

THE EFFECT OF CLIMATE CHANGE ON VEGETABLE FARMERS IN PEST CONTROL DECISIONS: CASE STUDY IN BOMBALI (SIERRA LEONE) AND BEYPAZARI (ANKARA) DISTRICTS

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ABSTRACT

The study was the effect of climate change on vegetable farmers in their pest control decisions (Case study Sierra Leone (Bombali District) and Turkey (Beypazari District)). With such the specific objectives were; to identify the new situation caused by climate change in pest control activities, to identify the factors affecting farmer decisions making process on pest control, and also the Perception of vegetable farmers on the causes of climate change in pest control activities. Purposively the communities were selected and the study research design was exploratory, focused on exploring the emergence of themes from respondent data, collected and transcribed via structured interviews. The household head were selected purposively. The study revealed that (65%) of the total targeted population are male and (35%) are female and also of the fifty (50) vegetable farmers interviewed in Sierra Leone (Bombali District), (35 %) of the population does not receive training on pest management and (45 %) of the total population in Turkey (Beypazari District) received training on pest management from Turkey. The majority of the vegetable farmers have managed vegetable production for six (6) years now. They have also practiced crop rotation and intercropping. Most of the vegetable farmers have heard about climate change and the main source is mass media. (70%) of the farmers interviewed within the two countries believe climate change is due to human activities.

This study recommends that vegetable farmers in Sierra Leone should receive training on pest management. In addition, alternative pest control methods should be made available to vegetable farmers to avoid the negative effects of pesticides. And also collaborative efforts from stakeholders in Turkey and Sierra Leone to create adequate awareness on the use of pesticide.

Keywords: Vegetable crops, climate change, Pest control decisions, temperature, Global

warming, fungicides, pesticides, household, income, crop rotation.

INTRODUCTION

The world's vegetable crop farmers are challenged with safe, growing, and nutritious food for the rapidly increasing global population in the face of the new change in climate and pest pressures (Bhardwaj, 2012). To enable vegetable farmers to continue to produce highly nutritious crops, they need to have access to appropriate knowledge on pest control, as well as knowledge on climate change.

Climate change in general may be a change in a situation that means various parameters in terms of its climatic appearances (Ayyogari, Sidhya, and Pandit, 2014). Some of these climatic parameters are relativity humidity, temperature, precipitation, and atmospheric gases composition etcetera. It can also be referred to as a change in weather conditions over time depending on the factor. According to Schneider et al (2007), the vulnerability to climate change situation is the degree to which this situation is unable to survive with the radical impacts of climate change. Vegetable crops are a rich source of protein, vitamins, carbohydrates, and salts (Bhardwaj, 2012). The increased health awareness to rural farmers on vegetable crops is now becoming one integral part of the average household's daily meals in Sierra Leone and Turkey. Also, the rapid increase in population growth rate has ignited a high demand for basic dietary for vegetable crops.

The change in climate conditions will pose a negative fell back on vegetable crop production and pest control decisions; consequently which also affect the food supply. The problems of climate change are extreme events that very difficult most time to predict which alter pest control decisions by vegetable farmers. Some of these climate changes that affected vegetable farmer's decisions are the erratic rainfall patterns and the rapid unpredictable high temperature spells consequently affected crop growth rate and increases the number of pests. Developing countries such as Sierra Leone and Turkey were particularly vulnerable. The shifts in the ecology, land degradation, and agro-economic areas etcetera, makes it difficult to cultivate the traditional way.

Climate change poses significant challenges on pest control decisions and negative impacts upon the present vegetable crop production. There is mounting evidence that vegetable farmers in developing countries are experiencing new situation on climate variability which has affected their pest control decisions some of this climate change variability is extreme temperature and precipitation that is linked to increased greenhouse gas emission.

Notwithstanding, the new situation of climate change regards its physiological and biochemical changes has influenced the pest control decision, pathogen mitigation, the ecology appearance

which has led the development of plant diseases (Khan, 2012).

The change in physiological in climate in plants may alter the farmer's pest control decisions regarding climate change perspective, the resistance to any disease may be overcome quickly because of the change in the climate. Fungicide and bactericide efficiency in pests increased moisture and temperature etc. Climate change most time makes vegetable farmers finding it very challenging to decide on pest control and also it ignited the contact fungicides on crops. Sierra Leone, Bombali District is characterized by grassland and open-bush. Rice, sweet potatoes and cassava are the staple food crops while groundnuts, peppers etcetera comprise the main cash/non-staple crops. The land in Bombali district is suitable for livestock rearing. The total number of people food insecure in Bombali District is 132,322 (MAFFS) and the percentage of household food insecure (severe and moderate) is 25.5% and Turkey (Beypazari District), the most famous local food in Beypazari district is Kurusu, a traditional long-lasting pastry. The fertile soil of the region makes it produce nearly 60% of Turkey's carrots, as well as lettuce, green onion, and spinach farming.

STATEMENT OF THE PROBLEM

Sierra Leone and Turkey vegetable farmers have faced a lot of challenges in terms of pest control decisions because of climate change in such countries.

There are very ambitious associated recently in these countries because of inadequate knowledge on the effect of climate change and pest control alternative decisions. The problem facing recently is the higher temperatures from global warming and the increase of sugars in some leaves and lower nitrogen content these has an advanced effect on pest control decision because these can also increase the damage caused by some insects and also help the integration of new pest.

Another possible effect of climate change that needs to be taken into account that affected pest control decision is a warmer temperature which also lowers the effectiveness of some fungicides and pesticides in pest control.

AIM AND OBJECTIVES OF THE RESEARCH

Aim

The aim of this study is the effect of climate change on vegetable farmers in pest control decisions (Case study Sierra Leone (Bombali district) and Turkey (Beypazari, Ankara).

Objectives of the study

Objectives of the study are as follows:

1. Identify new situation caused by climate change in pest control activities.
2. To identify the factors affecting farmer decisions making process on pest control
3. Perception of vegetable farmers on the causes of change in climate in pest control activities

Research Questions of the study

The study researched some of the following questions:

- What is the new situation caused by climate change in pest control activities?
- What are the factors affecting farmer decisions making process on pest control?
- What is the Perception of vegetable farmers on the causes of change in climate in pest control activities?

Justification

The challenges of climate change on vegetable farmers in pest control decisions is caused due to higher temperatures that hasten the life cycle of many pests, multiplying their birth rate consequently and also increasing the infection pressure. The increase in the number of pathogens due to climate change will eventually lead to unprecedented opportunities for pests which also affected the farmer pest control decision.

