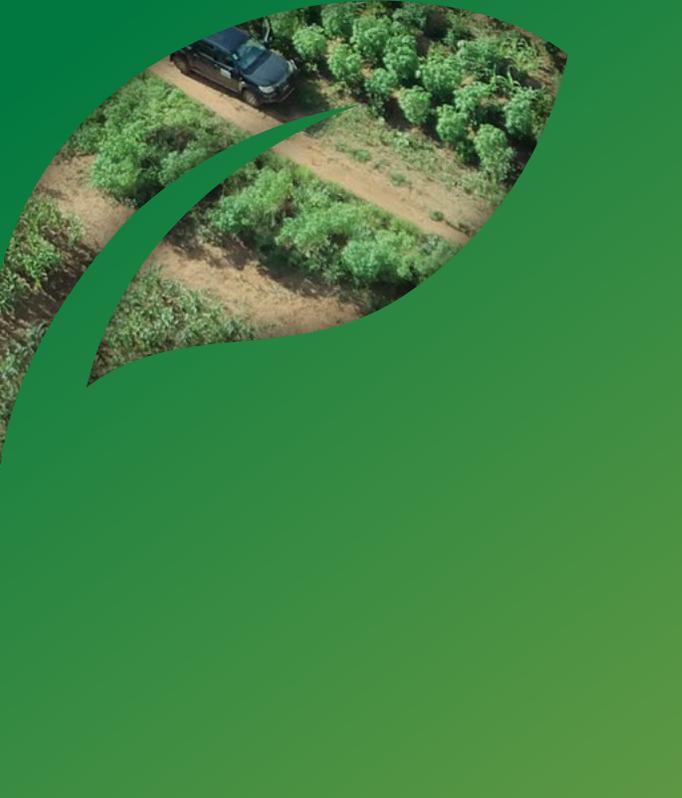




FERTILIZER CANADA



# 4R CHAMPION PROGRAM

4-H GHANA CASE STUDY REPORT

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**4R** ..... Right Source, Right Rate, Right Place, and Right Time

**APNI** ..... African Plant Nutrition Institute

**GAC** ..... Global Affairs Canada

**GES** ..... Ghana Education Service

**GSS** ..... Ghana Statistical Service

**MoFA** ..... Ministry of Food and Agriculture

**NSP** ..... Nutrient Stewardship Project

**SEND Ghana** ..... Social Enterprise Development Foundation of Ghana

**PYD** ..... Positive Youth Development



This case study report describes the Champion Program that was managed by 4-H Ghana and financed by Fertilizer Canada under the auspices of the 4R Nutrient Stewardship Project (NSP), which is being implemented in Ghana and two other African countries. A Positive Youth Development (PYD) non-profit organization, 4-H Ghana promotes agriculture, livelihood, and lifeskills among young people aged 12–20 years. By actively engaging young people on topical issues that affect their development, the PYD concept endorses youth empowerment. These young people are empowered after they agree to form or join 4-H clubs and accept to practically learn agricultural practices and other life skills in schools and communities. The clubs are guided by an Adult Leader or Volunteer in their project activities.

Given this background of 4-H Ghana, the main goal of the Champion Program was to expose male and female students or Club Members, their advisors (i.e., farmers), and parents to the concept of 4R soil nutrient solutions.

The 4R concept is based on the principle of using the Right Source of soil nutrients, applied at the Right Rate, in the Right Place, and at the Right Time. To address a key crop productivity constraint of declining soil fertility that will likely worsen in the future if not mitigated, the Champion Program sought to provide an avenue to expose current farmers, but much more importantly, future farmers (i.e., the youth), to the environmental and economic benefits of 4R. The beneficiaries of the Champion Program were learned how to: (i) use the Right Source of nutrients for various crops; (ii) apply these nutrients at the right rate based on specific nutrient requirements for each crop; (iii) ensure that the applied nutrients are supplied to the crop at the right place for enhanced uptake and minimal losses based on the cropping systems requirements; and (iv) ensure that the plant nutrients are supplied at the right time in line with specific crop nutrient uptake demands.





Under the Champion Program, beneficiary male and female students had the option to participate in one of three schemes: an in-field application where Club Members conduct a micro project to apply the 4R principles; youth-to-youth educational videos where Club Members record videos to explain the 4R principles; or an essay contest where Club Members submit an essay of 1000–1200 words around the concept of 4R. All Club Advisors and some Club Members undertook a short eLearning Course on the essentials of 4R, while male and female parents of the Club Members were exposed to the principles of 4R through farmer field days. The Champion Program was implemented from April to December 2021.



Following the implementation of the Champion Program, a key question that arose was: to what extent has the Program achieved its intended outcome? To answer this question, a multi-site case study assessment of the Program was conducted in August 2022 in all the regions of Ghana where the Program was implemented—namely, the Northern, Eastern and Central regions. The Evaluation Team relied on focus group discussions and key informant interviews to collect data from all stakeholders of the Program, which include implementers (i.e., staff of 4-H Ghana), Club Members, and their partners (i.e., Club Advisors or staff of the Ministry of Food and Agriculture, MoFA, Ghana Education Service, GES, farmers) or parents.



Beneficiaries who participated directly in the Program across the three intervention regions include: 2,084 Club Members (1,023 women and 1,061 men); 70 Club Advisors (15 women and 55 men); 1,415 farmers (500 women and 915 men); 3 staff from the Ministry of Food and Agriculture (1 woman and 2 men); 11 representatives from Ghana Education Service (5 women and 6 men); and 6 staff from 4-H Ghana (2 women and 4 men). During the 2021 farmers day celebrations, three beneficiary schools were recognized as the best agricultural schools in their respective regions.

Analyses of the case study data (Figure 1) show that the 4R Champion Program has improved the group dynamics of beneficiary school clubs, where students feel more proud to engage in agriculture and have a higher sense of value and networking. The Program also resulted in Club Advisors and parents engaging more in the activities of Club Members. All three (3) stakeholders (Club Members, Advisors and Parents)

now have a better appreciation and understanding of the economic and environmental benefits of the 4R concept. Given the substantial yields that they obtained from their micro projects, Club Members have also expressed their willingness to both engage in agriculture as a fulltime occupation, and adopt the 4R principles when they complete school.

**Figure 1: Outcomes of the Champion Program**

### **BETTER UNDERSTANDING OF THE 4R PRINCIPLES**

Club Members, Club Advisors (i.e., staff of GES and MoFA) and parents/farmers now have a better appreciation of why they need to use the Right Source of soil nutrients, applied at the Right Rate, in the Right Place, and at the Right Time.

### **IMPROVED GROUP DYNAMICS**

Club Members have learnt how to interact and behave in a group environment in order to facilitate the achievement of common goals.



## **Outcomes of the Champion Program**

### **GROWTH IN STUDENT NETWORK**

Club Members, Club Advisors, and farmers have developed valuable networks that they can use to improve their knowledge, work and wellbeing.

### **ENHANCED PARENTAL ENGAGEMENT**

Parents got the opportunity to interact with Club Advisors and their wards, and got to learn about their wards' academic progress and their practical knowledge they were acquiring on the 4R principles.

