HOW FARMERS ADAPT TO CLIMATE CHANGE IN AGRICULTURAL PRODUCTION: A CASE STUDY IN KY SON COMMUNE, KY ANH DISTRICT, HA TINH PROVINCE

Trinh Quang Thoai
Vietnam National University of Forestry – Dong Nai Campus

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SUMMARY

Agriculture has become an extremely vulnerable industry to the impacts of climate variability and change. Thus, strengthening adaptation capacity to climate change in agriculture is a societal priority in most of countries in the world, especially in the developing countries where a large number of people depended on agricultural production. The results of the study show that climate change signals have been really clear in Ky Son commune through increasing extreme weather events, especially drought and hot spell. Farmers in Ky Son commune have revealed a lot of risks caused by climate change for their agricultural production. Farmers in the commune have considered adaptive strategies to climate change in agricultural production, of which weather forecasts update and changing crop varieties are the most popular adaptive strategies. The study indicated 7 factors that have significant effects on farmers' decision in adaptation to climate change in agricultural production in the Ky Son commune, of which attendance in the training courses is the factor that have highest effect level. The study proposed the policies to improve farmers' adaptive capacity to climate change in agricultural production in Ky Son commune including: (1) Broadening training courses on climate change; (2) Continuing the preferential credit; (3) Promoting large-scale production patterns; and (4) Downscaling and Localizing weather forecast information.

Keywords*:* Adaptation, agricultural production, climate change, factors affecting, farmer.

1. INTRODUCTION

Climate change has become a threat to human society (Kibue et al., 2015), particularly in developing countries where smallholder farmers are greatly affected and are becoming increasingly more vulnerable to extreme weather events (Comoé and Siegrist, 2015). Thus, adaptation to climate variability and change is now gaining wide recognition and is a focal concern around the world (Thornton and Comberti, 2013).

Agriculture as the major means of man for providing food sustainability is highly dependent on and strongly affected by weather and climate as well as extremely related events (Sivakumar, 2011). Therefore, global agriculture has become an extremely vulnerable industry to the impacts of climate variability and change (Sima et al., 2015). Climate change has adversely affected crop production and yields in important agricultural regions of the world (Riedsma et al., 2009). In addition, higher temperature due to climate change may result to lower yields of crops with significant economic importance due to higher weed and pest proliferation (Nelson et al., 2009).

Increasing resilience and adaptation capacity to climate change in agriculture is a societal priority in most of countries in the world, especially in the developing countries where a large number of people depended on agricultural production (Kibue et al., 2015). Adaptation to climate change is necessary to reduce losses in agricultural production (Hirota et al., 2011). In addition, adaptation to climate change in agriculture is also an imperative task to ensure food and livelihood security of smallholder farmers (Nelson et al., 2009; Kibue et al., 2015). Agriculture has remained an important sector for Vietnam since it contributes 15% to national GDP and employs of 40% of the country's labor force (OECD, 2020). Thus, the Vietnamese Government has intensively considered improving its ability to adapt to climate change in agricultural production (Schmidt-Thomé et al., 2015).

There are many types of adaptive strategies to climate change in agricultural production.

Smith and Skinner (2002) divided adaptive strategies to climate change into four different categories, including (1) technological developments; (2) government programs and insurances; (3) farming production practices; and (4) farm financial management. Adaptation options may also involve agricultural systems, location, and climate change scenario (Rosenzweig and Tubiello, 2007). This also includes crop management, land management, irrigation management, income diversification, and rituals (Esham and Graforth, 2013).

Ky Son commune locates in the southwest mountainous region of Ky Anh district, Ha Tinh province. The commune has a total area of 90.36 square kilometers. Total population of the commune in 2019 is about 6,634 people. The major economic activity of the commune is agricultural production. The annual crops of the commune are rice, peanut, and cassava. Climate change has caused higher frequency and intensity of extreme weather events such as storms, flood, drought, cold spell in Ha Tinh province (Ha Tinh Provincial People's Committee, 2014). Moreover, the frequency and the strength of these natural disasters are likely to be more serious in the context of upcoming climate change in the province (ISPONRE, 2009). These extreme occurrences have also affected greatly and directly agricultural production of the region (Ha Tinh Provincial People's Committee, 2014).

