



RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security



Intermediate Outcomes of School-on-the-Air for Farmers in Cagayan Valley in the Adoption of Climate-Smart Rice Technologies

Marcelo R. Raquero
Narciso A. Edillo
Josie Y. Bas-ong
Orlando F. Balderama

Cecilia H. de los Trinos
Greyguel A. Barayuga
Hector Tabbun
Rogelio P. Matalang

Intermediate Outcomes of School-on-the-Air for Farmers in Cagayan Valley in the Adoption of Climate-Smart Rice Technologies

Marcelo R. Raquepo
Narciso A. Edillo
Josie Y. Bas-ong
Orlando F. Balderama
Cecilia H. de los Trinos
Greyguel A. Barayuga
Hector Tabbun
Rogelio P. Matalang

Correct citation:

Raquepo MR, Edillo NA, Bas-ong JY, Balderama OF, de los Trinos CH, Barayuga GA, Tabbun H, Matalang RP. 2020. Intermediate Outcomes of School-on-the-Air for Farmers in Cagayan Valley in the Adoption of Climate-Smart Rice Technologies. Cagayan, Philippines: Department of Agriculture-Regional Field Office 2.

Creative Commons License



This publication is licensed under a Creative Commons Attribution – NonCommercial–NoDerivs 4.0 Unported License.

Articles appearing in this publication may be freely quoted and reproduced provided the source is acknowledged. No use of this publication may be made for resale or other commercial purposes.

This work was implemented as part of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), which is carried out with support from CGIAR Fund Donors and through bilateral funding agreements. For details please visit <https://ccafs.cgiar.org/donors>. The views expressed in this document cannot be taken to reflect the official opinions of these organisations.

Abstract

The study assessed the intermediate outcomes of school-on-the-air (SOA) on learner-farmers in Cagayan Valley in the adoption of climate-smart agriculture (CSA) rice technologies. It determined socio-economic and biophysical characteristics of learner-farmers; ascertained the their level of awareness, knowledge, and adoption of climate-smart rice technologies; assessed the intermediate outcomes in terms of yield and income upon the adoption of CSA rice technologies; and identified preferred commodities, as well as issues and concerns for future SOA- CSA programs.

Using mixed research methods, 352 farmer-listener graduates were interviewed, and 24 farmer leaders participated in focus group discussions. Data collected were processed using the mode, median, mean, standard deviation, and weighted mean.

Findings revealed that graduates are predominantly male, at their middle age, married, and with high school level of education. They have a median income of PHP 80,000 sourced mainly from farming activities. They till about two hectares of rice land and have more than a hectare for other crops. Rice yield averages 108 cavans during the dry season and 90 cavans during the wet season.

The SOA-CSA has been an effective and efficient medium to reach and inform farmers about CSA technologies for rice. Its initial outcomes are evident in the high awareness and improved knowledge among farmers of the causes and effects of climate change. Likewise, the initial positive effects of the SOA-CSA are noted in the farmers' almost always use of the recommended climate-smart technologies for rice, which has resulted to a mean yield increase of 19 cavans per hectare and a related mean increase of P18,000 pesos in farm income per hectare. The initial outcomes of the SOA-CSA are the effect of the confluence of support extended by government agencies supportive of the climate mitigation program of the national government.

Keywords

Distance-based learning; radio; climate change; Philippines; adaptation.

Acknowledgements

The authors would like to convey their appreciation to the following individuals and groups whose contributions contributed to the completion of the work:

- The Department of Agriculture – Regional Field Office 2 (DA-RFO2), through Regional Director Narciso A. Edillo; and Dr. Ernesto D. Guzman, Regional Rice Program Action Officer, for the research funding;
- The CGIAR Research Program on Climate Change, Agriculture and Food Security in Southeast Asia, through the Regional Program Leader, Dr. Leocadio S. Sebastian, for the additional research funding;
- The Presidents, through their Vice-Presidents for Research, Development and Training and representatives, of Cagayan State University, Isabela State University, Nueva Vizcaya State University, and Quirino State University, most especially to Dr. Sameul Benigno, for the intellectual inputs and insights during the problem conceptualization and final phases of the research;
- The Department of Agriculture - Regional Agriculture and Fisheries Information Section through the Chief, Mr. Hector Tabbun and Staff; Dr. Rogelio P. Matalang, DWDA Station Manager; and Mrs. Catherine Jimenez, Communication Specialist, for their coordination, facilitation and secretarial support;
- The Station Managers of the DA-RFO2: Engr. Fidelino R. Cabantac (Quirino Experimental Station), Engr. Rodolfo A. Bayucan (Southern Cagayan Research Station), Engr. Rolando D. Pedro (Cagayan Valley Research Center), and Ms. Marina A. Acebedo (Nueva Vizcaya Experiment Station); and their respective staff for hosting the focus group discussions and for the facilitation;
- The Research Associates: Dr. Orlando Balderama of Isabela State University, Dr. Cecilia H. de Los Trinos of Nueva Viscaya State University, Mrs. Josie Y. Bas-ong and Dr. Gilbert Magulod of Cagayan State University, Mr. Greyguel Barayuga of Quirino State University, and their Enumerators, for the efficient field work;

- The farmer leaders of the model farms in Cagayan, Isabela, Nueva Vizcaya, and Quirino, for their active participation in sharing their experiences during the focus group discussions;
- The respondents of the study who provided the needed information during the interview;
- All other individuals and groups, who in one way or the other, have greatly contributed to the completion of this research work.

Contents

Abstract	4
Keywords	4
Acknowledgements	5
Contents	7
List of Tables	9
Acronyms and abbreviations.....	10
INTRODUCTION	11
Background of the Study	11
Objectives of the Study	14
Conceptual Framework.....	14
METHODOLOGY	15
Research Design.....	15
Locale of the Study	15
Respondents of the Study.....	16
Research Instruments	17
Data Gathering Procedures	18
Data Analysis	19
RESULTS AND DISCUSSION.....	20
Socio-economic Profile of the Farmer-Listener Graduates	20
Biophysical Characteristics of the Farmer-Listener Graduates	22
Topics Listened to By the Farmer-Listener Graduates	24
Listening Circumstances of the Farmer-Listener Graduates and Intermediate Outcomes	25
Farmer-Listener Graduates' Awareness and Level of Knowledge of the Causes of Climate Change.....	27
Awareness and Level of Knowledge of Farmer-Listener Graduates on the Effects of Climate Change.....	28
Farmer-Listener Graduates' Level of Knowledge on CSA Technologies and Level of Adoption	30
Problems Encountered by Farmers in the Adoption of CSA Technologies	32
Agencies Supportive of Farmer-Listener Graduates in the Adoption of CSA Technologies for Rice	34
Sources of Knowledge about CSA Technologies for Rice.....	36

Usefulness to Farmer-Listener Graduates of the Information Learned from the SOA-CSA	37
Economic Benefits of Farmers' Listening to the SOA-CSA	38
Intent to Participate in Other School-on-the-Air Program.....	40
Farmer-Listener Graduates' Suggestions on the SOA Program Features	41
CONCLUSIONS.....	44
RECOMMENDATIONS	45
REFERENCES	49
REFERENCES	49
ANNEXES	50

List of Tables

Table 1. Sampling of respondents in Cagayan Valley Region	16
Table 2. Socio-economic profile of the farmer-listener graduates	21
Table 3. Biophysical characteristics of farmers	23
Table 4. Topics listened to by the farmer-listener graduates	25
Table 5. Listening circumstances of the farmer-listener graduates and outcomes	27
Table 6. Awareness and level of knowledge of farmers on the causes of climate change	28
Table 7. Awareness and level of knowledge of farmers on the effects of climate change	29
Table 8. Farmer-listener graduates' level of knowledge on CSA technologies and their level of adoption	31
Table 9. Problems encountered by farmers in the adoption of CSA technologies for rice.....	33
Table 10. Agencies supportive of farmer-listener graduates in their adoption of CSA technologies	35
Table 11. Sources of knowledge about CSA technologies for rice	36
Table 12. Usefulness to farmer listeners of the information learned from the SOA-CSA for rice	38
Table 13. Economic benefits of farmers' listening to the SOA-CSA for rice technologies	39
Table 14. Farmer listeners' intent to participate in other school-on-the-air program..	41
Table 15. Farmer-listener graduates' suggestions on future SOA program features...	42

Acronyms and abbreviations

CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security in Southeast Asia
CSA	climate-smart agriculture
CVARRD	Cagayan Valley Agriculture and Resources Research and Development
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DA RFO2	Department of Agriculture Regional Field Office 02
FLG	farmer-listener graduate
PFRB	Philippine Federation of Rural Broadcasters
LFT	Local Farm Technician
MAO	Municipal Agriculture Office
MLGU	Municipal Local Government Unit
NIA	National Irrigation Administration
PAJ	Philippine Agricultural Journalists
PCIC	Philippine Crop Insurance Corporation
PLGU	Provincial Local Government Unit
RAFIS	Regional Agricultural and Fisheries Information Section
SOA	School-on-the-Air
SUC	State Universities and Colleges

INTRODUCTION

Background of the Study

One global issue threatening many country's efforts towards sustainable development is climate change. An unprecedented increase in greenhouse emissions has led to increased climate change impacts. It poses great challenges for the rural poor in developing countries that tend to rely on natural resources for their livelihoods and have limited capacity to adapt to climate change (Smit and Piliphosova 2001; UNFCCC 2007). Globally, climate change is attributed mostly to the changes in temperature, changes in precipitation, sea level rise and the melting of ice and snow in the Northern hemisphere (Intergovernmental Panel on Climate Change, 2009).

Long-term changes in climate variability and extreme weather-related events are already evident in many parts of the world. It has become increasingly clear that even serious efforts to mitigate climate change will be inadequate to prevent its devastating impacts that can reverse many of the economic gains made in the developing world in recent decades.

In the Philippines, the climate change phenomenon is often associated with extreme weather disturbances such as typhoons and floods, which, in turn, affect many other sectors of the economy. With 50.3% of its total area and 81.3% of the population vulnerable to natural disasters, the Philippines is considered a natural disaster hotspot. About 85.2% of its USD 86 billion annual gross domestic product is endangered, as it is located in areas of risk (World Bank 2008). Since 2000, about three million people have been affected by various disasters annually. The vulnerability of the Philippine agriculture sector to climate change has been acknowledged to be substantial as it is the most vulnerable among Asian countries like Thailand, Indonesia and Vietnam when it comes to floods and storms (ADB, 2012).

In a study, Vista (2014) reported that climate-induced impacts will result in a net loss to the Philippine economy and its key agricultural sectors in the short run. Since production would be greatly affected and would have ripple and multiplier effects in the economy, it is imperative for Filipino farmers to employ adaptation measures to lessen the impacts of climate change.