# 1.0 Introduction



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## 1.1 History of the 4R Program

The agricultural sector plays a vital role in the economy of Ghana. The majority of Ghanaians undertake agriculture on a smallholder basis, which is often characterized by low use of technology, low productivity and low income. Unfavourable climatic conditions, poor soil health and declining soil fertility are important drivers of low crop productivity in Ghana—especially in the northern parts of the country where the soils are marginal. The binding constraint of poor soil fertility indicates an urgent need to implement measures that can sustainably increase food security and reduce persistent poverty. In the absence of any significant intervention (for example, a green revolution), the food insecurity situation in Ghana in general and particularly northern Ghana, where poverty is widespread, will likely get worse as the population of the country continues to grow considerably. Fortunately, there are already proven technologies and practices that can help agriculturists address these constraints. However, it appears there has always been a gap between the level at which technologies and improved practices are developed and the level at which they are applied. Regardless of this gap, proven innovations can still play an important role if they can be made more widely available.

It is in this context that Fertilizer Canada, Cooperative Development Foundation of Canada, and the African Plant Nutrition Institute are implementing a 5.5-year project titled “the 4R Nutrient Stewardship Project (4R-NSP)”. Funded largely by Global Affairs Canada (GAC), the Project aims to improve the agricultural productivity and socio-economic wellbeing of 80,000 smallholder, vulnerable and poor Africans (the majority of whom are usually women, the aged and children) in three developing countries including Ghana. Beyond productivity, the Project seeks to improve gender equity and environmental resilience.

Premised on efficient use of fertilizer based on the 4R principles of Right Source, Right Rate, Right Time and Right Place, the Project was launched in Ghana in 2019 with the Co-operative Development Foundation of Canada as the lead implementing partner responsible for initiating relevant partnerships, providing logistical support, and identifying project sites and crops. The role of the African Plant Nutrition Institute (APNI) is to work with national partners to provide technical support for the Project. The national partners in Ghana are: Social Enterprise Development Foundation (SEND Ghana), which is responsible for the day-to-day implementation of the Project, and the Savanna Agricultural Research Institute (of the Council for Scientific and Industrial Research), which is tasked with providing on-ground technical support to the Project. The involvement of the two national partners will ensure that the 4R principles will be sustained after the exit of the Project.

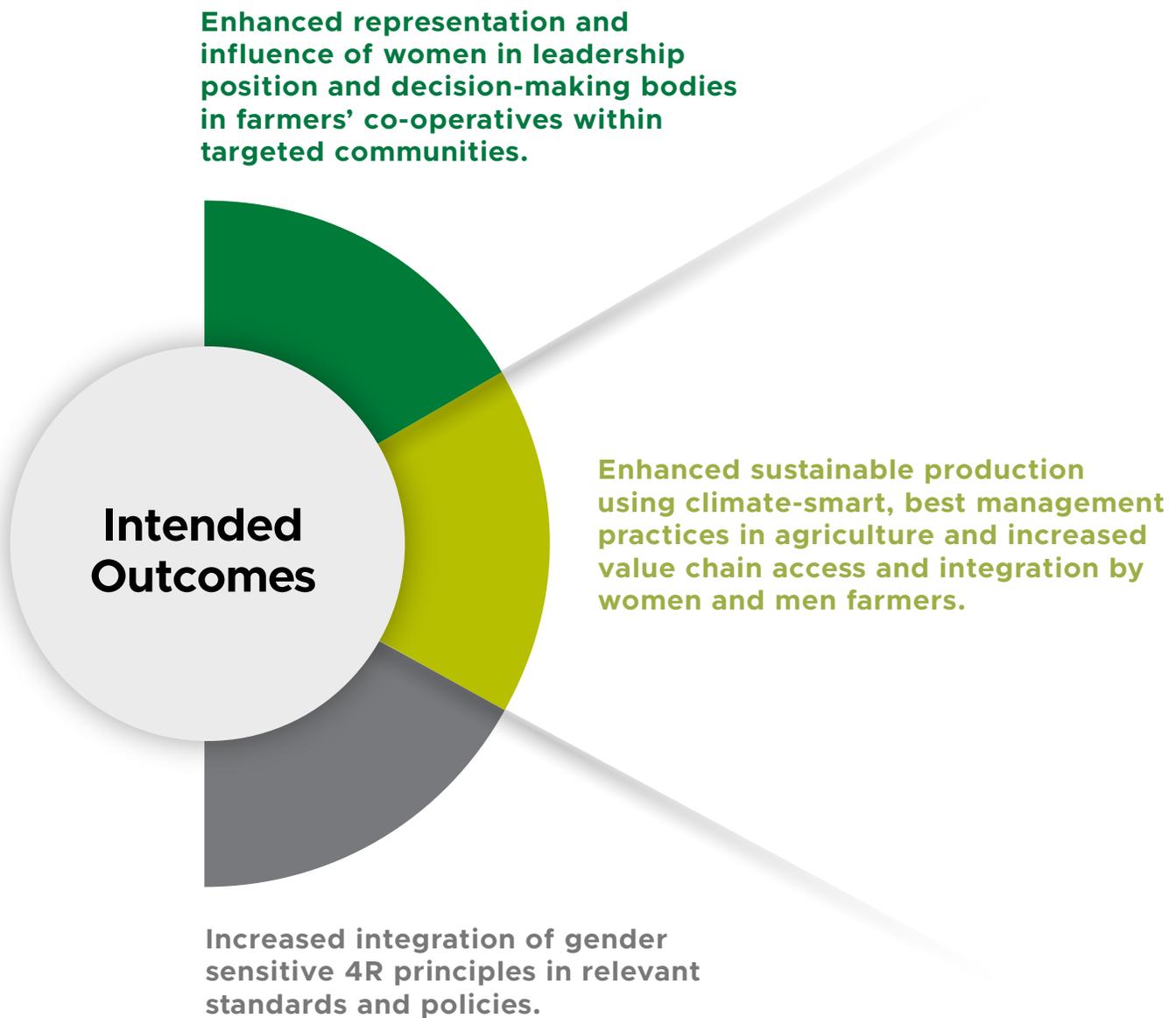
Following the launch of the Project in 2019, actual field work began in 2020 with the establishment of multiple gender-sensitive on-farm demonstration and learning sites based on the 4R principles or protocols. The aim of the demonstration and learning sites was to expose men and women farmers and extension agents to the practical performance of the 4R principles for subsequent adoption. Establishment of the 4R demonstration and learning sites along gender-sensitive lines is particularly important since women farmers in many Ghanaian communities produce on poorer soils and have limited access to production resources.

In addition to demonstrations, the Project is implementing gender equity and women's economic empowerment activities as well as building the capacity of farmer cooperatives to deliver services (such as inputs, credit, mechanization, post-harvest storage and

marketing) to their members. One key result area of the Project is to increase the integration of gender-sensitive 4R principles in relevant standards and policies (globally and nationally). To advance this, the Project, with leadership from Fertilizer

Canada, designed and implemented the 4R Champion Program. The 4R-NSP activities are all intended to achieve three main outcomes (Figure 2):

**Figure 2:** Outcomes of the 4R-NSP



## 1.2 Design of the 4R Champion Program

As parts of efforts to promote the principles of 4R, Fertilizer Canada provided a grant to 4-H-Ghana to implement the 4R Champion Program at 50 sites in the country. The purpose of the grant was to enable 4-H-Ghana to train students and its clubs on the concept of 4R and carry out micro projects based on the 4Rs. The Champion Program was intended to expose 1,500 male and female youth (i.e., 4-H Club Members) and 50 Club Advisors to 4R and best crop management practices. In addition, the Champion Program sought to expose 1,200 men and women smallholder farmers (or the parents of 4-H Club Members) to the benefits of the 4Rs through farmer field days.

The 4R Champion Program was organized around three schemes, and the 4-H clubs could select one (Figure 3).