Scope

This research was conducted mainly within Sierra Leone (Bombali district) and Turkey (Ankara province, Beypazari district) because there is a huge number of vegetable farmers in such areas and such districts are famous in terms of vegetable production. According to the study, the following was of a target to identify the new situation caused by climate change in pest control activities, to identify the factors affecting farmer decisions making process on pest control, and perception of vegetable farmers on the causes of change in climate in pest control activities.

Limitations

The challenges faced in the study are numerous, to name but a few, these will include constraints in terms of finance, time, and logistics, as well as difficulties in accessing information.

There was also be a constraint in transportation from the researcher's residence to the case study area during the research period, there is also a communication problem with the farmers. However, various measures are being put in place by the researcher to minimize the obstacle that emerged to reach the goal of the project.

Therefore, the researcher's result cannot be taken absolutely. Notwithstanding that, the researcher will of the view that the result will be adequate and useful for the purpose of this study.

MATERIALS AND THE METHODS

Introduction

The materials and the methods adopted in this research comprise the research design, the study area, the population, the sample and sample procedure, Data Collection, research instrument, Administration of the Questionnaire and Data Processing

Description of the study area

(Bombali district, Sierra Leone)

Bombali District is on the Northern Province of Sierra Leone and have its capital call Makeni. Bombali district comprises of the Temne and Limba as the most populated ethnic groups. Their main occupation is farming and trading. This zone is characterized by grassland and open-bush approximately 90% of the cattle in Sierra Leone are found in the Northern Province, predominantly in Bombali and Koinadugu Districts. About 200000 hectares approximately of savannah woodlands annually. Rice, sweet potatoes and cassava are the staple food crops while groundnuts, peppers etcetera comprise the main cash/non-staple crops. The total number of people food insecure in Bombali is 132,322 (MAFFS, 2018) and the percentage of household food insecure (severe and moderate) is 25.5%.

Turkey (Ankara provinces, Beypazari District)

Beypazari district is a district of Ankara Province of Turkey, with approximately 100 km west of Ankara city. According to the recent census, the population of Beypazari district is 46,493. Beypazari District Turkey has been a settlement since the ancient times and also holds symbols of ancient traditions with rich natural resources and historical, according to UNESCO report. The

district has diverse local food, and natural sources.

Research Design

The study research design was exploratory, focused on exploring the emergence of themes from respondent data, collected and transcribed via structured interviews. The approach to the study was exploratory to gain a deep understanding of climate change on vegetable farmers in pest control decisions (Case study Sierra Leone (Bombali District) and Turkey (Beypazari District)). Leedy and Ormrod (2015) contend that when little is known about a topic and there is inadequate information and unknown variables at play, a qualitative study can assist in the identification of what is important and needs to be studied. The research design used was non-experimental.

Source of Data

The work was largely based on primary and secondary data. Primary data was sourced from the vegetable farmers. On the other hand, secondary data refers to data which has already been collected and analyzed by someone else.

The Population, sample Size and Sampling Procedure

Population

This comprises vegetable farmers in Sierra Leone (Bombali District) and Turkey (Beypazari District, Ankara). 134 existing vegetable farmers in Bombali District (MAFFS Bombali District, Sierra Leone registered vegetable farmers 2021) and 1079 producer in Beypazari District (Ministry of Agriculture and Forestry Turkey, farmers registration system 2020 data).

Sample size

The target sample size was 100 farmers in Bombali District and Beypazari District in selected chiefdoms that are engaged in large scale vegetable farming. Of the 134 existing vegetable farmers in Bombali District (MAFFS Bombali District, Sierra Leone registered vegetable farmers 2021) fifty (50) were selected randomly and also out of 1079 producer in Beypazari District (Ministry of Agriculture and forestry turkey, farmers registration system 2020 data) fifty (50) farmers were selected randomly.

Sample procedure

A purposive sampling technique was use to select the vegetable farmers (which is 100 farmers) as a sample for the survey.

Data Collection Methods

The data was collected using survey, which comprised face-to-face interviews. Interviews were conducted in Krio and Turkish in person. The researcher and his team took shorthand notes of the conversation with each respondent to reconstruct the interview as accurately as possible as fact. 30 minutes were allocated for each questionnaire.

Research Instruments

A research questionnaire and interview guide were designed to facilitate interviews and the questionnaire was self-administered by the researcher and his three (3) other enumerators to individuals master farmers. The questionnaire used close and open-ended questions. Interview guide was used to guide the researcher and a notebook was used for note-taking. Following the interview including the primary source was gathered, reviewed, and then analyzed.

Administration of the Questionnaire

Interviews were organized with the vegetable farmers who were randomly selected and then the questionnaire was explained and administered to them since most of them could not read and understand well. The researcher then interviewed the farmers and conducted individual face-to-face interviews.

Data Processing

The researcher investigated various data analysis software before settling for Excel professional software for quantitative, qualitative, and mixed methods of data analysis. A general strategy for organizing and analyzing qualitative data includes the identification of preliminary categories helpful to the coding of the data (Leedy & Ormrod, 2015). The researcher drafted such a preliminary set of data categories and subcategories, listing general themes identified throughout the transcription and data editing process, as pertain to the research objectives. The researcher then used the SPSS software, analysis step to code interview data by respondent and research question, and by each category and subcategory from the preliminary table. Coding increased the efficiency with which the researcher was able to find, access, and reference respondent data.

The statistical analysis is a keyword frequency search tool, to efficiently code categories and subcategories to efficiently establish data-driven themes as Dominant, Semi-Dominant, Important or Inconclusive – memo-coded by respective themes. The researcher presented the data in a tabular format and used charts displaying frequencies, percentages, and means to explain the relevant allocation of response on all the variables. Although it was planned, no

statistical analysis could be done due to the lack of enough discrimination in the variables.

Summary and Conclusions

Chapter 3 outlined the study research design and methodology, including an explanation regarding why an exploratory methodology was the most appropriate and best-suited approach for the research problem. From the data I cannot do any statistical comparison, because of the nature of the questionnaire, but for joint paper, I can do statistical comparison.