To adapt with climate change in agricultural production, farmers in Vietnam have initiated a number of autonomous and planned adaptive practices, such as adjusting sowing dates, switching to drought-tolerant crops, changing crop varieties, and switching to rice-fish rotations (World Bank, 2010). This paper aims to determine how farmers in Ky Son commune adapt to climate change in agricultural production and analyzes the factors affecting their decision in adaptation to climate change in agricultural production.

2. RESEARCH METHODOLOGY

2.1. Method of data collection

The study used both primary and secondary data and applied various data collection methods. Desk study method was used to review existing literatures including annual reports of Ky Son People's Committee, journal articles, and research results regarding climate change adaptation in agricultural production of individuals and organizations. The secondary data consists of socioeconomic data of the study site such as population, economic structure. The collected primary data includes awareness, experiences of local communities and smallholder farmers on climate change as well as their practices and strategies to cope with climate change in agricultural production.

The primary data used in the study was collected by in-depth interview, focus group discussion (FGD), and individual interview using structured questionnaire. In-depth interview method was applied to discuss with 5 key informants including Head of Ky Son People's Committee, Head of villages, and Head of Farmer's Union. One FGD was conducted with 10 participants including representatives of People's Committee, Farmer's Union, Women's Union, Youth's Union, and head of villages. The primary data collected by in-depth interview and FGD focused on awareness, perception of local community and smallholder farmers in Ky Son commune on climate change and impacts of climate change on agricultural production as well as farmers' practices and strategies to confront with risks of climate change in agricultural production in the commune.

Individual interview was applied to gather information from farmers in the commune. According to statistical data of Ky Son People's Committee (2019), the commune has 1,957 households, of which about 98% of them has livelihood based on agricultural production (equivalent to 1,918 households). Since most of households in the commune have similar production conditions and face similar impacts of climate change on agricultural production, the random sampling method was applied to select research sample. With random sampling method, the Yamane's formula (1967) was applied to determine sample size. The formula

is as follows (N is total population of study area, n is sample size, and e is expected error with maximum acceptable value is 5%):

$$n = \frac{N}{1 + N * e^2}$$

With 1,918 agricultural households of the commune and 5% of expected error in sample selection, the sample size determined by applying Yamane's formula is 331 household's representatives. To ensure the significance of the study, 400 farmers in the commune were interviewed using structured questionnaire. The collected primary data by individual interview includes household's socioeconomic conditions, household's agricultural production, impacts of climate change on household's agricultural production, and household's adaptive strategies to climate change in agricultural production.

2.2. Data Analytical Tools

2.2.1. Descriptive statistics method

This study used descriptive statistics to show the general status of the respondents (farmers). Moreover, the study also applied this method to analyze the vulnerability situation as well as farmers' strategies to climate change in agricultural production in the study region. The parameters used include maximal value, minimal value, standard deviation, frequency and others.

2.2.2. Binary logit model

This study used the binary logit model to analyze factors influencing farmers' decision on adaptation to climate change in agricultural production. Farmers who applied at least one adaptive strategy get value as one (1). By contrast, zero (0) notes for farmers who did not use any adaptive strategies.The general form of a binary logit model is as follows Greene, 2003):

$$P_i\ (Y_i = 1) = \frac{e^{X\beta}}{1 + e^{X\beta}}$$

Where:

P_i is the probability of occurring one event ($Y_i = 1$: event occur;

$Y_i = 0$: event does not occur);

β is vector of parameters, and X is vector of factors affecting.