Each club is supervised by an Advisor. All Club Advisors and some Club Members were also expected to undertake a short eLearning Course on the essentials of 4R. The duration of the

entire Champion Program was April to December 2021. The process began with 4-H Ghana requesting for school clubs to express their interest to participate in the Champion Program by filling an application form, after which 50 clubs were selected to benefit from the program. All the selected clubs were then assisted to develop implementation plans around the 4R concept. At the beginning of the implementation phase, the advisors of the selected clubs and Agricultural Extension Agents of the Departments of Agriculture that operate in the Champion Program areas participated in a 4R trainers' workshop. 4-H Ghana then provided resources to help the clubs undertake their respective micro projects. For the essay competition, a committee was put in place to assess and rate the submissions. For the in-field applications, farmer field days were held to expose farmers or parents of the Club Members to the benefits of 4R. Beneficiaries of the program were encouraged to share the knowledge gained with their peers. 4-H Ghana also publicised the Program on social media platforms.

**Figure 3:** Options available for 4-H Clubs to choose

01

**In-field application where Club Members conduct a micro project to apply the 4R principles.**

02

**Youth-to-youth educational videos where Club Members record videos to explain the 4R principles.**

03

**Essay contest where Club Members submit an essay of 1000–1200 words around the concept of 4R.**





The purpose of this report is to present key findings from a multi-site case study of the Champion Program. The case study seeks to answer four key evaluation questions (Figure 4):

**Figure 4:** Evaluation questions

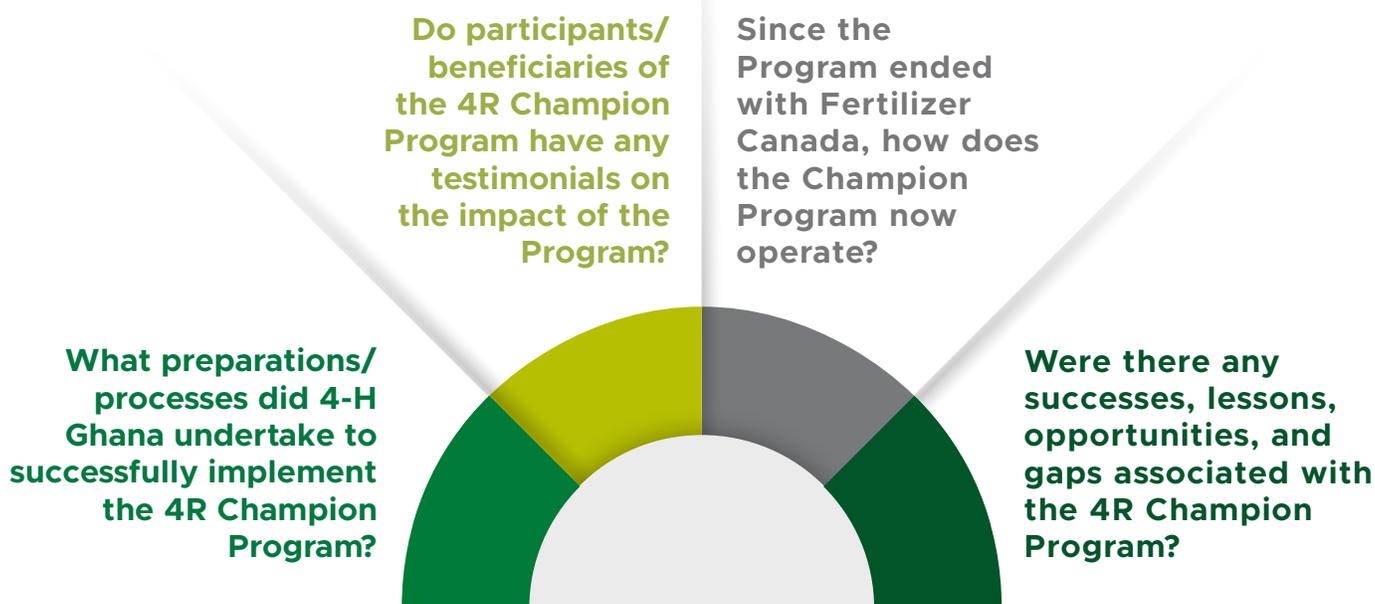
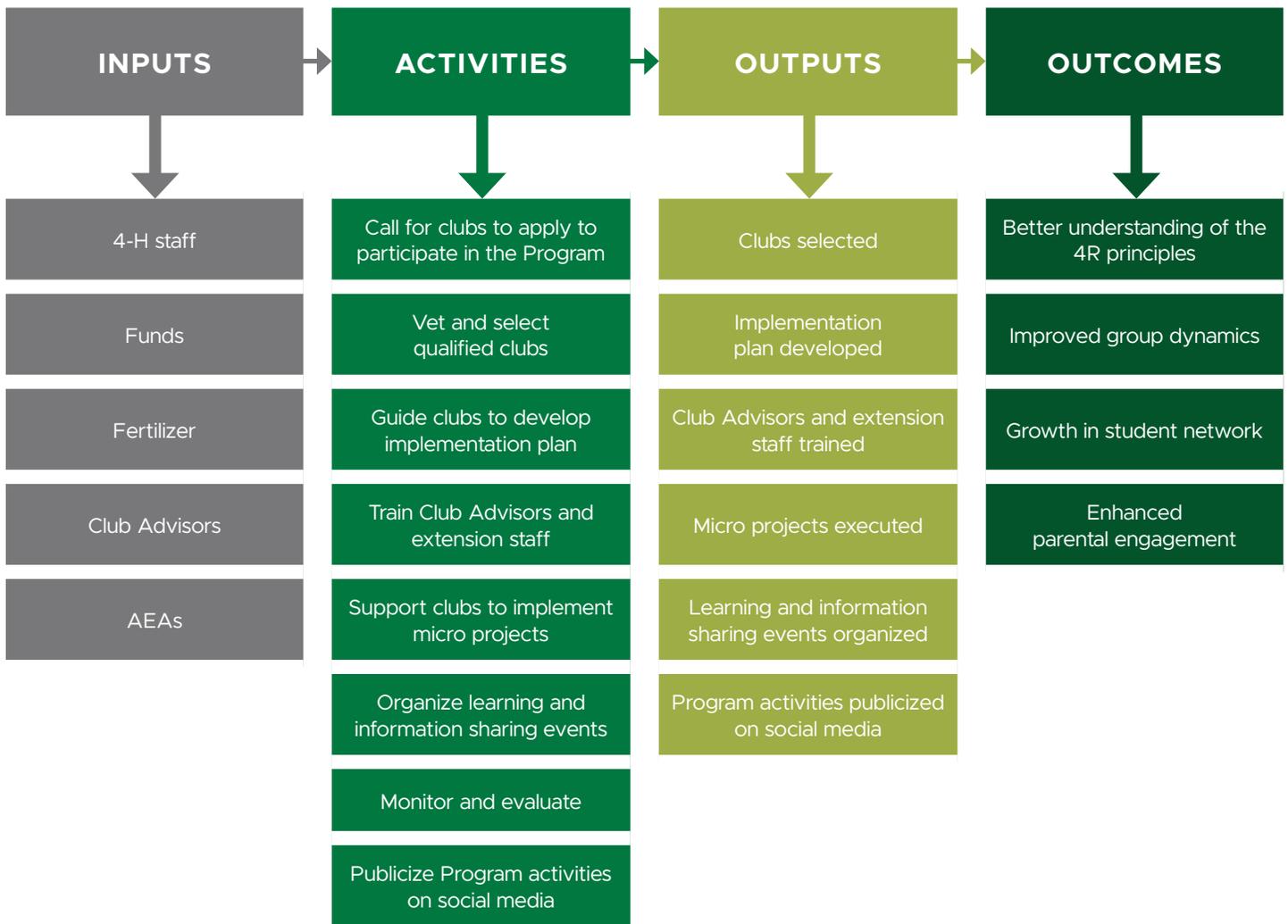




Figure 5 shows the impact pathway for the Champion Program. The figure outlines the inputs of the Program and the corresponding activities, outputs and expected outcomes.