RESEARCH RESULTS

Introduction

The research results from the data analysis process outlined in Chapter 3. As detailed in this section, the researcher drafted a preliminary set of data categories and subcategories identified throughout the transcription and data editing process, as they pertain to the research objectives and questions as seen below in 4.2 Presentation of Results, lists the preliminary categories and subcategories. The researcher used Excel Microsoft to code all interview data firstly by the respondent, then by the research question, and thereafter by each identified preliminary categories and subcategories.

Strategy and approaches for analyzing qualitative data are less prescriptive than analysis of quantitative data, and generally involve a greater reliance on inductive reasoning processes. The researcher observes situations, events, or concepts in the data and imposes specific meaning on these via some form of coding with conclusions drawn thereafter. This flexibility and open-mindedness are beneficial, though also increases the difficulty for a researcher to analyze the data with total objectivity. For this reason, a researcher should continuously acknowledge, to self and others that attitudes and beliefs may inevitably creep in, biasing observations and interpretations (Leedy & Ormrod, 2015).

Presentation of Results

One hundred (100) vegetable farmers were selected from Sierra Leone and Turkey, fifty (50) for each country, who were all considered as master farmers who mostly engage in massive farming within the specific district. The interview lasted for 30 minutes with each master farmer.

The sample was selected according to the calculated quota, being representative of the entire vegetable farmers in Sierra Leone (Bombali district) and Turkey (Beypazari district). Four research assistants were recruited to conduct this survey regards the time agreed with the vegetable farmer to complete the interview.

The researcher asked questions to gain insight and perspective from the vegetable farmers regarding their perceptions and understanding regarding climate change on vegetable farmers in pest control decisions following by identify the new situation caused by climate change in pest controls activities, identify the factors affecting farmer decisions making process and perception of farmers on the causes of climate change in pest control activities. The following question(s) were asked of vegetable farmers to gain deeper insights into their perceptions.

Demographic characteristics of farmers in Bombali district (Sierra Leone) and Beypazari District (Turkey)

The Demographic characteristics include household head, gender, Age, formal education, and marital status. For these previously compiled factors of demographic, the diagrams show the percentages of participation in the survey among various demographic.

Household head

Table 4.1 household head

Country	House heads		Total (%)
	Yes	No	
Sierra Leone	45.0	5.0	50.0
Turkey	48.0	2.0	50.0
Sum total	93	7	100

Table 4.1 shows the household heads for Sierra Leone (Bombali District) and Turkey (Beypazari District), respectively

Figure 4.1 illustrates the percentage of house heads and non-house heads farmers in Bombali district (Sierra Leone) and Beypazari District (Turkey). A total of 100 farmers were interviewed within the two countries (50) vegetable farmers from Sierra Leone (Bombali District) and (50) from Turkey (Beypazari District)) respectively. With respect to the (50) vegetable farmers interviewed in Sierra Leone (Bombali District), (45%) of them are house heads while (5%) are non-house heads. Likewise in Turkey (Beypazari District), out of (50) of farmers interviewed, (48%) are house heads while (2%) are non-house Heads.

From the data, this shows that there are more household head in Beypazari District (Turkey) than Bombali District (Sierra Leone).

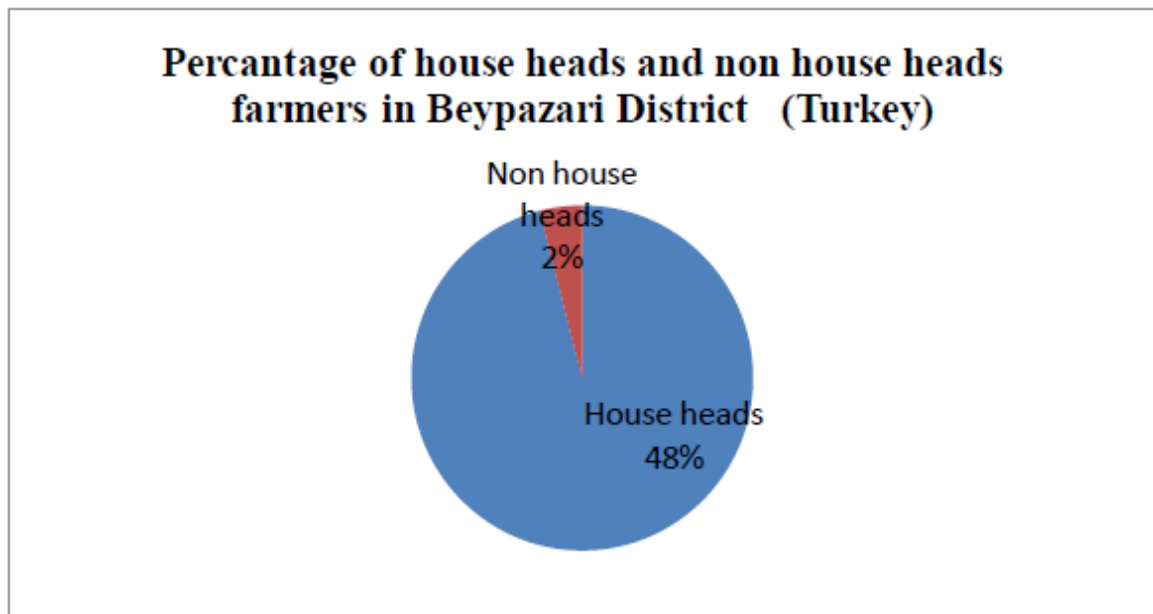
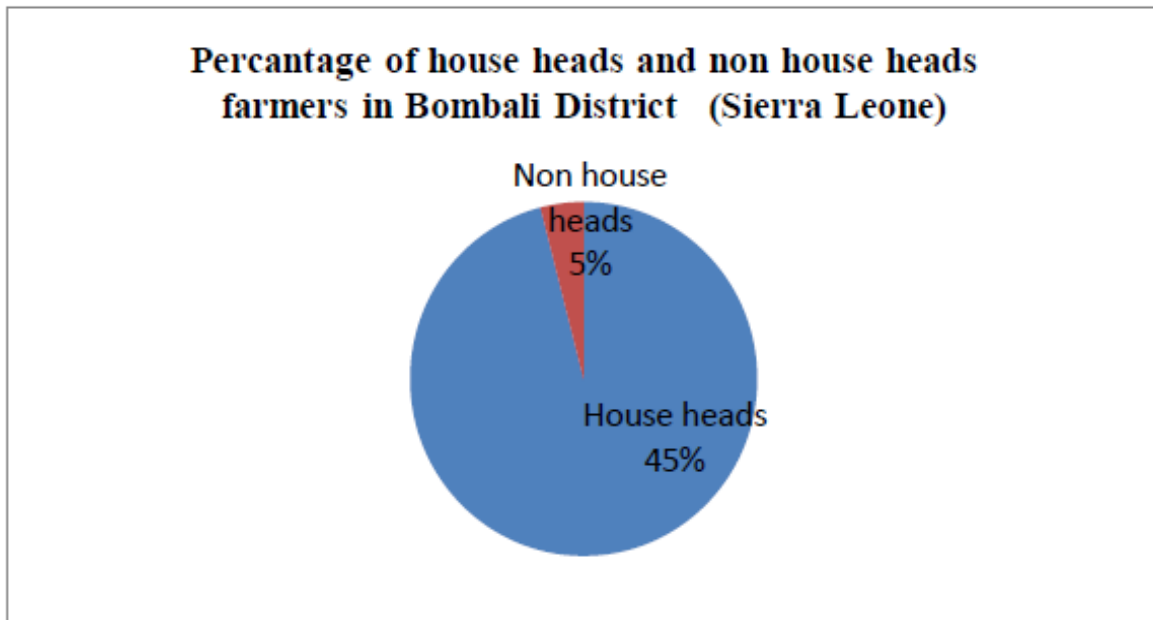