There is increasing urgency for a stronger focus on adapting agriculture to future changes in the climate. There are many potential adaptation options available at the management level, often variations of existing climate risk management. The management-level adaptation options are largely extensions or intensifications of existing climate risk management or production enhancement activities in response to a potential change in the climate risk profile. One of these include the cropping systems. There are many potential ways to alter management to deal with projected climatic and atmospheric changes. Citing several experts, Howden et al. (2007) enumerated varied adaptations to include:

- Altering inputs such as varieties/species to those with more appropriate thermal time and requirements and/or with increased resistance to heat shock and drought, altering fertilizer rates to maintain grain or fruit quality consistent with the prevailing climate, altering amounts and timing of irrigation and other water management.
- Wider use of technologies to “harvest” water, conserve soil moisture (e.g., crop residue retention), and use and transport water more effectively where rainfall decreases.
- Managing water to prevent water logging, erosion, and nutrient leaching where rainfall increases.
- Altering the timing or location of cropping activities.
- Diversifying income through integration with other farming activities such as livestock raising.
- Improving the effectiveness of pest, disease, and weed management practices through wider use of integrated pest and pathogen management, development, and use of varieties and species resistant to pests and diseases and maintaining or improving quarantine capabilities and monitoring programs.
- Using climate forecasting to reduce production risk.

However, there are yet relatively few studies that assess both the likely effectiveness and adoption rates of possible response strategies. Against the backdrop of rapidly changing weather conditions and the severity of the impact on poor subsistence farmers, it is urgent that the different options available to farmers to cope are documented. A good understanding of

how they can be widely adopted is critical. This understanding includes the adaptation options that farmers may have access to, their perception towards them, and the determinants to adopting them.

One development strategy thought of by the Philippine Department of Agriculture (DA) to inform the rice farmers about the effects of climate change and how to control its impact to rice farming is the use of the radio. As argued in a manual co-developed by DA Regional Field Office 02 (DA RFO2), despite the prevalence of high-speed Internet and television in today's world, radio is still a critical and relevant medium especially in developing nations (DA RFO2, 2018). Citing the data from the United Nations Educational, Scientific and Cultural Organization, more than 95% of the world's population uses radio, as compared to roughly one-third of the global population with Internet access.

Philippine data shows that radio reaches 85% to 90 % of the population, while TV reaches less than 60%. For this reason, radio is considered the most reliable medium for sharing news in the countryside. The document further argues that radio transcends literacy and geographical barriers and being in audio mode, elicits strong emotional impact among listeners. Along with this, the “Kaalang Pagsasaka sa Himpapawid,” a school-on-the-air (SOA) program for climate-smart agriculture (CSA) in Cagayan Valley was conducted. The program is a joint undertaking among the CGIAR Research Program on Climate Change, Agriculture and Food Security in Southeast Asia (CCAFS SEA), DA–RFO2, Philippine Federation of Rural Broadcasters (PFRB), Philippine Agricultural Journalists, Inc. (PAJ), Cagayan Valley Agriculture and Resources Research and Development (CVAARRD) Consortium, and other national and regional agencies in the region.

The SOA-CSA program contained 68 modules broadcasted in 14 radio stations within the Cagayan Valley Region. About 10,000 rice farmers enrolled in the program, but only around 5,000 graduated. How the graduates used their knowledge on CSA, which they acquired from the radio program is the intent of this study.

Objectives of the Study

The study assessed the intermediate outcomes of the SOA-CSA program on farmer-learners in Cagayan Valley in the adoption of climate-smart rice technologies. Specifically, it was intended to accomplish the following objectives:

1. to determine the socio-economic and biophysical characteristics of rice farmer-learners;
2. to ascertain the rice farmer-learners' level of awareness, knowledge, and adoption of climate-smart rice technologies;
3. to assess the intermediate outcomes in terms of yield and income after adopting climate-smart in rice technologies; and
4. to identify preferred commodities, as well as issues and concerns, for future SOA-CSA programs.

Conceptual Framework

The study is anchored on the theory that radio influences the rice farmers' knowledge and adoption of CSA technologies (Fig. 1). It is viewed that if the delivery of the program was effective, it could be evident in the awareness and knowledge of the causes and effects of climate change and the level of knowledge and adoption practices of the rice farmers taught in the radio program. It is assumed that the rice farmers who intently listened to the program and completed all episodes have higher level of awareness and knowledge of the climate-smart technologies.

Consequently, these rice farmers are likely to adopt these technologies in the rice production practices that address climate change concerns. Adoption of climate-smart technologies is considered as a factor to the yield and income differences among farmers.

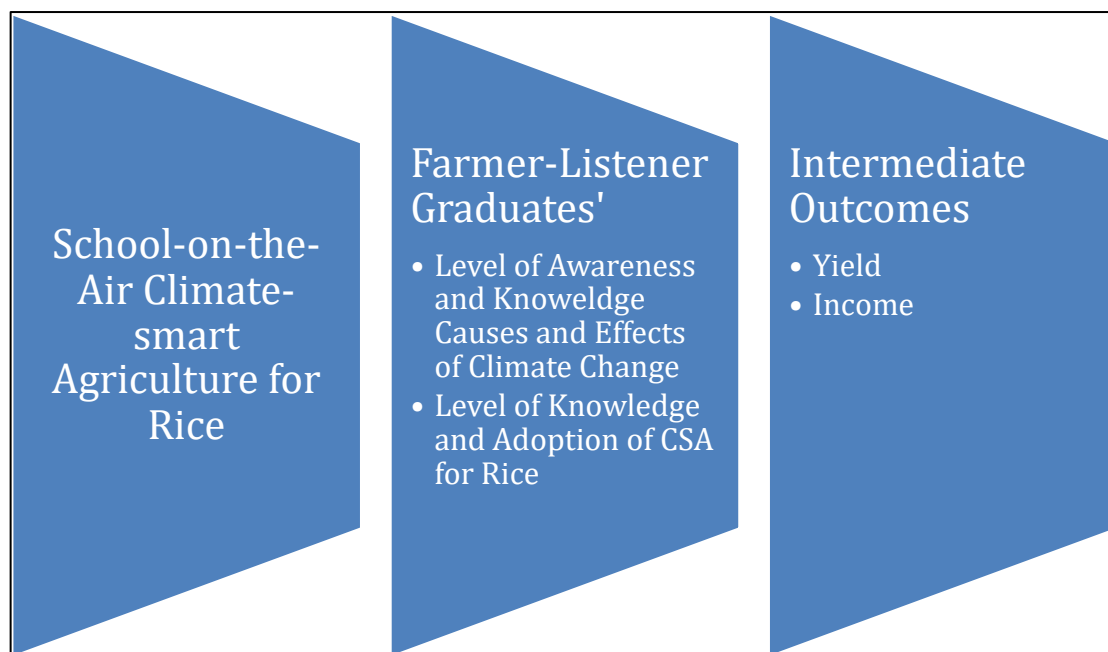


Figure 1. The assumed intermediate outcomes of the SOA-CSA program

METHODOLOGY

Research Design

The study used mixed research methods, i.e., the use of both quantitative and qualitative research strategies to gather the needed data to achieve the research objectives. The quantitative component of the study involved the collection of data through a structured questionnaire adopted from different sources. The qualitative aspect of the study involved the conduct of focus group discussions (FGDs) and key informant interviewing of selected groups and partner agencies.

Locale of the Study

The study was conducted in four provinces (Cagayan, Isabela, Nueva Vizcaya and Quirino) in the Cagayan Valley Region, particularly in municipalities within the broadcast reach of the 14 radio stations that aired the SOA-CSA materials.

Respondents of the Study

The population of the study was composed of all the graduates of the SOA – CSA program. Out of this population, an initial sample of 376 graduates was stratified across the provinces, with the most number coming from provinces that had the biggest number of graduates. The criteria for being selected in the study include:

- regular listeners;
- model farm participant; and
- resident of the area with good reception of the radio station broadcasting the SOA-CSA.

Using the Slovin’s formula to determine sample size and the proportional allocation technique, the samples of the study were distributed in the provinces shown in the table below.

Table 1. Sampling of respondents in Cagayan Valley Region

Province/Municipality	Number of Graduates	Desired Number of Samples	Actual Samples
Isabela	1775	168	164
Cagayan	1185	112	97
Nueva Vizcaya	300	30	25
Quirino	700	66	66
Overall Total	3960	376	352

In the actual data gathering in the sampled towns, the list of graduates was inadvertently misplaced at the Municipal Agriculture Office (MAO). Thus, the sampling technique was altered. The research team used snowball sampling method to reach the other graduates in the sampled barangay. After locating and interviewing the first sample with a graduation certificate, names of other graduates from the barangay were identified. In several sampled barangays, the number of samples was not met owing to their ineligibility based on the inclusion criteria, or eligible respondents were out of town during the visit; no call back was made due to time and financial constraints. For this reason, the actual samples were 352.

On the other hand, a total of 24 farmer leaders participated in the FGDs held separately in the four provinces. Some of the invited farmer leaders, who also hold positions in their communities, failed to come because of varied reasons. Nevertheless, the participants actively joined the discussion on the issues and concerns raised during the FGDs, which lasted for about one hour and thirty minutes.

Research Instruments

Two research instruments were used to gather the needed data. The Farmer-Listener Graduates' Questionnaire consisted of three parts (Annex A). Part I elicited the socio-economic and demographic profile of the graduate listeners, including age, sex, civil status, highest educational attainment, estimated annual family income, and sources of income; and the biophysical information related to farming like land area tilled for rice and other crops, and average yield per hectare.

Part II gathered information on the participation of the rice farmers, level of awareness, and level of knowledge of the causes and effects of climate change, and level of knowledge and adoption of climate-smart technologies taught in the SOA-CSA program. The farmer-listener graduates (FLGs) were asked first to identify the topics related to climate change they had heard. The topics were read one at a time by the enumerator.

Afterwards, for the level of awareness, farmers were asked if they were aware or not of the causes and effects of climate change, and then were asked on the level of knowledge they have about each of the causes and effects, using a three-point Likert scale: Little, Much, Very Much. On the level of adoption of the recommended interventions to manage climate change in rice farming, a three-point Likert scale was used to assess the information using Never, Sometimes, Almost Always, and Always.

Part III ascertained the intermediate economic effects of the FLG's adoption of the climate-smart rice technologies. The indicators are the average yield and income derived as influenced by the adoption of such technologies. On the other hand, Part IV gathered information on the preferred commodities to be covered by the SOA-CSA, as well as the preferred programming features.

The second instrument is the Focus Group Session Guide, the tool to guide in the discussion with farmer leaders (Annex B). The questions elicited from the FGD members their attitude, opinions, and ideas on the circumstances of their involvement in the SOA and future SOA programs, their knowledge and utilization (including sharing) of the climate-smart technologies, the problems related to their adoption, and the SOA program content and features they preferred.

Data Gathering Procedures

The field gathering of data was a collaborative undertaking of Cagayan State University, Isabela State University, Nueva Vizcaya State University, and Quirino State University, particularly their development researchers. These research faculty were research associates who hired several research enumerators corresponding to the scope of work assigned to the assigned province. Prior to the field gathering of data, the enumerators were trained by the associates. The training focused on the appreciation of the objectives of the study, how to establish rapport with the respondent, how to ask questions, and record responses. Mock interviews among the enumerators, as well as actual field interviews in the barangays not covered by the SOA study were conducted to determine the competence of the enumerators in assimilating what was taught to them.

During the field gathering phase, the cooperation of the local chief executive, through the Municipal Agriculture Office and the model farm group leaders, was sought. With the initial name of the farmer-listener graduate identified by the Municipal Agriculture Officer or the Focal Person, the next sample was identified by the respondent. Verification on the eligibility of the respondent was done before the interview progressed.