**Figure 5:** Impact pathway of the Champion Program



A case study approach was employed to assess the 4-H Champion Program in Ghana. To generate data for analysis, both qualitative and quantitative approaches were used. The Evaluation Team interviewed beneficiaries from all the project sites in Northern, Eastern and Central regions of Ghana. This allowed for the Team to get different perspectives from the diverse agro-ecological zones of the intervention area.

The Evaluation Team used a two-stage approach to identify respondents for enumeration. In the first stage, beneficiaries were grouped into three main strata based on their level of participation in the Program. The three strata were: program implementers (i.e., staff of 4-H Ghana); Club Members; and partners (i.e., Club Advisors, staff of MoFA and GES, farmers) or parents. The Evaluation Team developed a separate interview guide for each of these categories of respondents as presented in Appendix 1. The guide solicited information on demographic characteristics of respondents, knowledge, attitudes and perceptions of the 4R principles, club activities and leadership, post training activities, among others. The Evaluation Team then relied on both key informant interviews and focus group discussions to elicit information from respondents. Deliberate efforts were made to interview women respondents for each of the three strata of Program stakeholders. Three teams were created to collect the data, with each team responsible for interviewing respondents in a region of Ghana: Northern, Eastern and Central. All respondents provided informed consent prior to the start of each interview. A total of 14 clubs (represented by 12 male and 20 female Club Members), 12 farmers (10 men and 2 women), 3 male staff of GES, 1 male staff of MoFA and 6 staff of 4-H Ghana (4 men and 2 women) were successfully interviewed. The field work was conducted in August 2022.

The primary data that was collected was complemented by an extensive desk review of the Champion Program documents, the literature on 4R and a profile of the Program intervention areas. The primary data is presented as Appendix 2.

## 2.1 Overview of Intervention Regions

The Champion Program was implemented in the New Juaben South, Okere, Fantekwa North, Upper Manya Krobo, Akuapem North, Suhum and Nsawam Adoagyiri districts of the Eastern Region, Abura Asebu Kwamankese District of the Central Region and then Tamale, Savelugu, Tolon and Kumbungu districts of the Northern Region.

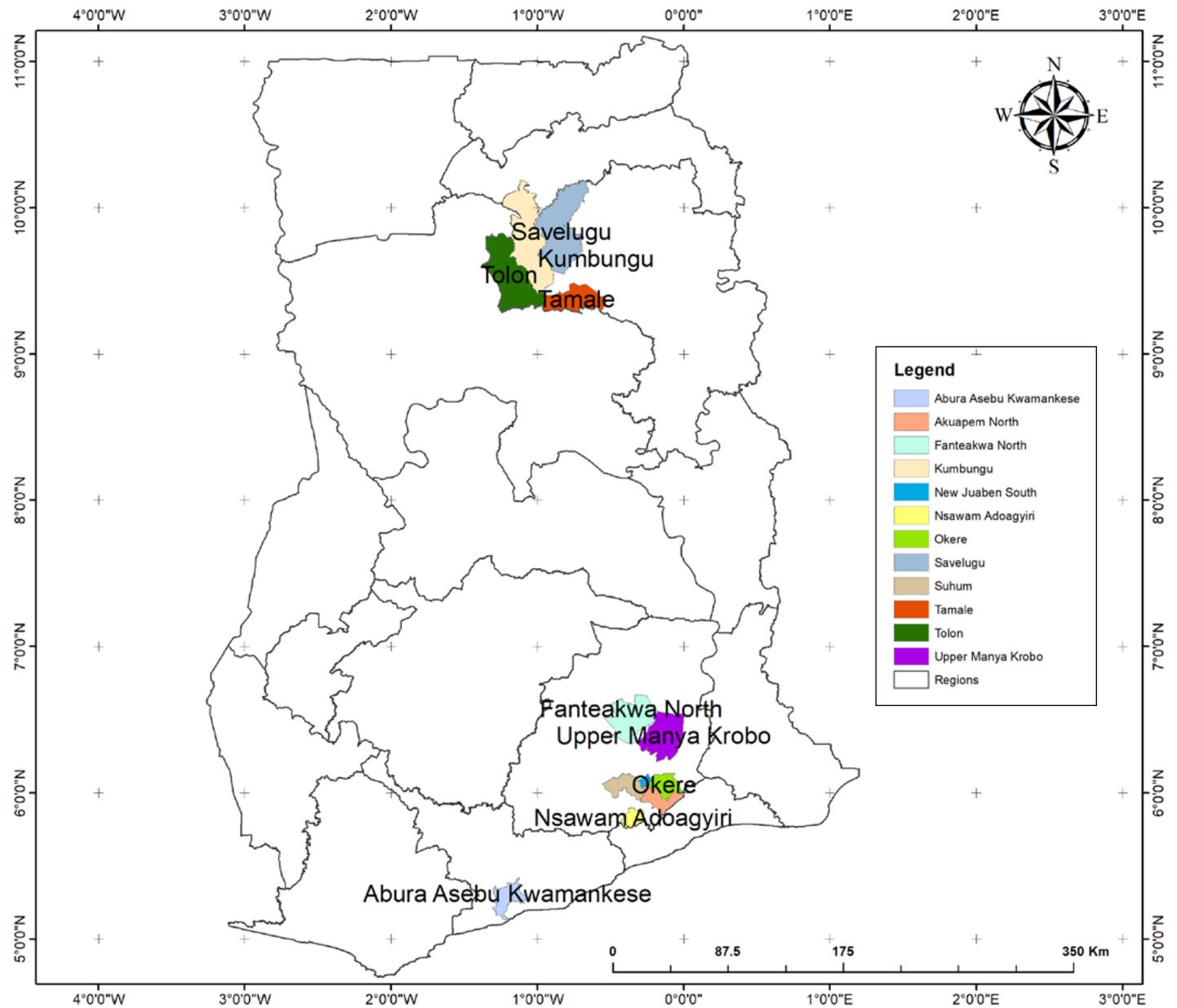
The climate of the Northern Region is relatively dry, with a single rainy season that begins in May and ends in October. The amount of rainfall recorded annually varies between 750 mm and 1,050 mm. Maximum temperature occurs towards the end of the dry season around March while minimum temperature occurs around December. The harmattan winds, which occur from December to early February, have a considerable effect on the Region's temperatures, making them vary between 14oC at night and 40oC during the day. Humidity is very low, aggravating the effect of the daytime heat. The harsh climatic conditions in the Region has an adverse effect on economic activity. The main vegetation in the Northern Region is grassland, interspersed with guinea savannah woodland, which is characterised by drought-resistant trees such as acacia, (*Acacia longifolia*), mango (*Mangifera*), baobab (*Adansonia digitata*), shea nut (*Vitellaria paradoxa*), dawadawa (*Parkia biglobosa*), and neem (*Azadirachta indica*). The majority of the people in the Northern Region engage in agriculture and produce crops such as yam, maize, rice, groundnuts, soybeans and cowpea (Ghana Statistical Service, GSS, 2013a).

Unlike the Northern Region, the rainfall pattern in the Eastern Region is double maxima with two rainy seasons. Similar to the Northern Region, the economy of the Eastern Region is predominantly agrarian characterised by both subsistence and commercial production of food and cash crops. Cocoa is a major traditional cash crop produced in the region, and pineapple the main non-traditional commercially grown food crop (GSS, 2013b).