Figure 4.1: above illustrates the percentage of house heads and non-house heads farmers in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Gender

Table 4.2 Gender

Country	Male	Female	Total (%)
Sierra Leone	30	20	50
Turkey	35	15	50
Sum	65	35	100
Total			

Figure 4.2 shows the percentage of male and female farmers interviewed in Bombali (Sierra Leone) and Beypazari District (Turkey) respectively. A total of 100 farmers were interviewed, (50) from Sierra Leone (Bombali District) and (50) from Turkey (Beypazari District). with regards to the (50) vegetable farmers interviewed in Bombali District (Sierra Leone), (30%) are male while (20%) are female. Considering the (50) vegetable farmers interviewed in Beypazari District (Turkey), (35%) are male while (15%) are female.

From the analysis, this show that there are more male vegetable farmers in Baypazari District (Turkey) than Bombali District (Sierra Leone) and also there are more female vegetable female farmers in Bombali District (Sierra Leone) than Beypazari District (Turkey).

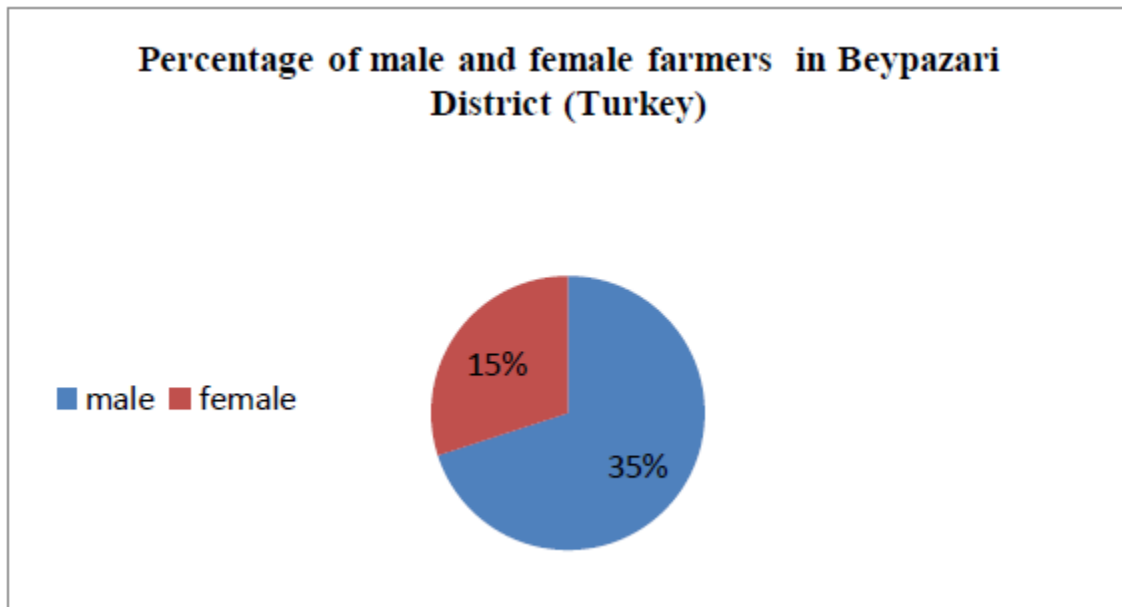
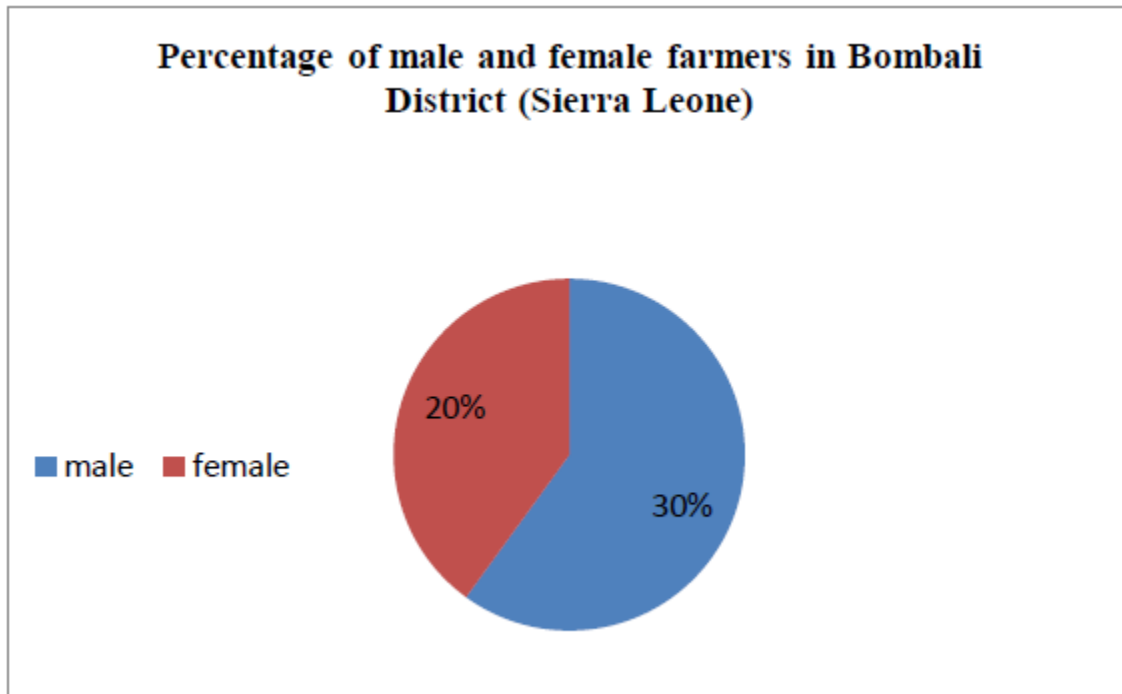