Marginal effect (ME) coefficient is a major tool to analyze the binary logit model. Marginal effect coefficients are determined through the following formula (Greene, 2003):

$$ME = \frac{\partial \Lambda(X'\beta)}{\partial X} = \Lambda(X'\beta)[1 - \Lambda(X'\beta)]\beta$$

Where:

X is independent variable matrix in logit model (factors affecting);

β is matrix of parameters in logit model;

The variables of the binary logit model are defined in the Table 1.

Table 1. Definition of explanatory variables of the empirical binary logit models

VARIABLE DEFINITION	NOTATION	MEASURED UNIT
Age of household's head	AGE	Year
Sex of household's head	SEX	1 = male; 0 = female
Educational level of household's head	EDU	Year
Farm size	FSIZE	Sao (500 m^2)
Damage level due to climate change	DAMAGE	VND million/year
Availability of household' agricultural labor	AGLABOR	Laborers
Farming experience	FEXPER	Years
Access to credit	CREDIT	1 = yes; 0 = no
Attendance in climate change training	TRAIN	1 = yes; 0 = no
Membership in local organizations	MEMBER	1 = yes; 0 = no

3. RESULTS AND DISCUSSIONS

3.1. Climate change and its impacts on agricultural production in Ky Son commune

Climate change is increasingly showing the clear signals in Ky Son commune and Ky Anh district in general. It is shown by increasing in average monthly temperature in the region over 40 years (Figure 1). Climate change and its signals are the reasons for the increasing frequency and intensity of extreme weather events in the commune and Ky Anh district. The extreme weather events such as drought, flood, cold spells and typhoons occur annually in the region; with droughts are the most frequent. Every year, the Ky Anh district faces three months of drought starting from April and most seriously in July (ISPONRE, 2009). The length of the drought incidence has also been increasing over time in the region (Coulier, 2016).

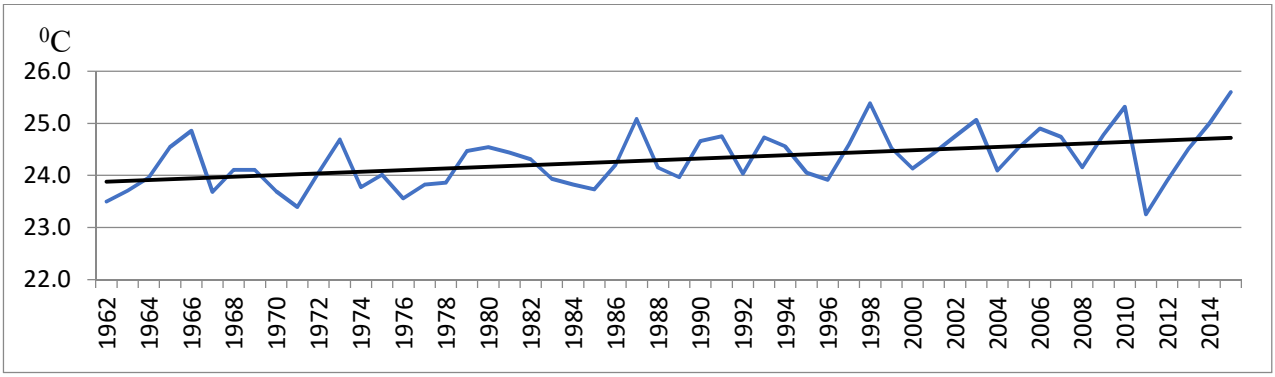

Figure 1. Average monthly temperature trend of Ky Anh district, 1961-2015 (IMHEN, 2016)

The extreme weather events due to climate change also have been identified by people in the commune and in the district. All of participants in in-depth interview and focus group discussion revealed the frequent appearance and high intensity of the extreme weather events in the region (Table 2).