The Central Region lies within both the dry equatorial and moist semi-equatorial zones. Annual rainfall ranges from 1,000 mm along the coast to about 2000 mm in the interior. The wettest months are May-June and September-October, while the drier period occurs in December-February and briefly in August. Mean monthly temperature ranges from 24oC in the coolest month (August) to about 30oC in the hottest months (March-April).

Whereas the agroecology of the coast of the region is coastal savannah with grassland and few trees, the agroecology of the inland areas is mostly semi-deciduous forest. Much of the original dense forest vegetation has been cleared for the cultivation of cocoa and oil palm. Figure 6 presents the map of Ghana with the intervention areas highlighted for ease of reference (GSS, 2013c).

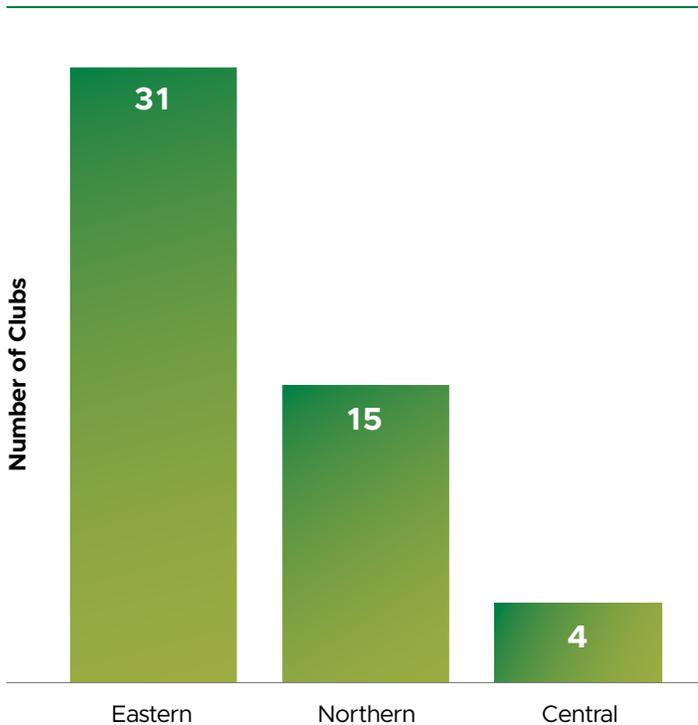
**Figure 6:** Map of Ghana with intervention areas highlighted



## 3.1 Coverage and Reach

The case study data showed that the beneficiaries who participated directly in the Program across the three intervention regions were 2,084 Club Members (1,023 women and 1,061 men), 70 Club Advisors (15 women and 55 men), 1,415 farmers (500 women and 915 men), 3 staff from the Ministry of Food and Agriculture (1 woman and 2 men), 11 representatives from Ghana Education Service (5 women and 6 men) and 6 staff from 4-H Ghana (2 women and 4 men). Figure 7 presents the distribution of the clubs that participated in the Champion Program disaggregated by region. The data shows that the Eastern Region, the Head Office of 4-H Ghana, had the highest number of clubs with the Central Region having the lowest number of clubs. The crops that were produced as part of the micro project of the various clubs include tomato, carrot, sweet pepper, okra, cucumber, lettuce, cabbage, onion, sweet potato, cowpea, maize, rice and millet.

**Figure 7:** Distribution of beneficiary clubs by region



To promote gender equality and women’s economic empowerment, the Program made deliberate efforts to train equal numbers of young men and women as shown in Figure 8. In the case of the Northern Region, the data shows that the Program built the capacity of an additional 33 young women when compared to young men. This is particularly commendable given that women in the region tend to have less access to productive resources and technical information due to the patrilineal and patrilocal nature of the communities in northern Ghana.

**Figure 8:** Regional distribution of club membership by sex

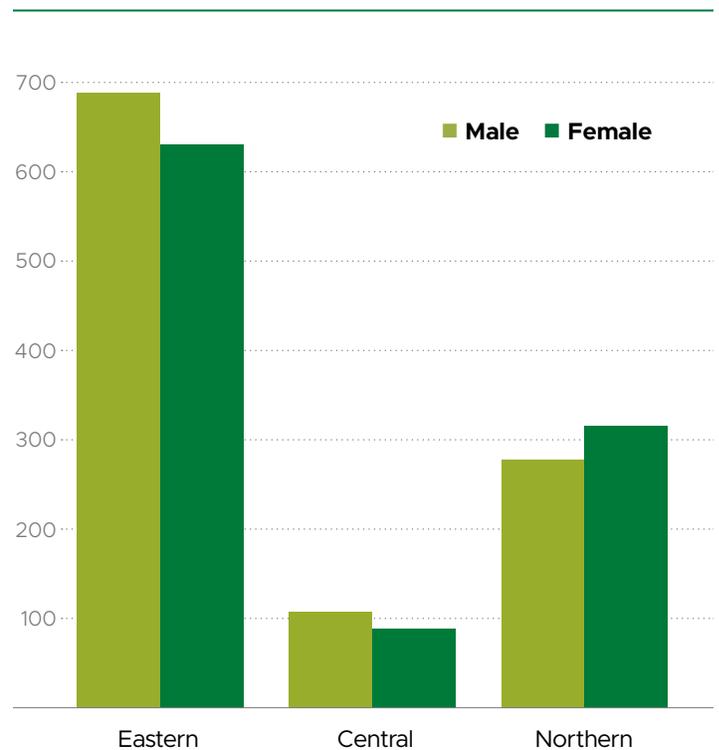
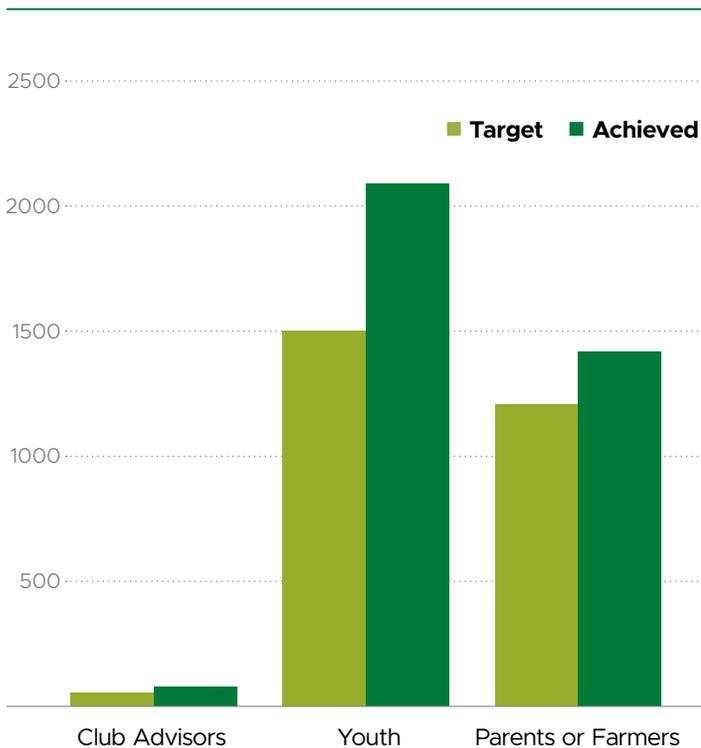


Figure 9 shows that the Program exceeded its target in terms of reach. The Program built the capacity of an additional 20 Club Advisors, 584 youth and 215 farmers than targeted. The extra achievements of the Program was primarily due to the higher level of interest that the additional participants expressed in partaking in the 4R Champion Program.