Figure 4.2 above shows the percentage of male and female farmers interviewed in Bombali District (Sierra Leone) and Beypazari District (Turkey)

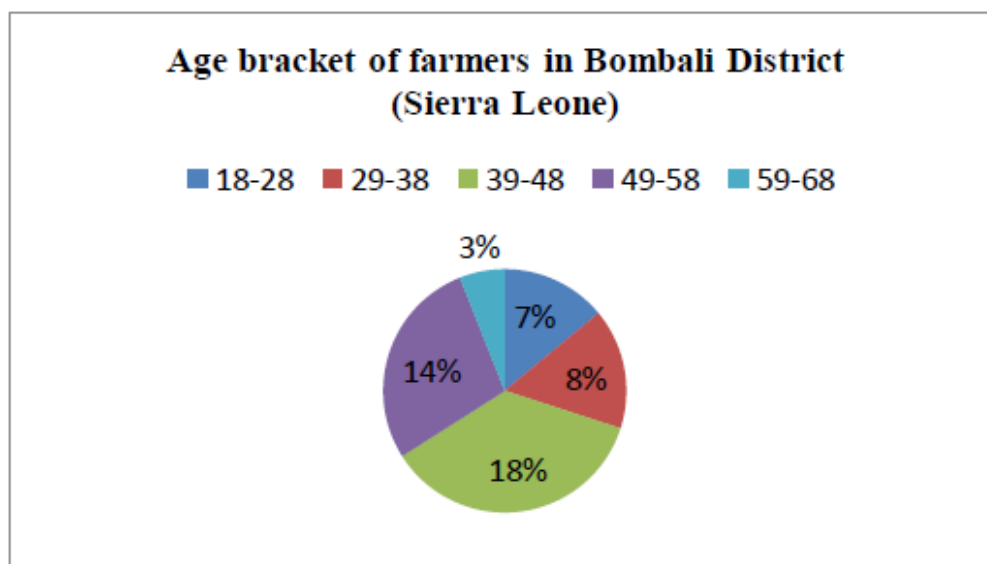
Age

Table 4.3 Age

Country	Age brackets (years)					Total
	18-28	29-38	39-48	49-58	59-68	
Sierra Leone	7	8	18	14	3	50
Turkey	8	7	14	10	11	50
Sum total	15	15	32	24	14	100

Figure 4.3 illustrate age bracket of vegetable farmers interviewed in Bombali District (Sierra Leone) and Beypazari District (Turkey). However, Out of the (50) vegetable farmers interviewed in Sierra Leone (Bombali District), (7%) fall within the age bracket (18-28 years), (8%) fall within the age bracket (29-38years), (18%) fall within the age bracket (39-48 years), and (14%) within (49-58 years) while (3%) are within (59-68 years) respectively. Similarly to Turkey (Beypazari District), out of (50) vegetable farmers interviewed, (8%) are within (18-28 years), (7%) fall within the age bracket (29-38 years), (14%) are within the age bracket (39-48 years), (10%) are within (49-58 years) while (11%) fall in the age bracket (59-68 years).

From the analysis there are more youth that engage in vegetable farming in Bombali District (Sierra Leone) than Beypazari District (Turkey).



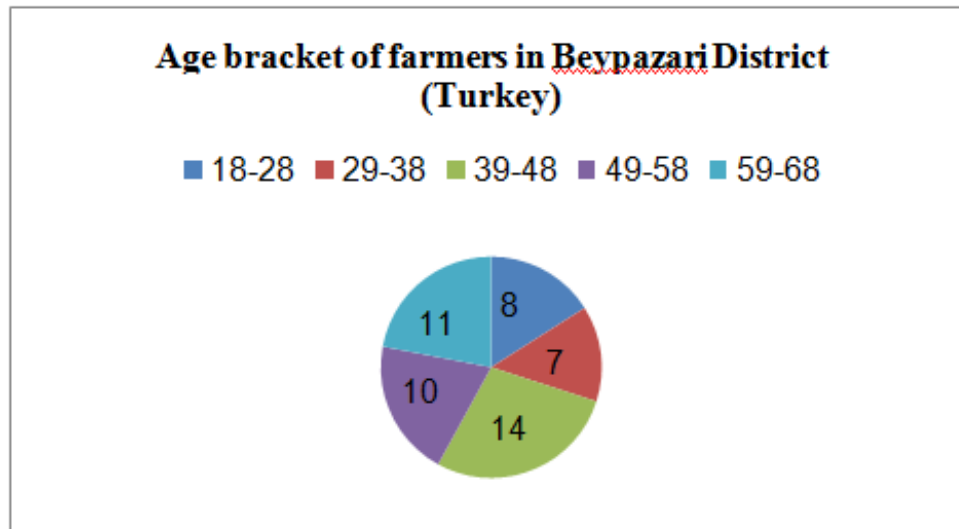


Figure 4.3 above indicates age bracket of farmers interviewed in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Marital status

Table 4.4 Marital status

Country	Marriage	Single	Divorced	Window	Total for each country
Sierra Leone	30	0	15	5	50
Turkey	40	0	5	5	50
TOTAL	70	0	20	10	100

Figure 4.4 shows the marital status of famers in Bombali District (Sierra Leone) and Beypazari District (Turkey). Considering the marital status of Vegetable farmers. Out of the (50) vegetable farmers interviewed in Sierra Leone (Bombali District), (30%) are married, (15%) have divorced while (5%) are widows. No farmer that is single was interviewed. Similarly for Turkey (Beypazari District), (40%) of the farmers interviewed are married, (5%) have divorced while (5%) are widows. No farmer that is single was interviewed.