The associates took responsibility in monitoring the enumerators, ensuring that the data collected were valid and reliable. The schemes of conducting one-on-one interviews between the enumerator and the sample respondent simultaneously facilitated the data gathering in a barangay. The separate interviews were conducted wherein the respondents would not be hearing the other's responses to avoid influencing the others from giving objective answers.

One FGD each for the four provinces was conducted with the farmer leaders of the model farms in the different parts of the province. The venues were Quirino Experiment Station in

Aglipay, Quirino on 24 September 2019; Southern Cagayan Research Center in Iguig, Cagayan on 1 October 2019; Cagayan Valley Research Center in Ilagan City, Isabela on 2 October 2019; and Nueva Vizcaya Experiment Station in Bagabag, Nueva Vizcaya on 7 October 2019. The composition of the FGD was from four to six. Using the FGD Session Guide, the questions elicited responses on the members' attitude, opinions, and suggestions on the SOA learnings and utilization, as well as their preferences on future SOA programs and their features. The lead researcher facilitated all FGD sessions in the provinces.

Data Analysis

Data were encoded in EXCEL file to have ease in data encoding, cleaning, and manipulation. After data cleaning, the file was imported into the Statistical Package for Social Sciences software.

To categorize and describe the group, frequency count, mean, and standard deviation were computed. General responses in variables measured by Likert scales was interpreted by computing the weighted mean per statement. The arbitrary scale points to interpret the weighted means are the following:

For Level of Knowledge:

Scale	Level of Knowledge
1.00 - 1.66	Little
1.67 - 2.33	Much
2.34 - 3.00	Very Much

For Level of Adoption:

Scale	Level of Adoption
1.00 - 1.75	Never
1.76 - 2.50	Sometimes
2.51 - 3.25	Almost Always
3.26 - 4.00	Always

RESULTS AND DISCUSSION

Socio-economic Profile of the Farmer-Listener Graduates

Farmer-listener graduates (FLGs) are predominantly males (69.9%); the rest (39.1%) are females. This trend characteristically describes the Filipino farmer in terms of gender, where there are more males (89%) than females (Census on Agriculture and Fisheries, 2002). In 2015, the proportion of females in the agricultural work force was 25.7%. It indicates that in the region, more females are joining the agriculture workforce.

In terms of age, FLGs are in their adult stage, as shown in the mean age of 52.4 with a standard deviation of 10.4. The youngest is 24 while the oldest is 80. Moreover, the fact that there are farmers who listened to the radio affirms the value of lifelong learning to a farmer interested to improve his or her farming practices.

This group of FLGs is younger than the national average age of Filipino farmers at 57, according to Director Asterio Saliot of the DA-Agricultural Training Institute (ATI) (The New Humanitarian, 2013). However, the 2017 survey of DA revealed that the farmers' average age is 60. Such trend is worrisome to the Department as this implies that young Filipinos are no longer interested to take on farming as an industry (Inso, 2018). More than three-fourths (86.1%) of the FLGs are married. This fact gives them more motivation to improve their rice production to meet the needs of the family members. In the FGD with farmer leaders, they claimed that this expectation was anticipated in the learning acquired from listening to the SOA-CSA program. They want new technologies that can increase their rice yield.

In terms of educational background, the majority (54.6%) of the FLGs has reached elementary and high school levels of education. It means that they are capable of processing information heard over the radio. This educational trend among the farmer-listener graduates in the region is far better than the reported national figure of one-third of agriculture workers who did not finish primary school (Briones, 2017).

The reported income of the farmer-listener graduates ranges from a minimum of PHP 50,000 (among the small landed farmers) to the maximum of PHP 1,500,000 (among owners of big farms). The median income is PHP 80,000, which is way below the average income of

farmers (farm, off-farm, and non-farm) that is around PHP 100,000. Comparing it to the 2015 poverty line of PHP 108,800 set by the National Economic and Development Authority, most of the farmers could hardly make both ends meet. Nevertheless, the farmer leaders explained during the FGD session that they can cope with their financial needs by engaging in subsidiary livelihood activities.

Table 2. Socio-economic profile of the farmer-listener graduates

Category	Frequency (n = 352)	Percent
Sex		
Male	246	69.9
Female	106	30.1
Age		
21 – 30	8	2.3
31 – 40	39	11.1
41 – 50	103	29.3
51 – 60	124	35.2
61 – 70	68	19.3
71 & older	10	2.8
Mean = 52.4 SD = 10.4		
Civil Status		
Single	19	5.4
Married	303	86.1
Widowed/Separated	30	8.5
Highest Educational Attainment		
Never in school	7	2.0
Some years in the elementary	41	11.6
Elementary graduate	34	9.7
Some years in high school	110	31.3
High school graduate	26	7.4
Technical/vocational graduate	40	11.4
Some years in college	84	23.9
College graduate	3	.9
Some units in the graduate school	2	.6
Master's graduate	5	1.4
Estimated Annual Family Income (Pesos)		
50,000 – 99,999	108	30.7
100,000 – 149,999	104	29.5
150,000 – 199,999	49	13.9
200,000 – 249,999	30	8.5
250,000 – 299,999	6	1.7
300,000 & more	16	4.5

Does not Know/ Could not Recall	39	11.1
Median Income = 80,000.00		
Sources of Family Income*		
Farming	352	100
Fishing	1	0.3
Public employment	11	3.1
Private employment	2	0.6
Others	8	2.3

*Multiple responses

Farming remains to be the main source of income of all the FLGs. A few are engaged in other income-generating activities like private and public employment and vending, among others. As they are dependent on farming, whatever problems encountered in their production activities impact on their financial capability to survive.

Biophysical Characteristics of the Farmer-Listener Graduates

Table 2 shows the biophysical characteristics of FLGs. Farm ownership for rice ranges from one-fourth of a hectare to 13 hectares. On the average, they till about 1.97 hectares (SD = 1.66). On the other hand, the area farmed for other crops ranges from one-fourth to five hectares; the mean is recorded at 1.57 (SD = 0.13).

As indicated, some farmers own a small farm while others own large farm areas. In a report, Koirala, et al. (2014) noted that “agricultural farms in the Philippines are heterogeneous: on one hand is a small group of farmers who operate large farms; on the other hand, many farmers operate small subsistence farms and a large majority is still practicing traditional agricultural systems.”

Asked about the average yield of rice per hectare during the dry season, the majority (about 55%) mentioned more than 101 cavans (1 cavan = 50 kg). Overall, a mean yield of 108.26 cavans (SD = 34.44) is recorded. During the wet season, rice yield is lower, with a mean of 89.55 cavans (SD = 32.86) is computed. Converted to metric tons (5.4, dry season; 4.47, wet season), the mean yield of farmers is higher than the national average of 4.31 (PSA, 2017). However, the figures are below other farmers’ use of more advanced hybrid varieties (e.g., SL-H8) that yield from 160 to 245 cavans per hectare of irrigated land (Gomez, 2019).

In the FGD sessions, farmers attributed their rice yield to the practice of recommended technologies, especially seed selection. However, the variations in the farmers' reported rice yield is attributed by experts to different factors such as genetics, agronomy, and climate variability brought by climate change (Lesk et al., 2016; Battiste & Naylor, 2009; Urban et al. 2015). Farmers also cited that even if they use high-yielding varieties, the expected economic benefit is negated by natural calamities such as typhoons, flooding, and market circumstances.

Table 3. Biophysical characteristics of farmers

Category	Frequency (n = 352)	Percent
Land Area Tilled for Rice (ha)		
Less than 1.0	55	15.6
1.00 – 1.99	159	45.2
2.00 – 2.99	63	17.9
3.00 – 3.99	36	10.2
4.00 – 4.99	10	2.8
5.00 & more	25	7.1
Does not Know/ Could not Recall	4	1.1
Mean = 1.97 SD = 1.66		
Land Area Tilled for Other Crops (ha)		
Less than 1.00	38	10.8
1.00 – 2.99	108	30.7
3.00 – 4.99	19	5.4
5.00 – 6.99	10	2.8
7.00 & more	5	1.4
No Area for Other Crops	172	48.9
Mean = 1.57 SD = 0.13		
Average Rice Harvest (Cavans) per Hectare (Dry Season)		
50 & lower	31.0	8.8
51- 100	106	30.1
101 – 150	195	55.4
151 – 200	13	3.7
Could not Recall	7	2.0
Mean = 108.26 SD = 34.44		
Average Rice Harvest (cavans) per Hectare (Wet Season)		
50 & lower	55.0	15.6
51- 100	182	51.7
101 – 150	100	28.4
151 – 200	8	2.3
Could not Recall	7	2.0
Mean = 89.55 SD = 32.86		

Topics Listened to By the Farmer-Listener Graduates

The topics most FLGs listened to are along cultural management practices of rice, namely: variety and seed selection (96%); land preparation and water management (94.6%); nutrient practices and pests and diseases management (93.2%); postharvest operations (92.9%); harvest management (92.3%); crop establishment (90.9%); and impact of climate change on agriculture and food security. Most topics listened to by the FLGs were on the cultural management aspects. Evidently, they are interested to learn about the rice technologies that are critical in the growth of the plant to ensure better yield.

In the FGD sessions, farmer leaders considered the information they acquired from the SOA-CSA program important to them as these influence the yield of their rice crop. Their realization of the impacts of climate change on their farming and the availability of food for them and the community added more reason for them to learn climate-smart technologies. In addition, they conveyed that their motivation to listen was for them to upgrade their adoption of technology that could give them more economic benefits. They answered affirmatively when asked if their expectations in listening were met.

As evidenced by the data, not all FLGs were able to listen to all the topics. Only 169 or 48% of them listened to all the 24 topics; others missed a few of the topics owing to various reasons. Farmer leaders pointed out several factors for their inability to miss the broadcast:

- they were out of town;
- the radio signal was poor, sometimes interrupted by intrusion of foreign language radio programs; and
- they moved to the farm before the program was aired.

However, those missing the broadcast inquired from their fellow farmer listeners what the topic was and what significant information was discussed. Others with cellphones asked a member of the family to record the program for them to listen to it later. Other listeners volunteered to share the information to those who missed the program, as well as on other farmers of the community who were not regular listeners. To some with cell phones, they visited the DWDA Facebook page to listen to the uploaded episodes they missed.