**Figure 9: Program targets matched with achievement**



### 3.2 Feedback from 4-H Ghana

The lead organization that implemented the Champion Program was 4-H Ghana. 4-H Ghana was selected to implement the Champion Program because of their experience in working with the youth and knowledge in agriculture. In implementing the Champion Program, 4-H Ghana selected and organized the participating clubs, coordinated the clubs' activities throughout the process, received and delivered the grant from Fertilizer Canada, developed an outcome reporting structure for club activities, and collected and collated the information for submission to Fertilizer Canada.

For school clubs that participated in the Essay Competition, 4-H Ghana worked with the Club Advisors to provide reading materials to prepare to structure and write the essay. This boosted the confidence of the students and taught them valuable cooperation and presentation skills. Appendix 3 presents some of the essays that the clubs wrote.

For the in-field application micro projects, 4-H Ghana, with support from the Department of Agriculture (of the Ministry of Food and Agriculture), supervised the clubs to help establish the gardens based on the 4R principles. To implement the clubs' micro projects, 4-H Ghana, with funding from Fertilizer Canada, provided each club with 50kg of inorganic fertilizer and cash support (CAD500).

By administering nutrients required and obtained from the right source, applied at the right rates (usually, 5 grams per plant), at the right time of plant growth, and at the right place (5 cm away from the plant so that the roots can easily absorb them), the clubs nurtured their crops to maturity. The Department of Agriculture was tasked with facilitating the farmer field days, which were held to expose parents of the club members to the principles of 4Rs.

To further facilitate the dissemination of information on the 4R principles from the perspective of the young men and women engaged in the micro project, the clubs created Facebook accounts and uploaded content on YouTube to share their work. The clubs uploaded pictures and videos of their activities on their social media accounts. These pictures and videos covered activities such as land preparation, planting, weed control, fertilizer application, harvesting, among others. Below are links to some social media accounts:

f
**Adonsco 4-H Club**

▶
**4R Solution Project: Ghana Senior High**

▶
**4R Champion Program with 4-H Ghana**

All the staff of 4-H Ghana who participated in this case study indicated that the 4R principles lead to an improvement in soil fertility, crop yields and income. The knowledge and perceptions of the 4-H staff on 4R are presented in Table 1. The table shows that, when asked whether they were dissatisfied the implementation of the Champion Program, or whether they felt

that the trainer of trainers approach was not effective, more than 85% of the interviewed 4-H staff disagreed or strongly disagreed. All the staff sampled agreed or strongly agreed that 4R is a practical, cost effective technology that improves resilience to climate.

**Table 1: Knowledge and perceptions of 4-H staff on 4R**

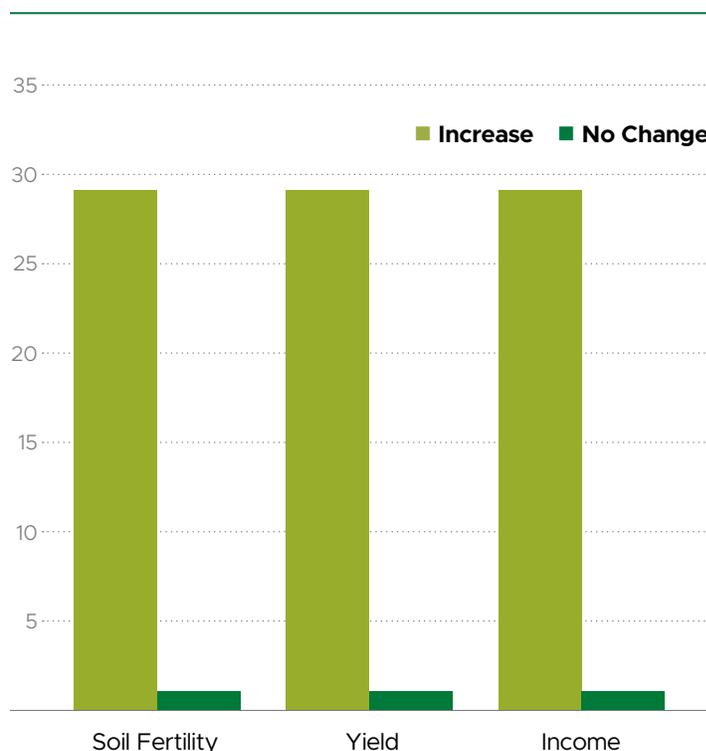
Variable (Percent)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Not satisfied with how the Champion Program was implemented	42.9	42.9	14.3	0	0
ToT was not an effective approach	71.4	14.3	0	0	14.3
4R is a practical technology for crop production	0	0	0	57.1	42.9
4R is cost effective	0	0	0	42.9	57.1
4R improves climate resilience	0	0	0	42.9	57.1

### 3.3 Feedback from Beneficiary Clubs

Analysis of the primary data that was collected shows that the average age of the Club Members who were sampled for the case study is 16 years with the youngest being 13 years and the oldest 18 years. Given that the Champion Program worked with basic and senior high schools, this age range was expected. Three beneficiary schools of the Program, namely Batanyaa Methodist School in the Central Region, and Bepose Methodist and Trom Nyerede Junior High schools in the Eastern Region, were awarded as the best agricultural schools during the 2021 farmers day celebrations held in their respective regions. Trom Nyerede Junior High School was also selected to exhibit their produce (obtained from the 4R micro project) as part of the farmers' day celebrations in the Eastern Region.

Nearly all the Club Members (97%) that participated in the case study reported that application of the 4R principles lead to an increase in soil fertility, higher crop yields and, ultimately, more income (Figure 10). The data shows that the yields obtained from the 4R micro projects were quite substantial. The Dagboshei AME Zion, for example, harvested 500Kg of maize from their 0.20Ha micro project.

**Figure 10: Influence of 4R on farm outcomes**



## Students of Tamale Islamic School grow vegetables to feed everyone in the school

Prior to their participation in the Champion Program, the output from the Tamale Islamic school in the Northern Region was not adequate to feed the entire school. However, the school club was able to produce rosette to feed the whole school when they participated in the 4R micro project. Pupils from nearby primary schools were invited to the school farm during harvest to arouse their interest in farming. Members of the club and the Club Advisor were determined to surmount all challenges and implement the 4R principles given the economic and environmental benefits associated with the concept. The club was initially confronted with the challenge of finding adequate water supply to irrigate their micro project during the dry season. This caused inconveniences and affected the students who were the main caretakers of the farm. The Club Advisor then consulted the school head and acquired two poly-tanks to store water to irrigate the micro project. This notwithstanding, the challenge was not completely resolved so Club Members had to fetch water from the well of a nearby community to irrigate their micro project. Thankfully, their efforts were rewarded with the bumper harvest that they obtained.



## Application of the 4R principles leads to additional farm implements and club party

Students from Nana Oware Agyepong School in Eastern Region harvested 350kg of produce from their 0.2ha maize farm after applying the 4R principles. They were able to purchase additional farm implements and organize a party for Club Members from the revenue that they got from the sale of their farm produce. See Appendix 4 for anonymized testimonies on the impact of the Champion Program from the perspective of beneficiary students.



In addition to the tangible benefits that the Champion Program provided to the beneficiary clubs, the Program also provided several intangible benefits. The Program promoted peer learning as well as gender equality and empowerment. According to the case study data, since clubs were assisted to elect executives to run club affairs, the average number of elected executives was six with women forming nearly half of the number. The case study data also shows that 97% of the students sampled shared the 4R knowledge that they obtained from the micro projects with their colleagues and parents. Each beneficiary, on average, shared knowledge on 4R with five other people. All the beneficiary Club Members who were sampled for the case study indicated that they would be applying the 4R principles on their farms.