Table 2. People's experiences to extreme weather events due to climate change in Ky Son commune, Ky Anh district, Ha Tinh province

Source of information	Type of weather events in the region and trends
In-depth interview of commune leaders; heads of villages, Famer's Union	- Drought, flood, hot spell and cold spell occur more frequently and intensely - Cyclone is unpredictable and more frequent
Focus group discussion with local stakeholders	- Storms, typhoon and cyclone appear with high intensity - Hot spell and drought tend to come earlier, occur longer and have high intensity

Source: Results of in-depth interview and FGD

Along with the recognition of the occurrence of climate change, local people in Ky Son commune have also mentioned that drought and flood are the most frequent extreme weather events in the commune (Figure 1). Many farmer respondents (78%) in Ky Son commune reported that drought is the most frequent extreme event in the region during the last five years. In addition, they have also revealed the increase in intensity and length of drought in the region (Coulier, 2016). Flood is also the second frequent extreme weather event in the area. Twenty two percent (22%) of the respondents reported the very frequent flood occurrences in the area. Meanwhile, nearly 60 percent of the people also identified the regular appearance of floods in the commune in recent years.

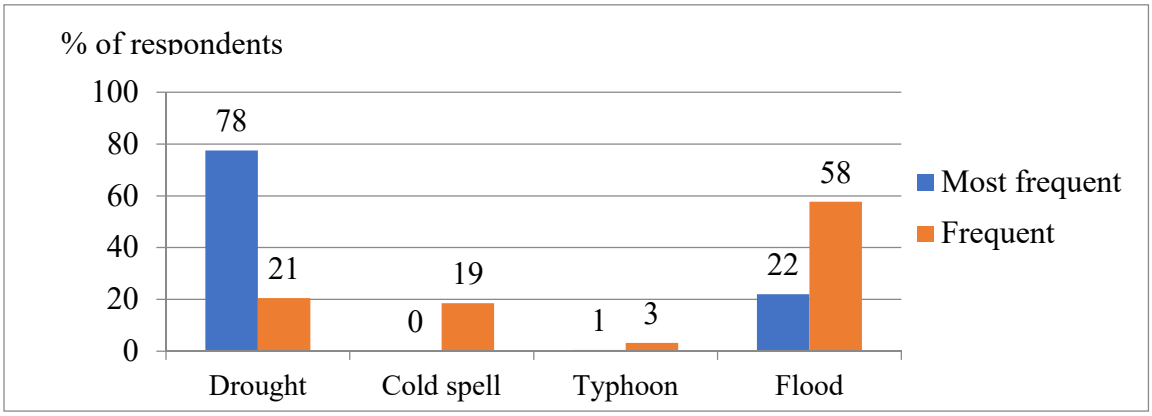

Figure 2. Farmers' perception on the occurrence of the extreme weather events during the last five years in Ky Son, Ky Anh district, Ha Tinh province

(Source: Investigated data)

The highly frequent occurrences of extreme weather events caused by climate change induced a lot of losses for agricultural production and livelihood of people in Ky Son commune, Ky Anh district, Ha Tinh province. The losses due to climate change in the region include decrease in crop productivity, increase in agricultural production cost, reduction in cultivated land, income reduction, and intensification in adaptation cost (Table 3).

Local people described the most noticeably adverse effect of climate change on smallholder farmers is agricultural income reduction. It is because most of smallholder farmers mainly depend on agricultural production, while agricultural production in Ky Son commune is strongly affected by negative impacts of climate change. Due to longer period of drought, cultivated land reduction becomes popularly in the commune, especially in the summer-autumn season (the second season of the commune). Annually, the second crop season (summer-autumn season) in Ky Son commune starts in June. However, June and July are the extreme season of drought in the area and this trend is more likely to increase in the recent years (ISPONRE, 2009). Thus, most of the farmers cannot cultivate in the rice field because of drought and poor irrigation systems in the region. Smallholder farmers in the commune also try to cultivate green bean in the second crop season. However, yield of green bean is also low because of lack water during this season. As a result, farmers vacated mostly their cultivated land in the summer-autumn season and worked as hired agricultural laborers.