From the data, there are more married vegetable farmers in Turkey (Beypazari District) than Sierra Leone (Bombali District) and also there are more divorced vegetable farmers in Sierra

Leone (Bombali District) than Turkey (Beypazari District)

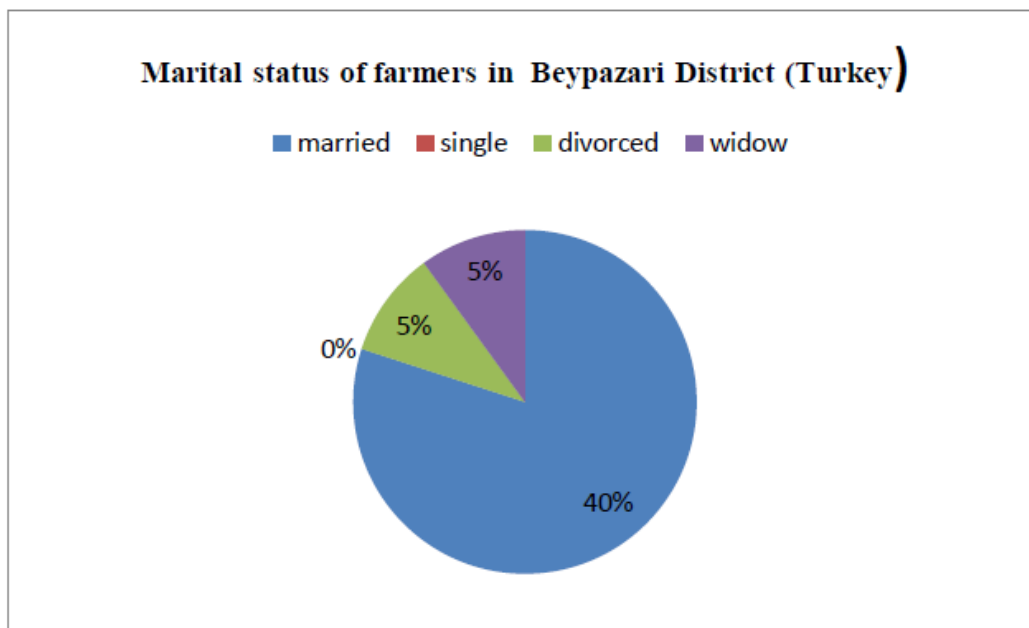
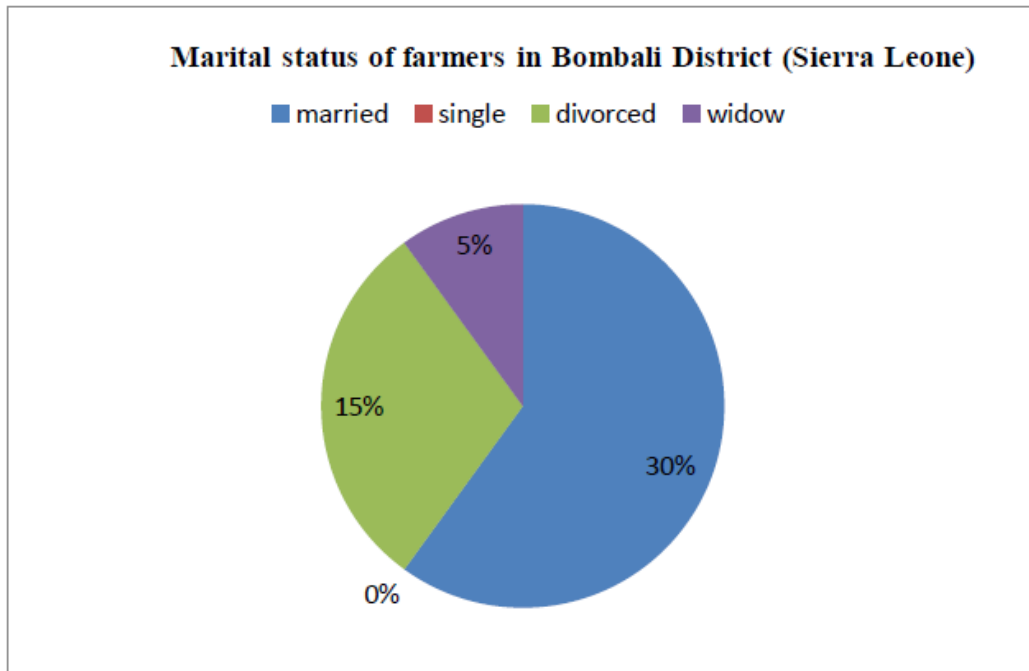


Figure 4.4 above shows the marital status of famers in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Formal Education level**Table 4.5 formal Education**

Country	Formal Education					Total
	None	Primary	Secondary	Tertiary	Arabic	
Sierra Leone	20	15	5	2	8	50
Turkey	2	5	23	20	0	50
Sum	22	20	28	22	8	100
TOTAL						

Figure 4.5 illustrates various level of education acquired by Vegetable farmers interviewed in Bombali District (Sierra Leone) and Beypazari District (Turkey). with respect to the level of education of vegetable farmers interviewed in Beypazari District (Turkey) out of the (50), (5%) of the vegetable farmers interviewed attained primary school education, (23%) acquired secondary school education, (20%) pursue tertiary education while (2%) acquired non formal education. However, no farmer interviewed in Beypazari District (Turkey) acquired Arabic education. Considering the (50) vegetable farmers interviewed in Bombali District (Sierra Leone), (15%) attained primary school education, (5%) completed secondary school, (2%) attained tertiary education, (8%) acquired Arabic education while (20%) attained no formal education.

From the data, there are more secondary education level vegetable farmers in Beypazari District (Turkey) than Bombali District (Sierra Leone) and there is no Arabic education in Turkey (Beypazari District).