Table 2 presents feedback on the knowledge and perceptions of 4R expressed by the Club Members who were sampled for the case study. The majority of respondents (more than 66%) disagreed or strongly disagreed that: they were not satisfied with the way the Champion Program was implemented, the trainer of trainers approach was not effective, it is difficult to learn 4R, and they do not have the time and skills needed to implement 4R. The majority of respondents (more than 60%) agreed or strongly agreed that 4R: is a practical technology for crop production, is cost effective, and improves resilience to climate change.

**Table 2: Club Members' knowledge and perceptions of 4R**

Variable (Percent)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Not satisfied with how the Champion Program was implemented	46.7	40.0	3.3	6.7	3.3
ToT was not an effective approach	46.7	43.3	0	3.3	6.7
4R is a practical technology for crop production	0	0	0	16.7	83.3
It is difficult to learn 4R	33.3	60.0	0	6.7	0
I do not have the time and skills needed to implement 4R	13.3	53.3	0	30.0	3.3
4R is cost effective	3.3	10.0	0	40.0	46.7
4R improves climate resilience	0	20.0	20.0	53.3	6.7





**Table 3:** Club Members’ assessment of the challenges of the Champion Program

Variable (Percent)	Not a Problem at All	Minor Problem	Neutral	Serious Problem	Very Serious Problem
Animal encroachment	6.7	0	0	40.0	53.3
Pests and diseases	3.3	16.7	3.3	43.3	33.3
Poor weather	6.7	13.3	0	70.0	10.0
Poor storage	10.0	16.7	6.7	36.7	30.0
Weak market linkage	33.3	6.7	3.3	43.3	13.3



The Champion Program faced some challenges (Table 3). The Club Members interviewed mentioned animal encroachment, pests and disease, poor weather, poor storage and weak market linkage as the main challenges that they faced when they were implementing their micro projects. Addressing these challenges will tremendously enhance the performance of future micro projects.

# Success Story

## Augustina produces her first crop

Unlike a few pupils of Saint Augustine's Catholic School in Ayeldo (in the Abura Asebu Kwamankese District of the Central Region) who already had some knowledge on how to produce some staple crops, Miss Augustina Yaa Boadua Ofori-Atta, the School's 4-H Club Advisor had never cultivated a farm or backyard garden prior to the Champion Program. However, Augustina was able to successfully establish a maize farm around her home after participating in the Program. She now knows how to use the

right source of soil nutrients, applied at the right rate, in the right place, and at the right time. Beyond the practical knowledge in agriculture, Augustina has used the Champion Program to improve her communication and leadership skills. She has been able to keep the school club running after the end of the Program by selling farm produce from the club garden and reinvesting into the club activities.

### 3.4 Feedback from Facilitators and Farmers

The average age of farmers in the sampled data is 45 years. Table 4 presents a distribution of the level of education of the farmers that were interviewed. The data shows that a good proportion of farmers (25%) have never been to school. The data further shows that a typical farmer has 10 other household members and 21 years of farming experience. These descriptive statistics suggest that an average farmer can apply the 4R principles for up to two decades before retiring, with access to family labour not being a binding constraint. All the farmers sampled indicated that the 4R principles increase soil fertility, yield and income. Therefore, they all shared the knowledge that they got on 4R with their peers, with each farmer sharing the knowledge with 12 other farmers on average.

**Table 4:** Educational attainment of the sampled farmers

Variable	Frequency	Percent
No education	4	25.0
Basic	2	12.5
Senior High	1	6.3
Tertiary	5	31.3
Postgraduate	2	12.5
Islamic	2	12.5



Table 5 shows that more than 55% of the interviewed farmers disagreed or strongly disagreed: they are not satisfied with how the Champion Program was implemented, it is difficult to learn 4R, they have the resources to implement 4R, and they do not have the time and skills needed to implement 4R. This result clearly shows that farmers who have been exposed to the principles of 4R are willing to apply the concept if they have access to the resources required to implement it. More than 70% of the farmers interviewed agreed or strongly agreed that the traditional ways of improving soil fertility is not the best and that 4R is: a practical technology for crop production, cost effective, and improves resilience to climate change. About 94% of the farmers sampled indicated their willingness to continue to apply the 4R principles into the future. See Appendix 5 for anonymized testimonies on the impact of the Champion Program from the perspective of beneficiary farmers.



**Table 5: Farmers' knowledge and perceptions of 4R**

Variable (Percent)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Not satisfied with how the Champion Program was implemented	50.0	37.5	0	6.3	6.3
4R is a practical technology for crop production	6.3	0	0	12.5	81.3
It is difficult to learn 4R	37.5	25.0	0	25.0	12.5
I have the resources to implement 4R	6.3	50.0	6.3	25.0	12.5
I do not have the time and skills needed to implement 4R	18.8	56.3	12.5	12.5	0
Traditional ways of improving soil fertility is not good	6.3	12.5	6.3	50.0	25.0
4R is cost effective	18.8	6.3	0	37.5	37.5
4R improves climate resilience	0	12.5	12.5	62.5	12.5
Intend to use 4R in future	0	0	6.3	18.8	75.0

## 3.5 Beyond the Champion Program: Challenges, Lessons Learned and Sustainability

Application of the 4R principles resulted in very good crop yields from the micro projects. However, during the cropping season, the Program faced some challenges. After receiving the funds and commencing their micro project, some clubs had challenges accessing agro-inputs and taking care of their project during the holidays. Club Advisors were instrumental in assisting the clubs to surmount these challenges by procuring the inputs themselves and transporting them to the school. Some Club Advisors also took care of the micro projects when school was on break. Pests and diseases were another challenge that affected the micro projects. The 4-H Team worked with the Department of Agriculture to identify the type and dosage of pesticide to use. A difficult challenge arose out of the effects of the COVID-19 pandemic. Following the pandemic, there was increased pressure on the academic calendar with limited time for extra curricular activities such as working on a 4R micro project. Students were thus assisted to judiciously utilize the limited time that they had to work on their micro projects. To prevent encroachment from animals and minimize theft, the clubs had to spend additional time and money to fence their micro projects. Though not anticipated, this challenge needed to be addressed in order to show the clear benefits of the 4R principles. Other constraints that minimized the impact of the project included:

- Challenges with internet connectivity, which diminished the effectiveness of e-learning in remote areas.
- Transfer, leave and resignation of Club Advisors, which created a vacuum and negatively impacted the performance of affected clubs.

- The indirect involvement of farming communities or parents of club members, which meant farmers were only exposed to the concept of 4R but not assisted or empowered to address the resource constraints associated with using 4R principles. This limited the extent of adoption of 4R.
- Inadequate visits by 4-H Ghana, which reduced the motivation and learning of the clubs.
- Lack of storage facilities, which meant the clubs had to quickly dispose of their inputs and produce to avoid losses. The Program did not have a marketing component so not all the high yields obtained from the micro projects translated into high income.
- The perception that the 4R principles requires more time and effort than traditional practices, such as broadcasting of fertilizer. This perception was a disincentive for the adoption of 4R.
- Inability to provide complementary services such as exchange visits and tours of research institutions, which limited clubs to what they learnt in their schools.
- Lack of a Program component to support individual students to apply the knowledge gained on their personal farms, which limited adoption of the 4R principles.
- Lack of commitment by some club members, which reduced learning and the overall performance of some of the clubs.