Table 3. Local experiences to adverse effects of climate change on agricultural production in Ky Son commune, Ky Anh district, Ha Tinh province

Type of effects	Ranking*
Decrease in crop productivity	3
Increase in agricultural production cost	4
Reduction in cultivated land	2
Increase in adaptation cost	5
Reduction in agricultural income	1

Source: Result of FGD with local stakeholders (1: highest level, 5: lowest level)*

Climate change also leads to increasing agricultural production cost for smallholder farmers in the commune. Due to unpredictable frequency and intensity of cold spell in January (starting time of winter-spring season) and hot spell in June (beginning time of summer-autumn season), most of smallholder farmers in Ky Son commune have to conduct replanting most of crops. This caused increase in agricultural production cost for smallholder

farmers in the region.

Farmers in the study site have also recognized the adverse effects of climate change on their agricultural production. A number of people (67%) revealed that the decrease in their crop yield is the direct effect of climate change on their agricultural production (Table 4). They also mentioned that climate change could increase their production (38%) or adaptation costs (9%). In addition, some people (4%) revealed that the reduction in the cultivated land area and soil erosion also resulted from climate change.

Table 4. Farmers' perception of adverse impacts of climate change on agricultural production in Ky Son commune, Ky Anh district, Ha Tinh province

Item[M]	Number of respondents	Percentage
Decrease crop yield	268	67
Increase production cost	152	38
Reduce cultivated land	36	9
Soil erosion	16	4
Increase adaptation cost	16	4

Note: M is multiple choice question *Source: Investigated data*

Table 5 shows the losses of farmers in the study site due to damages caused by extreme weather events that resulted from climate change. Seventy eight percent (78%) revealed the damage of climate change for their agricultural production. In addition, 56% of farmers in the commune reported that they could not cultivate in the second season (summer-autumn season) due to drought. The second crop season (summer-autumn season) in the region starts annually in June. However, June and July are the extreme season of drought in the area and this trend is more likely to increase in the recent years (ISPONRE, 2009). Most of the farmers cannot do anything in the rice field because of drought and poor irrigation systems in the region. Farmers also try to cultivate green bean in the second crop season. However, yield of green bean is also low because of lack water during this season. As a result, farmers vacated mostly their cultivated land in the summer-autumn season and worked as hired agricultural laborers. Hired agricultural labor has contributed an important role to household's income in Ky Son commune (Coulier, 2016).

Table 5. Farmers' losses in agricultural production due to extreme weather events in Ky Son commune, Ky Anh district, Ha Tinh province

Item	Measured unit	Value
Have been damaged by extreme events	% of respondent	78
Cannot plant for the 2nd season due to drought	% of respondent	56
Loss of annual crop in the total crop income	%	19
Estimated loss of annual crop per ha	VND million	9.0
Estimated loss of annual crop per year	VND million	2.4

Source: Investigated data

On the average, each investigated household in Ky Son commune lost estimably VND 2.4 million due to extreme events caused by climate change. The estimated loss level is equivalent to VND 9.0 million per hectare. The losses are mainly a decreasing crop yields and an increasing production cost (cost of seedling, fertilizer, etc. for replanting). Although the loss level of annual crops may be low in terms of the overall picture for most people, it appears to be high for farmers in Ky Son commune. It is because this loss already occupied nearly 20% of household's income from annual crops. This proportion burdened farmers in the commune, especially poor farmers whose livelihood depends largely on agricultural production.

3.2. Farmers' adaptive strategies to climate change in agricultural production in Ky Son commune

To reduce the losses of agricultural production due to climate change, farmers in Ky Son commune have increased their attention and applied different adaptive practices. A large number of investigated farmers (74% or 296 respondents) in the commune reported that they applied at least one adaptive strategy to extreme weather events caused by climate change in their agricultural production. However, few farmers (9%) had only one adaptive strategy to climate change. Normally, farmers applied from two to three adaptive practices. Especially, 3% of the farmers applied five adaptive strategies to cope with climate change in their agricultural production (Figure 2).