Table 4. Topics listened to by the farmer-listener graduates

Topics	Frequency (n = 352)	Percent
Overview of the Model Rice Cluster	296	84.1
Model Rice Cluster: Interventions from the DA-RFO 2 and other agencies	285	81.0
Model Rice Cluster: Methodologies	291	82.7
School-On-the-Air (SOA) Climate-smart Agriculture in Cagayan Valley: Rationale	310	88.1
School-On-the-Air (SOA) Climate-smart Agriculture in Cagayan Valley: Introduction of the project implementers	301	85.5
Climate Change 101 (science & concepts of climate change, causes, effects),	301	85.5
Impact of climate change on agriculture and food security	318	90.3
Climate change adaptation and mitigation mechanisms: the Philippine Rice Information System (PRISM)	298	84.7
Integrated diversified farming system .	298	84.7
Climate change adaptation and mitigation practices of the <i>Palayamanan Plus System</i>	267	75.9
Components of <i>Palayamanan Plus System</i>	263	74.7
Importance of having fallow period crops and planting high value crops	306	86.9
Climate-resilient vegetable crops and drip irrigation technology	304	86.4
Successful stories of farmers on integrated rice-based farming system used as both adaptation and mitigation strategy	300	85.2
Importance of crop insurance in case of calamity (drought or flood).	320	90.9
Variety and Seed Selection	338	96.0
Land Preparation	333	94.6
Crop Establishment	320	90.9
Nutrient Management	328	93.2
Water Management	333	94.6
Pests and Diseases Management	328	93.2
Harvest Management	325	92.3
Post-Harvest Operations	327	92.9
Marketing	301	85.5

Listening Circumstances of the Farmer-Listener Graduates and Intermediate Outcomes

Nearly all (92%) of the FLGs listened to the SOA-CSA program through their own radio sets. Those without radio sets (4.5%) listened to the program through the neighbor's transistor radio set, while an identical 1.7% of them with cellular phones either listened through the radio applications of their unit or listened through live streaming of the program on Facebook. They listened mostly at home (93.8%), while 3.4% brought to the farm their radio set and listened to the program as they undertook their farm chores. Others (2.9%) listened to the

program with their neighbor's and through their cellphone unit where they were at the time of the broadcast. The use of these strategies attests to the FLGs' desire to learn CSA for rice. In some instances, listening to the radio program was a family affair. If the farmer is out, the wife or a child was requested to listen and share the information to the farmer later. This practice was shared by the wives who went to the radio station to claim the husband's prizes in the quiz segment of the program.

About 68% of the FLGs could remember the information they heard from the school-on-the-air program; the rest (32.1%) could recall only a little. Apparently, FLGs could recall what they learned from the SOA program as they were able to take notes of the important points in the day's lesson. A number of farmers pointed out in the FGD sessions that some of the information they heard are related to what they have learned already from other farmer trainings. This means that what they learned from the SOA-CSA either adds or reinforces their prior learning. The integration of the past and new learning made them understand better the cultural management of rice.

The enthusiasm of 2.2% of the farmer-listener graduates is evident with their garnering of special awards during the graduation ceremony. These listeners belonged to the top of the class and became awardees of free loads in the day's quiz. The farmer leaders found the gimmicks and incentives during the program as a motivation for them to listen as they wanted to receive a reward.

Table 5. Listening circumstances of the farmer-listener graduates and outcomes

Category	Frequency (n = 352)	Percent
Mode of Listening to the SOA Program		
Own Transistor radio	324	92.0
Radio apps of the cellphone	6	1.7
Neighbor's transistor radio	16	4.5
Facebook	6	1.7
Place where the SOA Program was Listened to		
Home	330	93.8
Farm	12	3.4
Others	10	2.9
Amount of Information Heard Able to Recall		
Only a little	113	32.1
Much	160	45.5
Very Much	79	22.4
Opportunity as Awardee during SOA Graduation		
Yes	8	2.2
No	364	97.8
Award Received		
Top Placers	4	50.0
Honorable Mention	3	37.5
Weekly Winner	1	12.5

Farmer-Listener Graduates' Awareness and Level of Knowledge of the Causes of Climate Change

Results reveal that FLGs are generally aware of the causes of climate change. The primary causes cited are smoke belching of vehicles (98.6%), deforestation/illegal logging (97.2%), kaingin system in upland farming (95.7%), and overpopulation. They are also aware that burning of agricultural or crop residues (94.9%) aggravates the problem. Even the use of pesticides (92%) and use of fertilizers (91.8%) are recognized to cause climate change. All the other causes of climate change are also known by them. The finding points out the contribution of the radio in informing farmers of their practices detrimental to the environment, which eventually adversely impact their farming.

Generally, they have much knowledge of these varied causes of climate change (weighted means range from 1.83 to 2.31). It indicates that FLGs derived better appreciation of the causes of climate change after listening to the program. In the FGD sessions, farmer leaders emphasized that the deterioration of the environment has given rise to many contemporary problems, dealing major effects on their farming practices. Thus, they have become

interested to know more about climate change mitigation and adaptation. After considering the adverse impacts of climate change, they got interested to listen more to the SOA-CSA program.

Table 6. Awareness and level of knowledge of farmers on the causes of climate change

Causes	Farmers Mentioning Awareness		Level of Knowledge	
	Frequency	Percent	Weighted Mean	Description
1. Overpopulation	336	95.5	2.15	Much
2. Deforestation/Illegal logging	342	97.2	2.28	Much
3. Smoke belching of vehicles	347	98.6	2.26	Much
4. Use of Fertilizers	323	91.8	2.01	Much
5. Use of Pesticides	324	92.0	2.06	Much
6. Animal/Household Wastes	291	82.7	1.95	Much
7. Use of electrical appliances	294	83.5	1.83	Much
8. “Kaingin” System in Upland Farming	337	95.7	2.08	Much
9. Factories/Industries Operation	331	94.0	2.09	Much
10. Burning of agricultural/crop residues	334	94.9	2.31	Much
Overall Weighted Mean			2.10	Much

Awareness and Level of Knowledge of Farmer-Listener Graduates on the Effects of Climate Change

Prolonged drought and decreasing yield are the two main effects of climate change that the FLGs are aware of, as indicated by the equal percentage of 95.5% (Table 6). Moreover, natural calamities that are frequently occurring (94.9%); crop failure (94.3%); irregular increase and decrease in the normal rainfall (92.9%) and very wet season (92.9%) are identified by them. On the other hand, they are least aware about movement of the normal cropping pattern (84.9%) and extinction of plant and animal species (83.5%). Farmer leaders claimed that the SOA-CSA helped them be informed of the effects of climate change to their farming activities. Visualizing the continuing impacts of climate change to their farming activities and to the consequence to their families, they viewed it as alarming.

Table 7. Awareness and level of knowledge of farmers on the effects of climate change

Effects	Farmers Mentioning Awareness		Level of Knowledge	
	Frequency	Percent	Weighted Mean	Description
1. Average temperature is increasing	324	92.0	2.08	Much
2. Humidity is increasing	302	85.8	1.89	Much
3. Irregular increase and decrease in the normal rainfall	327	92.9	2.11	Much
4. Prolonged drought	336	95.5	2.07	Much
5. Very wet season	327	92.9	2.16	Much
6. Emerging of new vector-borne plant/animal diseases	309	87.8	1.93	Much
7. Movement of the normal cropping pattern	299	84.9	1.94	Much
8. High wind and heat waves	320	90.9	1.97	Much
9. Decreasing yield	336	95.5	2.13	Much
10. Natural calamities are frequently occurring	334	94.9	2.14	Much
11. Famine	281	79.8	1.97	Much
12. Crop Failure	332	94.3	2.11	Much
13. Extinction of plant/animal species	294	83.5	1.89	Much
14. Livestock/crop disease outbreak	312	88.6	1.97	Much
15. Decreasing crop/livestock biodiversity	310	88.1	1.91	Much
Overall Weighted Mean			2.02	Much

On the level of knowledge on the effects of climate change, the trend shows much knowledge, with an overall weighted mean of 2.02. FLGs benefitted from their listening to the SOA-CSA program. In the FGD sessions with the farmer leaders, whatever little knowledge they have before listening to the program was increased by the information they heard. They have now a better appreciation of stopping their traditional practices (like burning of rice straw in the farm) that they realize contribute to the problem of climate change. If they persisted with these practices, they explained they would be disadvantaged with continued episodes of getting lower farm yield.

Farmer-Listener Graduates' Level of Knowledge on CSA Technologies and Level of Adoption

FLGs were asked about their level of knowledge of the CSA technologies for rice, as well as their level of adoption. Overall, they have much knowledge of the rice technologies responsive to climate change, as manifested in the overall weighted mean of 2.11. The technologies much known by them include:

- using farm machinery equipment (2.53);
- applying the 3Rs (reduce, reuse, and recycle) in the farm (2.27);
- applying integrated pest management (2.25);
- using improved irrigation efficiency (2.16);
- integrated soil nutrient management (2.15); and
- using climatic information in farming (2.15).

Consistently, these same technologies are the ones adopted almost always by them, except for the use of farm machinery that is used always.

In the FGD sessions, farmer leaders pointed out that they adopted semi-farm mechanization or partial adoption. Farm machines are used during land preparation and harvesting while manual labor is used in pulling seedlings, transplanting, and harvesting palay that lodged heavily during windy heavy downpour. They explained the non-use of seedling transplanter because of they are not commonly used by them.

On applying the 3 Rs of solid waste management, farmer leaders related how the golden snails collected from the rice farm are used in vermicomposting. They used vermicompost as basal fertilizer. They have learned not to burn the rice straw; rather, they spread them on the farm. They explained that if properly decomposed the farm is supplied with 5% of free urea already.

They also explained the advantage of synchronous planting in reducing pest occurrence. Moreover, they shared the indigenous technology of laying madre de cacao (*Gliricidia sepium*) leaves on the farm for a while then draining the farm to drive away insects and corn plant hopper. Cutting branches of the tree and setting them in strategic areas of the farm also attains the same purpose. This practice manifests farmers' ability to blend tradition and science.

Table 8. Farmer-listener graduates' level of knowledge on CSA technologies and their level of adoption

Climate-smart Technologies for Rice	Level of Knowledge		Level of Adoption	
	Weighted Mean	Description	Weighted Mean	Description
Planting of drought and flood resistant varieties of crops	2.13	Much	2.75	Almost Always
Crop diversification	1.94	Much	2.42	Sometimes
Change in cropping pattern and calendar of planting	2.03	Much	2.50	Almost Always
Mixed cropping	1.98	Much	2.27	Sometimes
Using improved irrigation efficiency	2.16	Much	2.65	Almost Always
Integrated Pest Management	2.25	Much	2.95	Almost Always
Integrated Soil Nutrient Management	2.15	Much	2.77	Almost Always
Adopting soil conservation measures	1.96	Much	2.39	Sometimes
Organic Farming	2.09	Much	2.56	Almost Always
Using upgraded breeds of livestock	2.15	Much	2.69	Almost Always
Income diversification	1.96	Much	2.46	Sometimes
Using farm machinery equipment	2.53	Much	3.48	Always
Applying the 3Rs in the farm (reduce, reuse, and recycle)	2.27	Much	3.03	Almost Always
Using climatic information in farming	2.15	Much	2.74	Almost Always
Using different cropping systems (SCoPSA, SALT)	1.94	Much	2.28	Sometimes
Overall Weighted Mean	2.11	Much	2.66	Almost Always

On integrated pest management, farmer leaders shared their practice of observing the presence of insects in the farm. Farmer leaders attested that maintaining the paddies clean is effective in keeping insects and rodents away. If there are only two or three insects in a one square meter area, they believe that there is no need to spray pesticides. Instead, they prepare a concoction of pepper-Antibac fabric softening liquid-kerosene gas for the spot spraying to get rid of them.

Encouraging information that arose from the discussions is the radiation or diffusion effect of farmers' adoption of recommended technologies. Farmer leaders confirmed the "wait and see" approach of some farmers; if they do not see the benefits of a technology, they are hard to convince to adopt it. Cited as example is the non-burning of the rice straw after the harvest. Setting them on the rice farm and plowing them over during land preparation makes the soil more fertile.