### The Following Lessons can be Learned from the Champion Program:

**Regardless of age and sex, anyone with access to any size of land can apply and benefit economically from the 4R principles.**

**The next generation of producers become motivated to practice farming as a profession when they are exposed to the key principles of crop production and best management practices at an early age.**

**It is better to maximize scarce resources on a limited piece of land by applying the 4R principles than to produce sub optimally on a large piece of land.**

# The Champion Program

“The Champion Program has broadened my knowledge on how to mix and apply fertilizer without wasting it. I have learnt how to apply fertilizer without harming the environment. I now know that applying fertilizer at the right rate will prevent me from wasting fertilizer and by extension the scarce resources used to buy the fertilizer. Applying the right quantities of fertilizer and at the right place also assist in weed control since the weeds will not have access to unused fertilizer. Furthermore, applying too much fertilizer or not applying at the right place can lead to environmental pollution since excess fertilizer turns into carbon compounds when they evaporate. Leftover or used fertilizer also become rich in hydrogen ions which makes the soil acidic. Therefore, I have now learnt to apply the right rate of fertilizer by taking into consideration the nutrient requirement of the plant. I now know how to determine the nutrient lacking in the soil by

The Champion Program has revealed several lessons as espoused by implementers and beneficiaries of the Program. In the words of Laryea Calvin Nii of Adonten Senior High School in the Eastern Region:

carefully observing the growing plants. In addition to learning about the right rate and place, I now know the right time to apply fertilizer in terms of stage of growth and time of day. I now know that it is not right to apply fertilizer just before harvesting or under the rain or scorching sun due to problems of leaching and evaporation.

With all these knowledge that I acquired from my school's micro project, I have introduced my parents who are peasant farmers to the principles of 4R. My dad, who cultivates maize and cassava, produces his crop organically and is very sceptical about the use of fertilizer. He was of the opinion that consuming fertilizer-applied produce leads to illness. However, he now uses fertilizer and encourages his peers to do same after trying the 4R knowledge that I shared with him.”

Some measures were put in place by the Champion Program to ensure that the momentum generated by the Program did not wane with its exit. Therefore, the Program facilitated the formation of WhatsApp groups, where Club Members continued to engage after the exit of the Program. The school clubs are still in operation and continuing with their micro projects with

the help of their Club Advisors. They are also reinvesting the income gained during the Champion Program into their current micro project. The farmers who were exposed to the principles of 4R by the Program continue to contact Club Members, Club Advisors, and Staff of the Ministry of Food and Agriculture anytime the need arises.



# 4.0 Conclusion



The 8-month Champion Program which was implemented by 4-H Ghana with a grant from Fertilizer Canada under the 4R Nutrient Stewardship Project served as an opportunity to expose male and female youth organized in clubs, their parents, and Club Advisors to the concept of using the Right Source of soil nutrients, applied at the Right Rate, in the Right Place, and at the Right Time as an integrated principle. In partnership with the Ministry of Food and Agriculture (MoFA) and the Ghana Education Service (GES), the Program was implemented in the Northern, Eastern and Central regions of Ghana in the 2021 crop production season.

A multi-site case study of the beneficiary youth, parents and Club Advisors conducted in August 2022 shows that, in spite of the relatively short implementation period, the Program provided clear benefits, which produced a better understanding of the concept of 4R, improved group dynamics among the clubs, facilitated growth in the beneficiary network, and enhanced parental engagement. Therefore, the Program was able to accomplish its main objectives. Allowing male and female Club Members to either implement a micro farm project, record video,

or participate in an essay competition, based on the 4R principles, all while building the capacity of both Club Advisors and parents, was very relevant for the target groups and intervention areas. Application of the 4R principles to the micro projects resulted in substantial crop yields.

Going forward, applying the 4R principles to school farms on a wider scale will result in a situation where schools that provide meals for their students can rely on their own farm for all or a majority of their food needs. In the medium to long term, the outputs of the Champion Program will become evident as male and female Club Members complete school, take up agriculture as an occupation, and begin to implement the 4R principles on their farms. Exposure of female Club Members to the principles of 4R has the potential to close the crop productivity gap that exists between male and female farmers. The network of trained male and female Club Members and the collaboration with GES and MoFA provide an opportunity to promote and sustain the concept of 4R. The knowledge obtained will remain as a skilled asset.

In spite of the commendable performance of the Global Champion Program, a future program premised on a similar context can include activities around marketing and value chain linkages given that such linkages are important to facilitate the adoption and sustenance of the 4R principles. To make the clubs more attractive among students while boosting publicity, a future program could organize training sessions on campus and provide branded T-shirts (with caps) to Club Members. A future program can also organize education tours to research institutions as well as facilitate exchange visits between clubs to promote camaraderie and learning. Beyond club activities, a future program needs to put in mechanisms to monitor how the ideas being promoted at the club level are being implemented at the community level during vacation or after school. Program Implementers must continue to work with beneficiaries to implement their ideas or the knowledge gained on their personal projects. It may be worthwhile to form an alumni to serve both as a platform for continual engagement and as a pool of mentors for future beneficiaries of a similar program. This will improve networking while facilitating peer dissemination of information.

# References

**Ghana Statistical Service, GSS, (2013a).** 2010 Population and housing census. Regional Analytical Report: Northern Region, Accra, Ghana.

**Ghana Statistical Service, GSS, (2013b).** 2010 Population and housing census. Regional Analytical Report: Eastern Region, Accra, Ghana.

**Ghana Statistical Service, GSS, (2013c).** 2010 Population and housing census. Regional Analytical Report: Central Region, Accra, Ghana.



## Appendix 1: Data collection tools

- [FC 4-H Case Study Guide: Clubs](#)
- [FC 4-H Case Study Guide: Partner Farmers](#)
- [FC 4-H Case Study Guide: Project](#)

## Appendix 2: Primary data in STATA and Microsoft Excel

- [Club Guide](#)
- [Farmer Guide](#)
- [Project Guide](#)

## Appendix 3: Students' essays on 4R

- [4-H Club Essay](#)
- [4-H Club Essay](#)
- [Twumguaso 4-H Club 4R Essay](#)
- [What 4R Means to Me](#)

## Appendix 4: Students' testimonies on the impact of the Champion Program

The following are anonymized testimonies of some the students who participated in the Program:

- “I did not know how to correctly apply fertilizer prior to the Program. I now know how to properly apply fertilizer after participating in the Program”
- “Participating in the Program has motivated me to take up farming as an occupation”
- “I have learnt how to plant in rows and how to apply fertilizer”
- “I observed that the fertility of our soil improved making our crops healthier when we applied the 4R principles to our crop”
- “I live in the city so the micro project gave me practical experience on farming, something I had not done before”
- “The Program increased the level of cooperation among us”
- “I learnt how to transplant”
- “I was able to teach members of my household who are now applying the 4R principles”
- “Beyond learning how to cultivate crops by applying the 4R principles, I also acquired public and leadership speaking skills after participating in the Champion Program”.

## Appendix 5: Farmers' testimonies on the impact of the Champion Program

The following are anonymized testimonies of some the farmers who participated in the Program:

- “I did not know it was good to plant in rows before the program. After getting to know the benefits of row planting, I now plant in rows and this makes it easier for me to water my plants and effectively undertake other cultural practices”
- “I obtained more output after applying the 4R principles and this has given me more money in my pocket”
- “I applied the 4R principles on my farm and I can tell you I will have food all year round”
- “I have stopped wasting fertilizer after learning how to apply fertilizer at the right place and in the right quantities”
- “I had to sell my livestock during the lean season to complement my harvest prior to participating in the program but now, with the 4R principles, I can feed my family the whole year without selling any animal”.

# Thank You



## Partners



## Funders



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