The major adaptive strategies to extreme weather events of farmers include changing crop varieties, switching to new cultivar types, adjusting farming calendar, following up weather forecasts, and intercropping (Table 5). In the total of farmers who applied at least one adaptive strategy to climate change in agricultural production (296 people) in Ky Son commune, 85% chosed following up weather forecasts as priority adaptive tactic to extreme weather events caused by climate change. Thus, improving the quality of weather forecast and meteorological information could significantly increase adaptive efficiency of farmers to climate change in agricultural production in the study area. The second popular adaptive strategy is change crop variety that was selected by 65.9 % of investigated farmers in the commune. The percentage of farmers who chose adjust farming calendar, switch to new cultivar types, and intercropping as adaptive strategies to climate change in agricultural production are 28.0%, 19.9% and 8.1%, respectively.

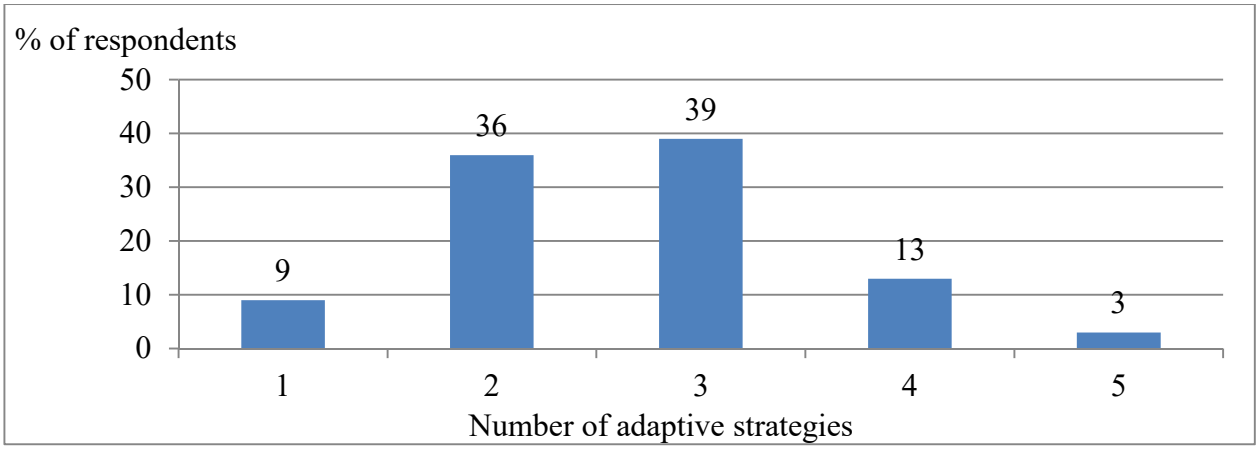

Figure 3. Number of adaptive strategies of farmers to climate change

(Source: Investigated data)

Table 5. Farmers' adaptive strategies to climate change in agricultural production in Ky Son commune, Ky Anh district, Ha Tinh province

Strategy[M]	Number of respondent (n = 296)	Percentage
Follow up weather forecasts	252	85.1
Change crop variety	195	65.9
Adjust farming calendar	83	28.0
Switch to new cultivar types	59	19.9
Intercropping	24	8.1

Note: M is multiple choice question *Source: Investigated data*

Along with analyzing the adaptive strategies of farmers to climate change in agricultural production in Ky Son commune, the study determined the factor affecting farmers' decision in adaptation to climate change in agricultural production. The binary logit model was applied to analyze the factors affecting farmers' decision in applying adaptive strategies to climate change in agricultural production. The model was tested for multicollinearity problem. In addition, the robust standard error procedure was used to

address the heteroskedasticity of the model. According to Wooldridge (2013), robust standard error could solve effectively heteroskedasticity since it gives relatively accurate P-value to ensure the significance of the binary logit model.