As the non-adopting farmers realize its benefits, they begin inquiring from the farm leaders who are willing to share their learning. Likewise, farmer leaders narrated how they convinced other farmers of the advantage of transplanting one seedling per hill against the traditional practice. They claimed that they were able to convince non-listener farmers who found that there is less need of seeds when using hybrid seeds (15kg/ha) versus the inbred seeds (40 kg/ha.). In a research by Wanda (2016), agricultural radio programs in Africa have influenced farming activities and through the adoption of new ideas, farmers become economically empowered.

The technologies sometimes adopted by the FLGs are along income diversification (2.46), crop diversification (2.42), using different cropping systems (2.28), and mixed cropping. The finding reflects the intent of the FLGs to have multiple sources of income that are not totally dependent on rice production. In the FGD sessions, they expressed the desire to learn farm diversification, including the acquisition of value-adding skills for their main product.

Problems Encountered by Farmers in the Adoption of CSA Technologies

The primary problems related to the adoption of climate-smart rice technologies are natural calamities (68.8%), lack of financial resources (67.3%), and lack of support from agencies (51.4%). Whatever inputs they invest to get more yields from the farm is dependent on the weather conditions. Farmer leaders, in the FGD sessions, revealed that at times their yield is reduced when drought and typhoons hit their area. At the flowering stage of the rice plants, rain showers between 9AM and 1PM are mentioned by the farmers to be detrimental to their rice plants. Strong winds at this stage, they claimed, are also unfavorable because pollens in the spikelets are blown away.

Table 9. Problems encountered by farmers in the adoption of CSA technologies for rice

Problems	Frequency (n = 312)	Percent
Inadequate knowledge	116	33.0
Lack of financial resources	237	67.3
Natural calamities	242	68.8
Lack of support from agencies	181	51.4
Others (e.g., delayed release of irrigation water; pest infestation)	5	1.4

On the other hand, typhoons during the maturity stage of the rice plants are disadvantageous for farmers to gain more profits. They alleged that when rice plants lodged due to flooding, the combined harvester could not be used. Under such situation, grains are submerged under water, resulting to the blackening of the grains and at worse, their germination. Consequently, when it is sold, it is cheaply priced.

In terms of financial resources, farmer leaders narrated the red tape involved in securing loans, like the many documents to prepare and the certifications to secure. For instance, in the Agricultural Competitiveness Enhancement Fund loan offered by Landbank, loan applicants are required to submit documents, namely: MAO certification, Farm Plan, Notarized Statement that they do not have current loans, and Tax Information Number from the Bureau of Internal Revenue. Seemingly, the farmers do not appreciate the concern of the lending institutions to assure them of their ability to repay loans. On the farm mechanization loaning program, on the other hand, they claimed that it is only through a cooperative that it could be availed. The documentary requirements to be submitted are discouraging the farmer groups to secure this type of loan program.

Clarifying their problem on lack of support from government agencies, some farmer leaders related that at times, the distribution of certified seeds and fertilizer is delayed. Related to this problem, farmers commented on the practice of government technicians in asking what rice variety they want, not based on the characteristics of the rice farm.

Likewise, they are allegedly asked to subject the farm for soil analysis, but results are not delivered on time, keeping the farmers from following the recommended fertilizer needs. At

times, though, the reason for the delay is their last-minute submission of the soil prior to land preparation. In addition, some farmer leaders explained their difficulty of managing farm weeds because irrigation water is not available at times. Those situations force them to apply weedicides.

In the FGD sessions, some farmers suggested that the provision of support to the farmer listeners should not end with the graduation; there must be a follow-up to determine the technology application of the graduates. They should not be left to fend for themselves. Another suggestion is the need to time the airing of the SOA program before the onset of their planting season for the farmers to apply what they learn. Related to this proposal is the need for DA RFO2 to coordinate with the farm technologists in the Municipal Local Government Units (MLGUs) to conduct a demonstration farm, utilizing the technology at the time it is promoted by the SOA as a model for the farmer listeners to observe.

Agencies Supportive of Farmer-Listener Graduates in the Adoption of CSA Technologies for Rice

Two government agencies are identified by the FLGs to be providers of support in their adoption of recommended rice technologies; these are the MLGU through the MAO (82.7%) and DA RFO 2 (76.7%). Nearly half of the farmer-listener graduates also mentioned the National Irrigation Administration (NIA), (49.4%), ATI (46.6%), and Philippine Crop Insurance Corporation (PCIC) (44.9%) that are supportive of them.

Table 10. Agencies supportive of farmer-listener graduates in their adoption of CSA technologies

Agencies	Frequency (n = 352)	Percent
NIA	174	49.4
DA RFO 2	270	76.7
DA-ATI	164	46.6
PCIC	171	48.6
Philippine Rice Research Institute	101	28.7
State Universities and Colleges (SUCs) in the area	43	12.2
PFRB	31	8.8
DWPE Radyo ng Bayan	100	28.4
Philippine Agricultural Journalists, Inc.	6	1.7
Gunglo Dagiti Mannurat nga Ilocano	10	2.8
International Rice Research Institute-CGIAR Research Program on Climate Change, Agriculture and Food Security in Southeast Asia	16	4.5
CVARRD Consortium	40	11.4
Provincial local government unit (PLGU)	140	39.8
MLGU	291	82.7
Others (Non-DA printed materials, children in school)	15	4.3

The continuing program of the municipalities to provide seed and fertilizer subsidies has made the FLGs aware of the LGU support to them. Moreover, during the farm visits, the municipal agriculture extensionists provide farmers with technical assistance in their farming activities. Although the MLGUs are just conduits of the DARFO 2 in implementing agricultural productivity programs, farmers are unaware of the fact that it is the regional office as the main provider of the free inputs and technology disseminated to them by the MLGU. FLGs also recognize the free irrigation water provided by NIA in their respective areas. Similarly, they are aware of the crop insurance they benefit from through the PCIC.

On the other hand, more than one-fourth of the farmer-listener graduates took cognizance of the support given by the PLGU (39.8%), Philippine Rice Research Institute (28.7), and Radyo ng Bayan – DWPE (28.4%). Because of their non-proximity to the farmers, the other agencies have no opportunity to be accessed by the farmer-listener graduates. State universities in the area, through their extension program, also extend support to the farmers in various ways.

As for the other agencies cited by farmers, they could be referring to their involvement in the SOA-CSA. During the orientation, farmers were informed of the many agencies collaborating in the program.

Sources of Knowledge about CSA Technologies for Rice

The study wanted to identify the various sources of information from which the FLGs derive their knowledge. Table 10 shows that DA RFO2 remains to be the main source of knowledge of the farmers through various modes. The SOA-CSA program (70.7%) was identified because of its recency in implementation. In the FGD sessions, farmer leaders estimated that their knowledge on CSA for rice technologies due to the SOA would border from 70 to 80%.

This finding proves the effectiveness of the SOA as a mode of informing farmers of any agricultural development beneficial to them, especially on CSA, as the topics were devoted on it. The power of the radio as vehicle for agricultural development is asserted by Myers (2008) in his research that pointed out that unlike television and newspapers, radio is still the most popular and widely used medium of communication. The radio has also helped bridge the digital divide by providing an opportunity for sharing information limitlessly.

Table 11. Sources of knowledge about CSA technologies for rice

Sources	Frequency (n = 352)	Percent
DA School-on-the Air – Climate-smart Agriculture for Rice	249	70.7
Other Radio Programs	187	53.1
Television programs	27	7.7
Field days	190	54.0
Meetings/fora	192	54.5
Social media	92	26.1
Seminar-Workshops	255	72.4
Farmer leaders in the barangay	207	58.8
Extension workers from the Municipal Agriculture Office	250	71.0
Extension workers of agricultural suppliers	194	55.1
Flyers/pamphlets from DA and other agencies	207	58.8

The regular modes of information dissemination of DA RFO2 are also identified. These include flyers and pamphlets from DA and other agencies (58.8%); seminar-workshops (72.4%); meetings/fora (54.4%); and field days (54%). As part of the network of service providers, the involvement of the ATI with its season-long farm school was acknowledged by

the FGD participants. This means that DA remains as the primary source of information of the farmers.

As a partner agency in agricultural development, the extension workers from MAOs (71%) are cited as the major sources of what they know about climate-smart rice technologies. Considering that most agricultural development programs implemented by DA RFO2 are downloaded to the local government units, the farmers took cognizance of the important role of the MAO as an information provider.

Majority (58.8%) of the farmer-listener graduates pointed out the assistance also provided by the Local Farm Technicians (LFTs). In the FGD sessions, nearly all the LFTs in their area share the information they learned to their fellow farmers. This finding attests to the advantage of deputizing and empowering LFTs because they are the most accessible technicians in their own communities. The monetary monthly incentive of PHP 3,000 for the eligible LFTs who complete requirements is mentioned as additional motivation for them to sustain their efforts as farm technicians.

Usefulness to Farmer-Listener Graduates of the Information Learned from the SOA-CSA

Inquired about the usefulness of the information learned from the SOA-CSA, the trend shows that they were useful to the farmer-listeners. Majority (55.7%) considered the learning useful, while 36.9% believed it was very useful. About 7% thought it was somewhat useful.

Participants to the FGD sessions related the importance of knowing the causes and effects of climate change, especially the ways to reduce the risks in their rice production activities. They mentioned that their learning has made them cope with the uncertainties of farm production owing to unpredictable climatic conditions in their area. They explained that the usual cropping pattern has changed, pushing them to learn alternative options.

Among those who found their learning useful, 53.4% were moderately influenced while 28.9% were fully influenced. Only 16.8% were slightly influenced. FGD participants mentioned that they have been convinced that adopting climate-smart rice technologies is indeed beneficial to them. From their initial use of the technologies they heard in the SOA-

CSA program, they had observed their effects to their crops and consequently their yield. With the initial observations, they claimed that such technologies are relevant to them.

Table 12. Usefulness to farmer listeners of the information learned from the SOA-CSA for rice

Category	Frequency (n = 352)	Percent
Usefulness of the Information Learned in Farmers' Rice Production Activities		
Not at all	3	.9
Somewhat useful	23	6.5
Useful	196	55.7
Very useful	130	36.9
Extent of Influence of Learning from the SOA-CSA for Rice Technologies in Rice Production Activities		
Not at all	3	0.9
Slightly influenced	59	16.8
Moderately influenced	188	53.4
Fully influenced	102	28.9

Economic Benefits of Farmers' Listening to the SOA-CSA

In terms of economic benefits, about 96% declared that there was an observed increase in farm yield (Table 12). About 43% indicated they had much increase in their yield while 17% considered the increase just enough. The rest noted a little increase. Indeed, the SOA-CSA initially contributed to approximately 19-cavani increases per hectare in rice production by farmers who adopted the recommended technology.

Moreover, the yield is higher among the FLGs who adopt more technologies, particularly the use of high-yielding hybrid varieties (e.g., SL8, Bigante, Pioneer) resistant to drought and flood, integrated pest management, organic farming, and efficient use of irrigation water. It means that adopting more recommended rice technologies would result to higher yield.

Among those who reported lower yield were those using inbred varieties, like RC222, PSB, and RC82. To this variation, it was reported that adopting technologies for sustainable farming systems involves uncertainty and trade-offs. Technologies that can contribute to an economically efficient farm sector and the financial viability for farmers can motivate farmers to adopt them in their farms. Farmers will invest in and implement sustainable technologies

and farm practices if they expect the investment will be profitable (Organization for Economic Cooperation and Development, 2001)

In the FGD sessions, farmers indicated that the use of hybrid rice requires 15 kg of seeds only, as compared to the 40 kg required in using inbred varieties. The big reduction of input cost is the new practice of setting only one seedling per hill. Furthermore, nutrient competition is minimized, resulting to more grains and consequently higher yield.