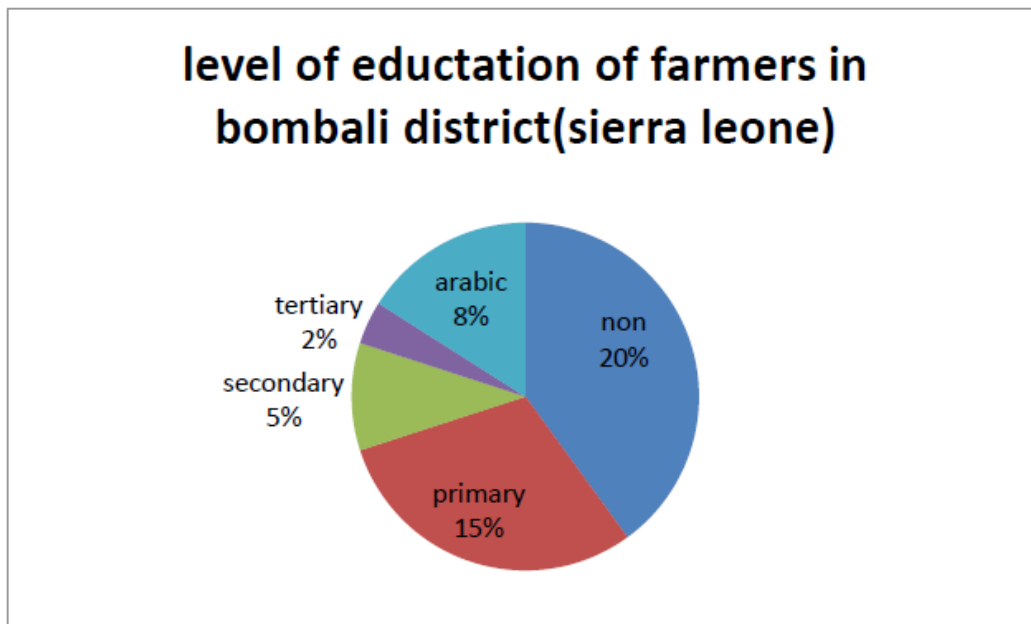
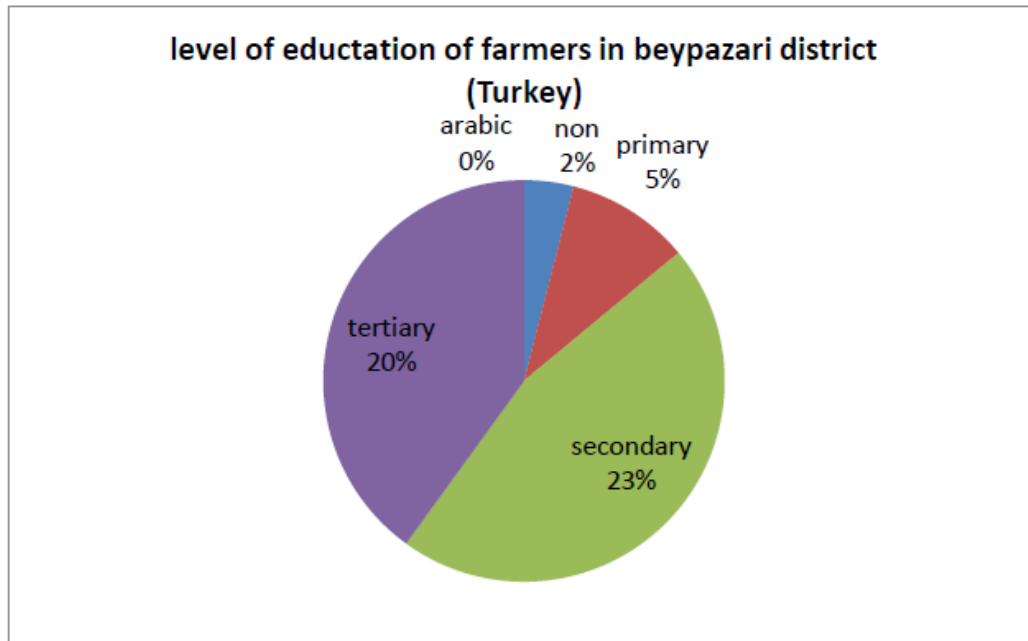


Figure 4.5 above illustrates various level of education acquired by farmers interviewed in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Size of household

Table 4.6 Size of house hold per farmer in Sierra Leone and Turkey

Country	household members					Total
	Four	Five	Six	Seven	Nine	
Sierra Leone	10	15	11	10	4	50
Turkey	0	12	14	13	11	50
Sum	10	27	25	23	15	100
TOTAL						

Figure 4.6 shows percentage of respondents interviewed both Bombali District (Sierra Leone) and Beypazari District (Turkey). Considering the (50) respondents interviewed in Sierra Leone (Bombali District), (10%) of them have a family size of four (4), (15%) have five (5) family members, (11 %) have a family of six (6), (10%) have seven (7) members while (4%) have a family of nine (9) members. Similarly for Turkey (Beypazari District), out of the 50 of respondents, (14%) of them have a family size of six (6), (13%) have seven (7) members, (11%) have nine (9) family members while (12%) have five (5) family members.

From the data, Turkey (Beypazari District) have more household member of six (6) than Sierra Leone (Bombali District). And there is no Household of four (4) in Turkey (Beypazari District)