The estimated results (Table 6) shows that the Wald χ^2 (415.1) is highly significant. It implies that there was an overall significant relationship between 10 explanatory variables considered and the probability of adaptation to climate change in agricultural production of farmers at 1% significant level. The value of Pseudo R^2 (0.4916) is also highly significant (since Prob > χ^2 = 0.000), meaning that 10 explanatory variables explained significantly 49.16% of changing the probability that farmers apply adaptive strategies to climate mate change in agricultural production. Among explanatory variables, 7 variables including age of household's head, education level of household's head, farm size, damage level, farming experience, access to credit, and training attendance were the factors that affected significantly the probability that farmers adapt to climate change in their agricultural production. Of which, only age of household's head has negative effects. It implies that the older farmers have lower probability of applying adaptive strategies to climate change in agricultural production.

Table 6. Factor affecting farmers' decision on adaptation to climate change in agricultural production in Ky Son commune, Ky Anh district, Ha Tinh province

Variables	Coefficients	P-value	Marginal effects	P-value
Constant	-0.620*	0.058	-	-
Age of household's head (AGE)	-0.058*	0.055	-0.010*	0.056
Sex of household's head (SEX)	-0.251ns	0.401	-0.044ns	0.413
Educational level (EDU)	0.021*	0.073	0.004*	0.074
Farm size (FSIZE)	0.143***	0.000	0.024***	0.000
Damage level (DAMAGE)	0.279**	0.028	0.047**	0.016
Agricultural labor (AGLABOR)	0.106ns	0.621	0.018ns	0.620
Farming experience (FEXPER)	0.064**	0.033	0.011**	0.035
Access to credit (CREDIT)	0.276**	0.029	0.047**	0.030
Training attendance (TRAIN)	1.123***	0.000	0.155***	0.000
Organizations' member (MEMBER)	0.753ns	0.154	0.150ns	0.215
Log pseudolikelihood	-196.73	-	-	-
Wald χ^2	415.1	0.000	-	-
Prob > χ^2	0.000			
Pseudo R^2	0.4916	0.000	-	-
Number of observation	400	-	-	-

****, **, * are significant at 1%, 5%, and 10%, respectively; ns is non-significant*

Of the factors that have positive significantly effects on farmers' decision in adaptation to climate change in agricultural production, training attendance has the highest value of marginal effect (0.155). This value implies that farmers who attended the training course on climate change have 15.5% higher in the probability of adaptation to climate change in agricultural production than other farmers did, ceteris paribus. Damage level and access to credit are the factors that have the second highest effects on the farmers' probability of applying adaptive strategies to climate change in agricultural production. Farmers who bear higher damage level, and accessed to a loan from credit policy are likely to have 4.7% higher probability of adaptation to climate change in agricultural production compared to other farmers, ceteris paribus. The value of farm size is 0.024 and is significant at 1%. It implies that the probability of adaptation to climate change in agricultural production of farmers who have larger farm size is 2.4% higher compare to other farmers have, ceteris paribus. Finally, farmers who have higher education level and more experienced farmers have 1.1% and 0.4% higher the probability of

adaptation to climate change in agricultural production than other farmers, respectively. While, gender of household's head, availability of household's agricultural labor, and membership of local organizations are the factors that have unclear effects on the farmers' probability of adaptation to climate change in agricultural production. It is because there is no big difference between these factors among farmers in the commune.

4. CONCLUSIONS AND RECOMMENDATIONS

The climate change signals have been really clear in Ky Son commune through local people's recognition. Due to climate change, many extreme weather events have increasingly occurred in the commune, especially drought and hot spell. Drought tends to be more serious for the commune with earlier and longer occurrence, and higher intensity. Smallholder farmers in Ky Son commune have faced a lot of risks caused by climate change for their agricultural production such as decrease in crop productivity, reduction cultivated land, intensification in adaptation cost, and reduction in household's income. Averagely, loss in annual crop production due to climate change of each household in Ky Son commune is approximately 20% of total household income.