Because of the preceding circumstances, 96% of the farmer-listener graduates observed an increase in their farm income after the initial use of the recommended technology heard from the SOA-CSA program. The increase was generally much as about 58% of them clustered in the “much” and “very much” response categories. The mean income increase is PHP 18,345 (SD = P14,319). The finding reveals that the farmers’ initial adoption of the recommended CSA technology has benefitted them financially.

Table 13. Economic benefits of farmers’ listening to the SOA-CSA for rice technologies

Category	Frequency (n = 352)	Percent
Observed Increase in Farm Yield with Farmers’ Adoption of Climate-smart Technologies		
Yes	337	95.7
No	15	4.3
Extent of Increase in Farm Yield Due to the Adoption of Climate-smart Technologies (n =337)		
Very little	31	8.8
Little	95	27.0
Just enough	61	17.3
Much	107	30.4
Very much	43	12.2
Number (Cavans) of Increase in Rice Yield/Hectare		
1 – 5	47	13.9
6 – 10	89	26.4
11 – 15	43	12.8
16 – 20	77	22.8
21 – 25	44	13.1
26 – 30	4	1.2
31 – 35	7	2.1

36 & more	26	7.7
Mean = 19.34 SD = 15.02		
Observed Increase in the Income/Hectare After Using CSA Technologies for Rice		
Yes	337	95.7
No	15	4.3
Extent of Increase in Income Due to Adoption of Climate-smart Technologies (n = 337)		
Very little	29	8.6
Little	109	32.3
Much	139	41.2
Very much	58	17.2
Amount (Pesos) of Increase in Income/Hectare (n = 337)		
5,000 & below	47	13.9
5,001 – 10,000	90	26.7
10,001 – 15,000	42	12.5
15,001 – 20,000	77	22.8
20,001 – 25,000	15	4.5
26,001 – 30,000	27	8.0
30,001 – 35,000	3	0.9
35,001 & more	36	10.7
Mean = 18,345.00 SD = 14,319.00		

In the FGD sessions, the farmer leaders expressed their apprehension that whatever gains they derived from the adoption of CSA technologies for rice would be useless and insignificant owing to the threats brought about by the Rice Tariffication Law. A common argument cited is that the current traders' buying price of PHP 12 per kilo of rice, which to them, even if it would be PHP 12.50, would just be a break-even situation for them. Ironically, they cited the price of rice bran at PHP 11 per kilo to be better than the palay grain price, alleging that the by-product commands a better price than the main product. Added to their woes is their difficulty to sell their palay to the National Food Authority as there is a quota of 25 - 50 cavans per scheduled delivery. Their desire to meet deadlines in paying loans forces them to sell their harvest to private buyers at a low price of PHP 12.

Intent to Participate in Other School-on-the-Air Program

Considering the benefits of listening to a SOA, almost all the FLGs expressed their desire to join such kind of program. The primary commodity the majority (73.6%) of the farmers preferred is on high-value crops. This choice is related to their sentiments on the low-buying

price of rice grain. In the FGD sessions, they expressed intention to shift from rice to other crops such as sweet potato, market price of which is PHP 40/kg. Growing sweet potato, they claimed, entails minimal inputs and cultural management. Yet, they argued it is more financially rewarding.

Other preferred commodities are livestock (54.5%), poultry (46%), and corn (41.8%). In the FGD sessions, the majority of the farmer leaders identified corn as their preferred commodity. In the discussion, however, they conveyed another threat on the profitability of corn production: the market price could be low because high-yielding corn varieties is input-intensive.

Table 14. Farmer listeners’ intent to participate in other school-on-the-air program

Category	Frequency (n = 352)	Percent
Intent to Participate in Other SOA		
Yes	349	99.1
No	3	0.9
Preferred Commodity in the Next SOA*		
Corn	147	41.8
Livestock	192	54.5
High value crops (fruits, Vegetable, industrial trees)	259	73.6
Poultry	162	46.0
Fish farming	117	33.2
Others (e.g., processing/value adding)	7	2.0

Farmer-Listener Graduates’ Suggestions on the SOA Program Features

To have more enrollees in future SOA programs, several considerations should be considered as suggested from the FLGs’ experiences. Table 14 indicates that the most preferred time slot by 67.9% of farmers is 5 AM to 6 AM. In the FGD sessions, farmer leaders pointed out that at 5 AM, they are still at home and have time to listen. The Nueva Vizcaya group, however, mentioned that the feasible time for them is 4:00AM as they could listen to the program while they prepare their morning meal. As the sign-in time of most radio stations is 5 AM, they mentioned that 12 noon to 1 PM could be a good alternative. Airing the SOA outside those

time slots would reduce listenership as most of them are already in the farm, except those who bring with them their transistor radio.

Table 15. Farmer-listener graduates' suggestions on future SOA program features

Category	Frequency (n = 349)	Percent
Preferred Time Slot*		
5AM to 6AM	237	67.9
11 AM to 12N	29	2.6
12N to 1 PM	72	20.5
5PM to 6 PM	12	3.4
6 PM to 7 PM	19	5.4
Radio Station Preferred in the Area		
DZNC	10	2.9
DWDA	30	8.6
DWPE	95	27.2
Radyo Natin	16	4.6
DWRL	4	1.1
DWQP	2	0.6
DWSI	86	24.6
DWRV	65	18.6
DWSM	9	2.6
DWTS	3	0.9
Others	29	8.3
Tandem of Announcers Preferred		
Both male announcers	90	25.8
Male and female announcers	208	59.6
Both female announcers	21	6.0
Any	30	8.6
Language Preferred to be Used		
Ilokano	309	88.5
Tagalog	40	11.5

*Multiple responses

The radio stations with the best reception within their area were suggested by the farmer-listeners. In the FGD sessions, the radio stations with good reception in the Isabela and Quirino provinces, and partly in Nueva Vizcaya, are DWSI (24.6%) and DZNC (2.9%). In addition to DWSI, DZRV (18.6%) in Nueva Vizcaya was suggested by the farmers. In Cagayan, DWPE was suggested by 27.2% of the farmers, while 8.6% identified DWDA. All

community radio stations near their areas, although limited in signal coverage, were identified by other farmers.

For the farmer leaders, choosing the radio station with the best signal is a major factor for the farmers to listen and to truly benefit from the program. When there are interferences from other radio stations and when the signal is fluctuating, farmers could not pick up the salient information that they need to know. Likewise, they will not be able to retrieve an information easily because a SOA episode cannot be replayed right away. Those with access to social media can review the broadcast they missed.

In terms of announcers, the majority (59.6%) suggested a male and female tandem, while approximately 26% favored that both announcers be male. In the FGD sessions, the farmer leaders mentioned that they will listen to any tandem of announcers as long as they can present information clearly. Additionally, they suggested that the program hosts need to have a sense of humor to maintain the listeners' attention. They also desired that they talk slowly and clearly for them to catch up and take down notes.

The 30-minute duration of the program is favorable for them. Likewise, they recommended that summary notes of each episode should be distributed to them during the graduation for them to review the lessons and revisit the episodes they missed.

As Ilocano is the lingua franca in the Cagayan Valley region, it is identified as the preferred language during the program. Farmer leaders in the FGD sessions mentioned that technical terms in English without Ilocano equivalent was explained by the program hosts during the first SOA-CSA program. This strategy, they said, could still be adopted by the next batch of hosts.

CONCLUSIONS

Farmer-listener graduates are predominantly married middle-aged men with a high school level of education. They have a median income of PHP 80,000 sourced mainly from farming activities. They till about two hectares of rice land and have more than a hectare for other crops. Rice yield is 108 cavans on average during the dry season and 90 cavans during the wet season. Farmers need various communication channels to access relevant information for their farms, especially that climate change is dealing major damages and losses to the entire agriculture sector in the Philippines.

This SOA-CSA program attests to the power of radio as a medium to empower farmers. The program has been an effective and efficient medium to reach and inform farmers about climate-smart rice technologies. Its initial outcomes are evident in the high awareness and knowledge of the causes and effects of climate change among the farmers. Likewise, the initial positive effects of the SOA-CSA are noted in the farmers' "almost always" use of the recommended climate-smart rice technologies, which has resulted to an additional yield increase of 19 cavans per hectare and in turn an increase in farm income of about PHP 18,000.

The initial outcomes of the SOA-CSA are results of the confluence of support extended by government agencies supportive of the climate mitigation program of the national government. However, the initial benefits are foreseen to diminish unless the negative impacts of the Rice Tariffication Law remain unabated.

RECOMMENDATIONS

To sustain the initial gains of the SOA-CSA program among FLGs, the following are suggested:

1. *Post-SOA Support Mechanisms*: sustaining the enthusiasm of the FLGs to adopt the recommended climate-smart technologies in rice production through the following measures:
 - a. DA RFO2 to forge a memorandum of understanding (MOU) with the MLGUs for the (1) agricultural technologists and the LFTs in tracing the FLGs and following them up in their use of the technologies heard, and providing additional information, if needed; (2) establish a demonstration farm showcasing the technologies promoted by the SOA-CSA program for the FLGs and other farmers to learn; and (3) provide training on crop processing to add value to their produce;
 - b. DA RFO2 to draft a workable network of government agencies and non-government agencies that delineates a cooperative undertaking based on their mandates to support the needs of the FLGs wanting to adopt the recommended technologies. This network should also be tapped to contribute in the damage control regarding negative feedbacks hurled against the Rice Tariffication Law, which to the minds of the farmers is disadvantageous to them in many ways;
 - c. DA RFO2, particularly the Regional Agricultural & Fisheries Information Section (RAFIS) to produce illustrated information materials in the local languages about the recommended CSA technologies for rice for easy reference by the FLGs when adopting the technologies;
 - d. RAFIS to document initial success stories of FLGs who adopted the CSA technologies for rice. Utilizing them as promotional materials could convince others to similarly adopt the technologies;

- e. After three years, an impact evaluation of the SOA-CSA should be conducted to assess the long-term impact of the program. In doing so, gender and age segregation of impact could be assessed.
- f. RAFIS, particularly DWDA and regional office website administrators, to sustain in the archives feature of the regional website or in the Facebook account all episodes of the SOA-CSA program for the FLGs to review and other interested farmers to listen.

2. *Future SOA Programs:* In designing future School-on-the-Air programs, the following are recommended:

- a. Program Content – The SOA should feature only new technologies. Topics along crop diversification, income diversification, and value-adding should be highlighted to provide opportunities for farmers to get more benefits from their produce.
- b. Program Features – The best time slot is 5AM-6:00AM with 30-minute duration, using Ilocano as medium by either a male-male announcer tandem or a male-female tandem. Clarity of explanations, coupled with humor, appeals to the farmer listeners.
- c. Timing of the SOA Program – It should be aired in time of the cropping season, for the farmer-listeners to apply right away what they learned from the program.
- d. Enrolment of Listeners – There should be a system of enrolling farmers to the SOA. The eligible enrollee should have his/her own transistor radio or have access to radio apps and Internet connections to ensure that they could be regular listeners to the program. An official identification card could be issued to formalize the enlistment of the listener. The assistance of the MLGU through the Agricultural Extension Workers could facilitate the process. The possible use of online registration to farmers with access to the Internet should be explored.