Adaptation to climate change in agricultural production have been increasingly considered by farmers in the Ky Son commune. Most of the farmers in the commune have applied at least one adaptive strategy to climate change in agricultural production. There were five major adaptive practices to climate change in agricultural production in the commune including changing crop varieties, switching to new cultivar types, adjusting farming calendar, following up weather forecasts, and intercropping. Among these adaptive strategies, weather forecasts update and changing crop varieties are the most popular adaptive tactics.

The factors that have significant effects on farmers' decision in adaptation to climate change in agricultural production in the Ky Son commune include age of household's head, education level of household's head, farm size, damage level, farming experience, access to credit, and training attendance. While, sex of household's head, availability of household's agricultural labor, and membership of local organizations are the factors that have unclear effects on the farmers' probability of adaptation to climate change in agricultural production.

The empirical results show that most of farmers in the Ky Son commune have updated weather forecast to cope with climate change in agricultural production. In addition, attendance in the training courses on climate change, access to credit policy, and farm size are determined as the factors that have highly significant effects on farmers' decision in adaptation to climate change in agricultural production in the Ky Son commune. Thus, the policies that should be considered to improve adaptive capacity of farmers in Ky Son commune to climate change in agricultural production include: (1) Broadening training courses on climate change; (2) Continuing the preferential credit; (3) Promoting large-scale production patterns; and (4) Downscaling and Localizing weather forecast information.

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NÔNG DÂN THÍCH ỨNG NHƯ THẾ NÀO VỚI BIẾN ĐỔI KHÍ HẬU TRONG SẢN XUẤT NÔNG NGHIỆP: TRƯỜNG HỢP NGHIÊN CỨU ĐIỂN HÌNH TẠI XÃ KỲ SƠN, HUYỆN KỲ ANH, TỈNH HÀ TĨNH

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Trường Đại học Lâm nghiệp - Phân hiệu Đồng Nai

TÓM TẮT

Nông nghiệp là một lĩnh vực chịu tổn thương lớn bởi tác động của biến đổi khí hậu. Vì vậy, tăng cường khả năng thích nghi với biến đổi khí hậu trong sản xuất nông nghiệp là một ưu tiên hàng đầu ở tất cả các quốc gia, đặc biệt là các nước phát triển nơi có nhiều người sống phụ thuộc vào sản xuất nông nghiệp. Kết quả của nghiên cứu này đã chỉ ra rằng biến đổi khí hậu đã được xác nhận tại xã Kỳ Sơn thông qua sự xuất hiện ngày càng nhiều của các hiện tượng thời tiết cực đoan, đặc biệt là nắng nóng và hạn hán. Nông dân tại xã Kỳ Sơn đã chỉ ra rất nhiều thiệt hại trong sản xuất nông nghiệp của họ do tác động của biến đổi khí hậu. Nông dân tại xã Kỳ Sơn đã áp dụng một số chiến lược thích ứng với biến đổi khí hậu trong sản xuất nông nghiệp, trong đó cập nhật thông tin thời tiết và thay đổi giống cây trồng là các chiến lược thích ứng phổ biến. Nghiên cứu đã chỉ ra được 7 yếu tố có ảnh hưởng rõ rệt đến quyết định áp dụng các chiến lược thích ứng với biến đổi khí hậu trong sản xuất nông nghiệp của nông dân tại xã Kỳ Sơn, trong đó tham gia các lớp tập huấn về biến đổi khí hậu là yếu tố có ảnh hưởng lớn nhất. Nghiên cứu đã đề xuất được một số giải pháp để tăng cường khả năng thích ứng của nông dân tại xã Kỳ Sơn với biến đổi khí hậu trong sản xuất nông nghiệp bao gồm: (1) Mở rộng các lớp tập huấn về biến đổi khí hậu; (2) Tiếp tục thực hiện các chính sách tín dụng ưu đãi; (3) Khuyến khích các mô hình sản xuất lớn; và (4) Cụ thể hóa các thông tin dự báo thời tiết tới cấp độ địa phương.

Từ khóa: Biến đổi khí hậu, nông dân, sản xuất nông nghiệp, thích ứng, yếu tố ảnh hưởng.

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