- e. Monitoring of the Listeners – To ensure regularity of listenership, the enrolled farmer-listeners could be monitored by the local farm extensionists in their area or through the LGU agricultural extension workers in their service area. Random checking of farmer-listeners with mobile phones could be done to check their listening behavior. In addition, questions from the listeners should be entertained while the program is in progress. If the program is pre-taped, questions shall be answered in the next episode. Other comments and feedbacks could also be entertained with the names of the sender being acknowledged. This practice would motivate the listeners to sustain their listenership in other episodes.
- f. Resource Persons – In addition to the use of agency-based resource persons to discuss the technology being promoted, entrepreneurs and managers from the industry and private sector should be invited as a way to link the farmers to the potential market of their products, as well as, to motivate them to engage in the commodity being promoted.
- g. Establishment of a Demo Farm – Through the LFT/extensionist, DA RFO2 could establish a demonstration farm within the barangay to showcase the application of the recommended technology being discussed by the SOA program.
- h. Soliciting Support of SUCs –DA RFO2 can involve experts from the SUCs to become tutors of farmer-listeners who have clarifications or questions on a recommended technology that they inadequately understand from the broadcast and which they already need in their farm activity.
- i. SOA Podcast – The practice of uploading the SOA episodes should continue as a means by which farmer listeners could review the lesson for greater understanding and mastery. In addition, the edited version of the live streamed radio program could be enhanced with footages of the technology discussed juxtaposed with the image of the anchors and expert guest.
- j. Instructional Support Materials – For the farmer-listeners to master the technology recommended by the SOA program, complementary instructional

materials could be produced and distributed to them on graduation day for them to be able to revisit and review the lessons.

REFERENCES

- Battisti D S, Naylor RL. 2009. Historical warnings of future food insecurity with unprecedented seasonal heat. *Science* 323, 240–244. DOI: 10.1126/science.1164363
- Briones RM. 2017. Characterization of agricultural workers in the Philippines. QC: Philippine Institute of Development Studies. Accessed from <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps1731.pdf>
- ADB. 2012. Addressing climate change and migration in Asia and the Pacific. Accessed from <https://www.adb.org/sites/default/files/publication/29662/addressing-climate-change-migration.pdf>
- DARFO2. 2018. Kaalamang Pagsasaka sa Himpapawid Operations Manual.
- Gomez EJ. 2019. SLAC proves 11 MT/ha palay harvest possible. Accessed from <https://www.manilatimes.net/2019/03/14/business/agribusiness/slac-proves-11-mt-ha-palay-harvest-possible/525101/525101/>
- Howden M, Soussana JF, Tubiello FN, Chhetri N, Dunlop M, Meinke H. 2007. Adapting agriculture to climate change. *PNAS* 104 (50) 19691-19696 DOI:org/10.1073/pnas.0701890104 Accessed from <https://www.pnas.org/content/pnas/104/50/19691.full.pdf>
- Iizumi T, Ramankutty N. 2016. Changes in yield variability of major crops for 1981–2010 explained by climate change. *Environmental Research Letters* 11, p.034003.
- Inso FA. 2018. Declining farmer population. Accessed from <https://cebudailynews.inquirer.net/191635/declining-farmer-population#ixzz620nY9AQ8>
- IPCC. 2009. Report of the 31st Session of the Intergovernmental Panel on Climate Change. Bali, Indonesia, 26-29 October 2009. Accessed from https://www.ipcc.ch/site/assets/uploads/2018/05/final_report_31.pdf
- Koirala KH, Mishra AK, Mohanty S. 2014. Impact of land ownership on productivity and efficiency of rice farmers: A simulated maximum likelihood approach. Accessed from <https://www.researchgate.net/publication/266674418> DOI: 10.13140/2.1.4979.0729

- Lesk C, Rowhani P, Ramankutty N. 2016. Influence of extreme weather disasters on global crop production. *Nature* 529, 84–87. DOI: 10.1038/nature16467
- Myres M. 2008. Radio and development in Africa. A Concept Paper Prepared for the IDRC Final Draft August 2008 (online sources)
- OECD. 2001. Adoption of technologies for sustainable farming systems. Wageningen Workshop Proceedings. Accessed from <https://www.oecd.org/greengrowth/sustainable-agriculture/2739771.pdf>
- Smit B, Pilifosova O. 2001. Adaptation to climate change in the context of sustainable development and equity. Chapter 18 in *Climate change 2001: Impacts, adaptation, and vulnerability—contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK: Cambridge University Press.
- The New Humanitarian. 2013. Filipino farmers – a dying breed. Accessed from <http://www.thenewhumanitarian.org/feature/2013/02/26/filipino-farmers-dying-breed>
- UNFCCC. 2007. *Climate change: Impacts, vulnerabilities, and adaptation in developing countries*. Bonn, Germany.
- Urban DW, Sheffield J, Lobell DB. 2015. The impacts of future climate and carbon dioxide changes on the average and variability of US maize yields under two emission scenarios. *Environmental Research Letters*. DOI: 10,045003.
- Vista AB. 2014. Simulating climate-induced impacts on Philippine agriculture using computable general equilibrium analysis. *J. ISSAAS* 20, 1:16- 28. Accessed from <https://pdfs.semanticscholar.org/7dd6/311ab362b6388d699364e68f0646a931025a.pdf>
- World Bank. 2008. *Development and climate change: A strategic framework for the World Bank Group*. Washington, DC.

ANNEX A

ENUMERATORS' INTERVIEW GUIDE FOR FARMERS

Part I – Profile of Farmer Listeners

A. Socio-economic Information

To the Enumerator: Tell the Respondent (R): I would like to get information about your socio-economic life. Kindly provide me the information on the following:

1. Are you a Male Female

2. What is your age as of last birthday? _____

3. What is your civil status? Single Married
Widowed/Separated

4. Highest Educational Attainment: What is the highest level of education have you attained? Put a check mark on the space of the response given

 Never in school
 Some years in elementary
 Elementary graduate
 Some years in high school
 High school graduate
 Technical/vocational graduate
 Some years in college
 College graduate
 Some units in the graduate school
 Master's graduate
 Others, please specify: _____

5. What is your estimated annual family income? _____

6. Sources of family income:
 Farming
 Fishing

- ___ Public employment
 - ___ Private employment
 - ___ Others, please
- specify: _____

B. Biophysical Information

1. What is the land area that you till for rice: _____ hectares?
2. What is the land area that you use for other crops: _____ hectares?
3. What is the average harvest per hectare of rice (1 cavan = 50 kg) during the DRY season?: _____ cavans
4. What is the average harvest per hectare of rice (1 cavan = 50 kg) during the WET season?: _____ cavans

Part II – School-on-the Air Participation and Assessment of Awareness, Knowledge, & Adoption

A. SOA Participation

1. There were several episodes of the SOA program. What were those you listened to?

Note to the Enumerator: Wait for the spontaneous answer of the R. Put 2 checkmarks if the cause is spontaneously given (meaning R volunteers gives it as an answer). Then, if he/she cannot provide answers. Ask R. “Do you remember of the following as a topic you heard. Tell me if it is Yes or No as I give them one by one.” Whatever is the answer put one checkmark in the corresponding cell.

Yes	No	Topics
		Overview of the Model Rice Cluster
		Model Rice Cluster: Interventions from the DA-RFO 2 and other agencies
		Model Rice Cluster: Methodologies
		School-On-the-Air (SOA) Climate Smart Agriculture in Cagayan Valley: Rationale
		School-On-the-Air (SOA) Climate Smart Agriculture in Cagayan Valley: Introduction of the project implementers
		Climate Change 101 (science & concepts of climate change, causes, effects),

		Impact of climate change on agriculture and food security
		Climate change adaptation and mitigation mechanisms: the Philippine Rice Information System (PRISM)
		Integrated diversified farming system .
		Climate change adaptation and mitigation practices of the <i>Palayamanan Plus System</i>
		Components of <i>Palayamanan Plus System</i>
		Importance of having fallow period crops and planting high value crops
		Climate-resilient vegetable crops and drip irrigation technology
		Successful stories of farmers on integrated rice-based farming system used as both adaptation and mitigation strategy
		Importance of crop insurance in case of calamity (drought or flood).
		Variety and Seed Selection
		Land Preparation
		Crop Establishment
		Nutrient Management
		Water Management
		Pests and Diseases Management
		Harvest Management
		Post-Harvest Operations
		Marketing

2. How did you listen to the SOA program?
 - ___ through owned transistor radio
 - ___ through radio apps of the cellphone
 - ___ through a neighbor's transistor radio
 - ___ Others, please specify

3. Where did you listen the SOA program?
 - ___ at home
 - ___ in the farm
 - ___ others, please specify: _____

4. How much of the information you heard from the SOA – CSA can you recall at this time?
 - ___ Only a little
 - ___ Much
 - ___ Very Much

5. Were you an awardee in the SOA-CSA graduation?

_____ Yes

_____ No

6. If Yes, what is

it? _____

B. Level of Awareness, Level of Knowledge, and Level of Adoption

1. Are you aware of the causes of climate change?

_____ Yes

_____ No

2. If Yes, kindly enumerate what are these? Kindly tell also how much knowledge do you have of those which you are aware of.

Note to the Enumerator: Wait for the spontaneous answer of the R. Put 2 checkmarks if the cause is spontaneously given (meaning R volunteers it as an answer). Then, if he/she cannot provide answers. Ask R. "Do you remember of the following as causes of climate change. Tell me if it is Yes or No as I give them one by one." Whatever is the answer put one checkmark in the corresponding cell.

As to the level of knowledge, ask R "How much knowledge to they have with each cause mentioned. If they are not aware of the cause, don't ask the level of knowledge.

Awareness		Causes	Knowledge Level		
Yes	No		Little	Much	Very Much
		Overpopulation			
		Deforestation/Illegal logging			
		Smoke belching of vehicles			
		Use of Fertilizers			
		Use of Pesticides			
		Animal /Household Wastes			
		Use of electrical appliances			
		"Kaingin" System in Upland Farming			
		Factories/Industries Operation			
		Burning of agricultural/crop residues			

3. Are you aware of the effects of climate change? *Check whatever is the answer.*

_____ Yes _____ No

4. If Yes, kindly enumerate what are these? Kindly tell also how much knowledge do you have of those which you are aware of.

Note to the Enumerator: Wait for the spontaneous answer of the R. Put 2 checkmarks if the effect is spontaneously given (meaning R volunteers it as an answer). Then, if he/she cannot provide answers. Ask R. "Do you remember of the following as effect of climate change. Tell me if it is Yes or No as I give them one by one." Whatever is the answer put one checkmark in the corresponding cell.

As to the level of knowledge, ask R "How much knowledge to they have with each effect mentioned. If they are not aware of the effect, don't ask the level of knowledge/

Awareness		Effects	Knowledge Level		
Yes	No		Little	Much	Very Much
		Average temperature is increasing			
		Humidity is increasing			
		Irregular increase and decrease in the normal rainfall			
		Prolonged drought			
		Very wet season			
		Emerging of new vector-borne plant/animal diseases			
		Movement of the normal cropping pattern			
		High wind and heat waves			
		Decreasing yield			
		Natural calamities are frequently occurring			
		Famine			
		Crop Failure			
		Extinction of plant/animal species			
		Livestock/Crop disease outbreak			
		Decreasing crop/livestock biodiversity			

C. Level of Knowledge and Adoption of CSA Technologies

Note to the Enumerator: As R the level of knowledge, he/she possesses about the technology. Say, “Kindly tell me how much knowledge you have about each technology taught in the SOA. Your answer could be Little if you know just a few about it; Much if you have enough knowledge; and Very Much if you have more than enough knowledge. (Check the column mentioned). Then, ask: “With this technology you know, what is the level of adoption you are applying them in your farming? Your answer could be Never if you are not using at all, Sometimes if you use once in a while; Almost Always if you use it more often; and Always if you use them every cropping. (Check the column mentioned).

Level of Knowledge			Technologies	Level of Adoption			
Low	Much	Very Much		Never	Sometimes	Almost Always	Always
			Planting of drought and flood resistant varieties of crops				
			Crop diversification				
			Change in cropping pattern and calendar of planting				
			Mixed cropping				
			Using Improved irrigation efficiency				
			Integrated Pest Management				
			Integrated Soil Nutrient Management				
			Adopting soil				

			conservation measures				
			Organic Farming				
			Using upgraded breeds of livestock				
			Income diversification				
			Using farm machinery equipment				
			Applying the 3Rs in the farm (reduce, reuse, and recycle)				
			Using climatic information in farming				
			Using different cropping systems (SCoPSA, SALT)				

D. Problems Encountered in the Adoption of CSA Technologies

1. What are the problems you encountered in the process of adopting the recommended CSA Technologies?
 - ___ inadequate knowledge
 - ___ lack of financial resources
 - ___ natural calamities
 - ___ lack of support from agencies
 - ___ Others, please specify_____

2. Have you received support from government and private agencies in connection with the adoption of CSA technologies? What are these? I will mention an agency and tell me if you received help from their staff. If Yes, tell me the support received.

Agency	Support Given?		Nature of Support
	Yes	No	
NIA			
DARFO 2			
ATI			
PAJ			
PCIC			
PhilRice			
SUC in the Area			
PFRB			
Radyo ng Bayan			
PAJ			
GUMIL			
IRRI-CCAFS SEA			
CVAARD			
PLGU			
MLGU			
Others			

Part III – Benefits of SOA – CSA Participation and Adoption of CSA Technologies

A, Knowledge and Behavior Changes

To the Enumerator: Record the response by checking the appropriate space. In items that require more than one response, check as many as provided by the R

1. What are the sources of your knowledge about climate smart technologies?

- ___ DA SOA – CSA
- ___ Other Radio programs
- ___ Television
- ___ Field days
- ___ Meetings/For a
- ___ Social Media
- ___ Seminar-workshops
- ___ Farmer leaders
- ___ Extension workers from the MAO

- Extension workers from agricultural suppliers
- Flyers, pamphlets from DA and other agencies
- Others, please specify _____

2. How useful were the information heard in your rice production activities?

To the Enumerator: Record the response by checking the appropriate space

- Not at all
- Somewhat Useful
- Useful
- Very Useful

3. To what extent has the information you heard from the SOA – CSA influenced your rice production practices?

- Not at all
- Slightly influenced
- Moderately influenced
- Fully influenced

B. Economic Benefits

To the Enumerator: Record the response by checking the appropriate space. In items that require more than one response, check as many as provided by the R

1. Has your farm yield increased with your adoption of climate smart technologies?

- Yes
- No

2. In your assessment, how would you rate this increase?

- Very Little
- Little
- More than enough
- Much
- Very much

3. If it increased, how many cavans, @ 50kg(dry) /ha, were there?

4. In terms of farm income, has there increase with your adoption of climate smart technologies?
_____ Yes
_____ No
5. In your assessment, how would you rate this increase?
____ Very Little
____ Little
____ Much
____ Very much
6. If yes, how much per hectare? Php_____

Part IV - Preferences on Future SOAs and Program Features

To the Enumerator: Record the response by checking the appropriate space. In items that require more than one response, check as many as provided by the R

A. Commodity Preferences on Future SOA-CSA

1. Would you like to participate in another SOA-CSA again?
_____ Yes _____ No
2. If Yes, what commodity would you want next discussed in the SOA – CSA?
____ Corn
____ Livestock (large and small ruminants)
____ HVC (fruits, vegetables, Industrial trees (coffee & cacao))
____ Poultry
____ Fish farming
____ Others, please specify:_____

B. SOA Program Features

1. What time would you prefer for the SOA CSA broadcast?

- ___ 5am to 6am
- ___ 11am to 12noon
- ___ 12N to 1pm
- ___ 5pm to 6pm
- ___ 6pm to 7pm
- ___ Others, please specify _____

2. In which radio station in your area would you like the SOA-CSA broadcast? Check what is mentioned by R.

Cagayan	Isabela	Nueva Vizcaya	Quirino
DWDA	DWRA	UFM	DWQP
DWPE	DWSM		
DRTG	DWSI		
DWTS			
DWRL			
DWRE			
Radyo Kalugaran			
Radyo Natin			

3. Which tandem of announcers do you prefer to host the program?

- ___ Both Male announcers
- ___ Male and Female announces
- ___ Both Female announcers

4. In which language would you prefer to use in the program?

- ___ Ilokano
- ___ Tagalog
- ___ Ibanag
- ___ Itawes
- ___ Kankanaey
- ___ Isinay
- ___ Yogad
- ___ Gaddang
- ___ Others, please specify _____

ANNEX B

FOCUS GROUP DISCUSSION SESSION GUIDE

1. Why did you listen to the SOA-CSA program?
2. What were your expectations about the SOA-CSA program?
3. Were your expectations met as the broadcast progressed? After graduation?

Why or why not?
4. What were these unmet expectations?
5. Are you adopting what you learned from the SOA-CSA? Why and why not?
6. What agencies (government, non-government, SUCs, private companies)

have extended assistance in any form for you to adopt the CSA technologies?
7. Would you be willing to participate again in another SOA-CSA program?

Why?
8. In what commodity would you prefer the next SOA-CSA be tackling? Why?
9. What preference do you have in terms of the following?
 - a. Time slot
 - b. Radio station
 - c. Broadcasters
 - d. Language used

10. In what ways could the SOA-CSA be of wider reach to farmers? What could your organization do to help farmers without a radio set?

ANNEX C

PHOTO DOCUMENTATION



INTERVIEW WITH FARMER LISTENER GRADUATES





FOCUS GROUP DISCUSSION WITH FARMER GROUPS' OFFICER
LISTENER GRADUATES





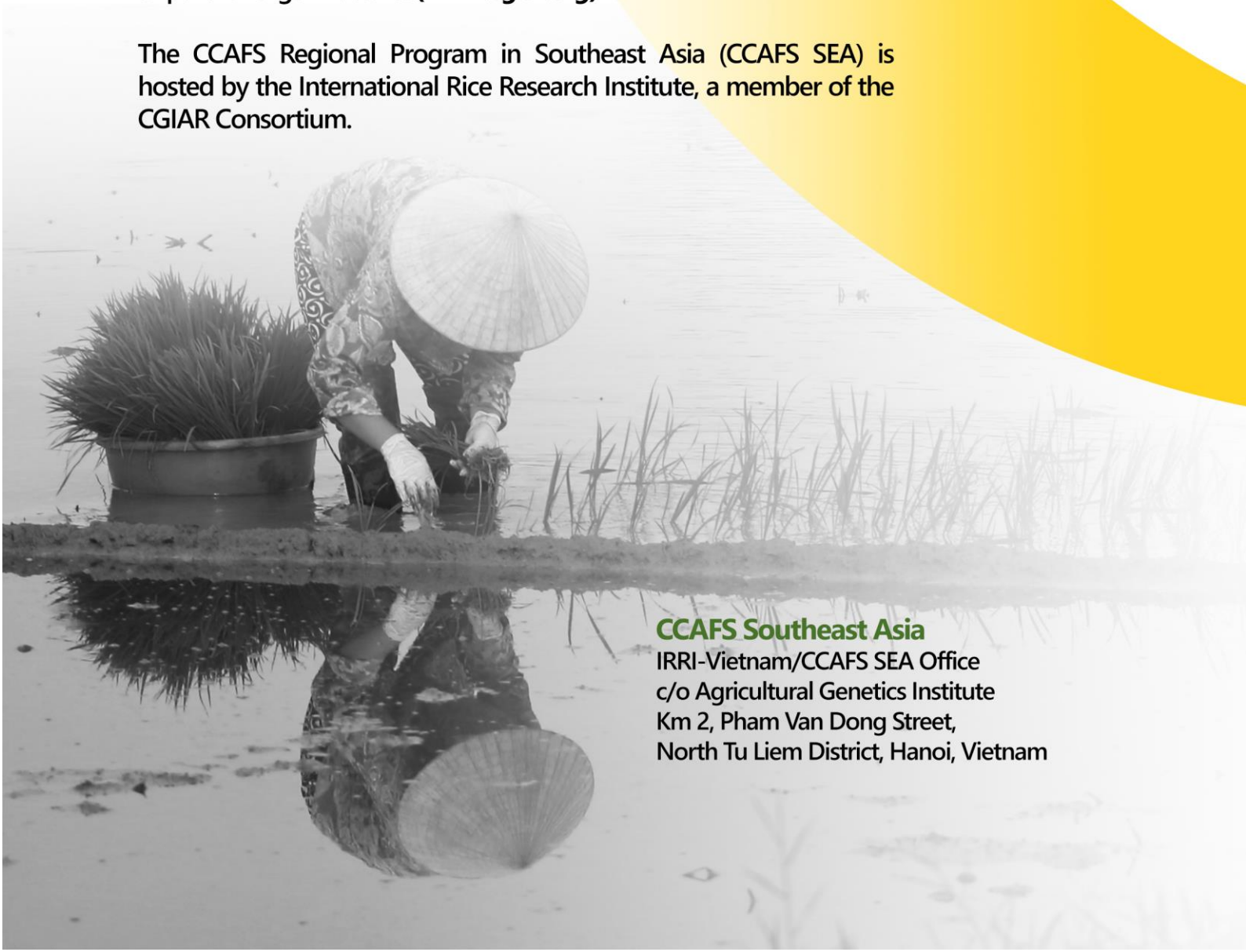
RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



The **CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)** is a strategic partnership of CGIAR and Future Earth, led by the International Center for Tropical Agriculture (CIAT). CCAFS brings together the world's best researchers in agricultural science, development research, climate science and Earth System science, to identify and address the most important interactions, synergies and trade-offs between climate change, agriculture and food security. (www.ccafs.cgiar.org)

CGIAR is a global agriculture research partnership for a food secure future. Its science is carried out by the 15 research centers which are members of the CGIAR Consortium, in collaboration with hundreds of partner organizations. (www.cgiar.org)

The CCAFS Regional Program in Southeast Asia (CCAFS SEA) is hosted by the International Rice Research Institute, a member of the CGIAR Consortium.



CCAFS Southeast Asia

IRRI-Vietnam/CCAFS SEA Office
c/o Agricultural Genetics Institute
Km 2, Pham Van Dong Street,
North Tu Liem District, Hanoi, Vietnam