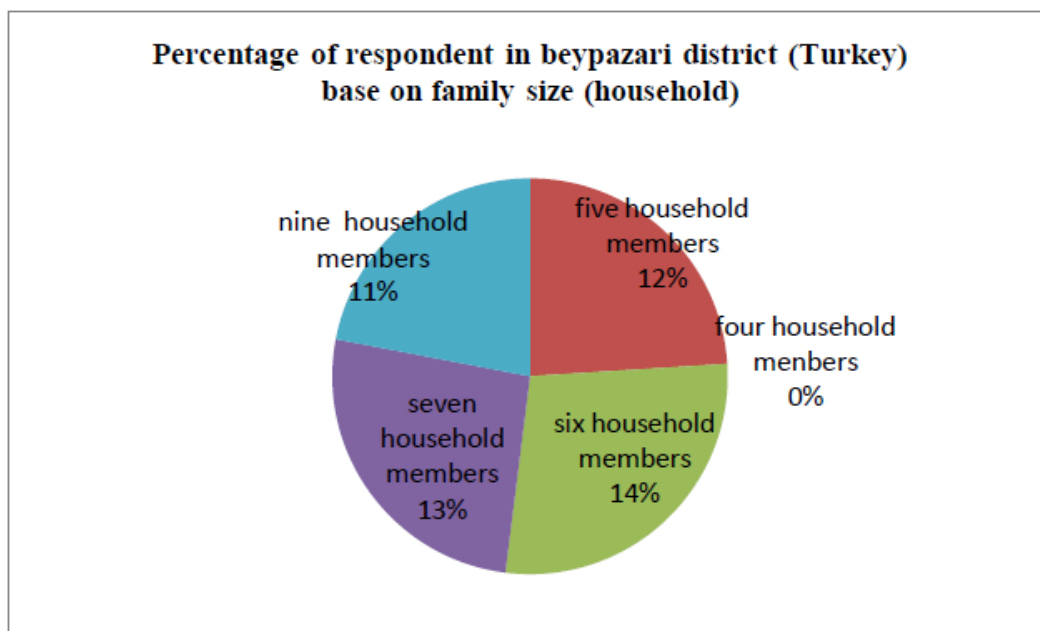
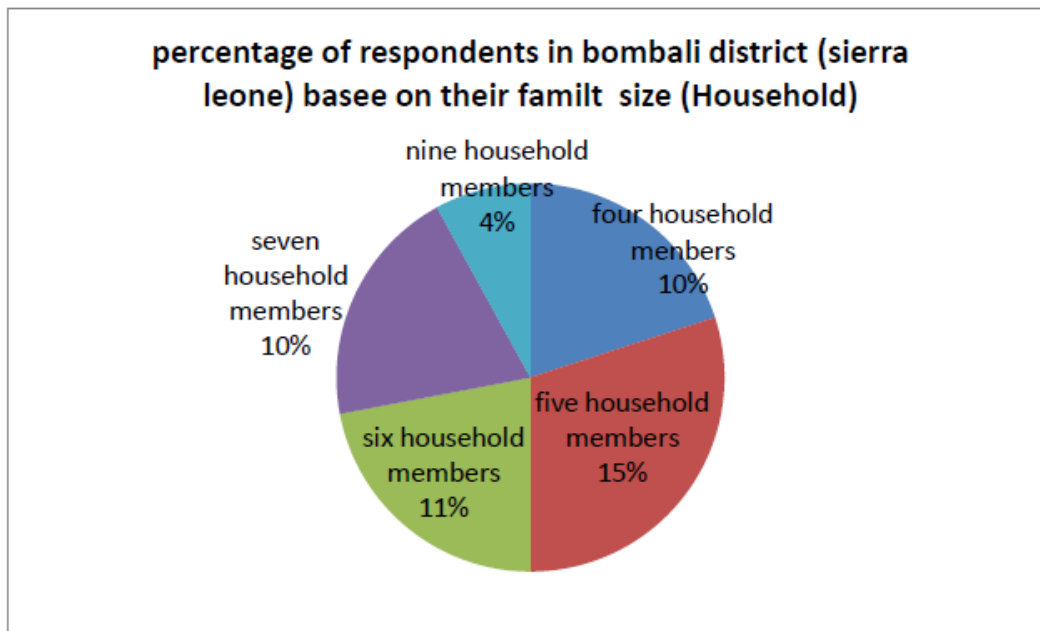


Figure 4.6 above shows percentage of respondents interviewed both Sierra Leone (Bombali District) and Turkey (Beypazari District).

Estimated monthly income from all sources

Table 4.7 Monthly income per farmer in Sierra Leone and Turkey

Country	Monthly income (TL)			Total
	0-5,000	5,0001-10,000	10,000-20,000	
Turkey	37	12	1	50
	Monthly income (LE)			Total
	0 -200,000	300,000 – 500,000	600,000 upwards	
Sierra Leone	21	25	4	50
Sum total	58	37	5	100

Figure 4.7 illustrates monthly income generated by farmers in Bombali District (Sierra Leone) and Beypazari District (Turkey). With respect to the (50) vegetable farmers interviewed in Sierra Leone (Bombali District), (21%) generated a total of Le 0- 200,000 thousand Leones monthly, (25%) earn Le 300,000-500,000 while (4%) received Le 600,000 thousand Leones upwards. Likewise for Turkey (Beypazari District), (37%) of the farmers interviewed earned an estimated amount of 0-5,000tl per month, (12%) received 5,000-10,000tl while (1%) earned 10,000-20,000tl monthly.

From the data, considering the exchange rate Vegetable farmers in Turkey (Beypazari District) earned more income compare to vegetable farmers in Sierra Leone (Bombali District).

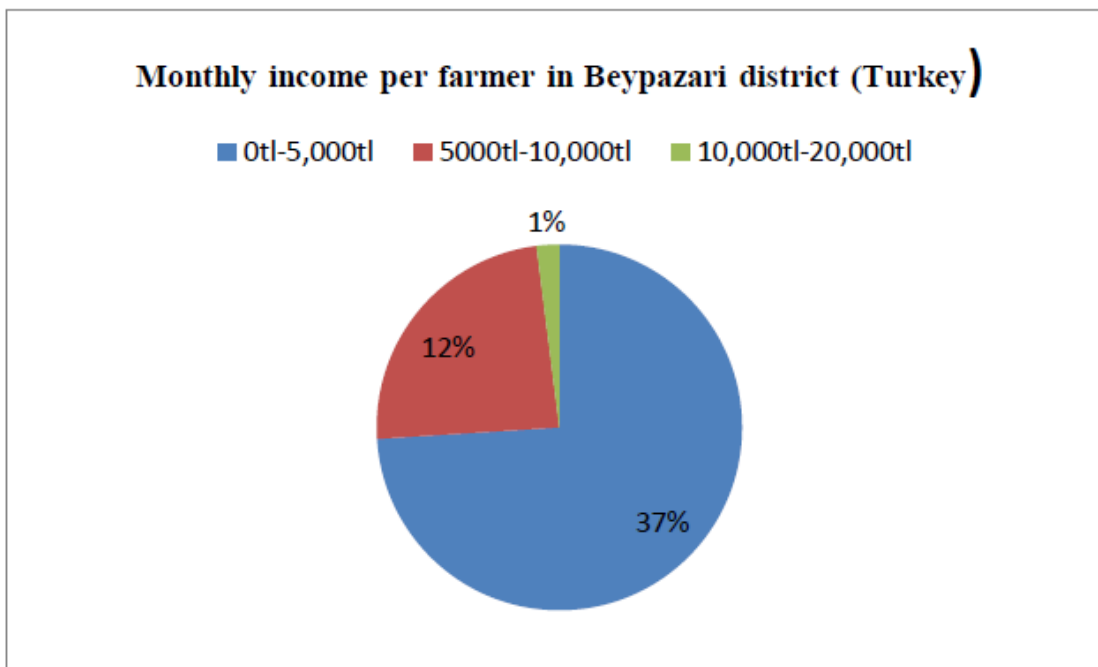
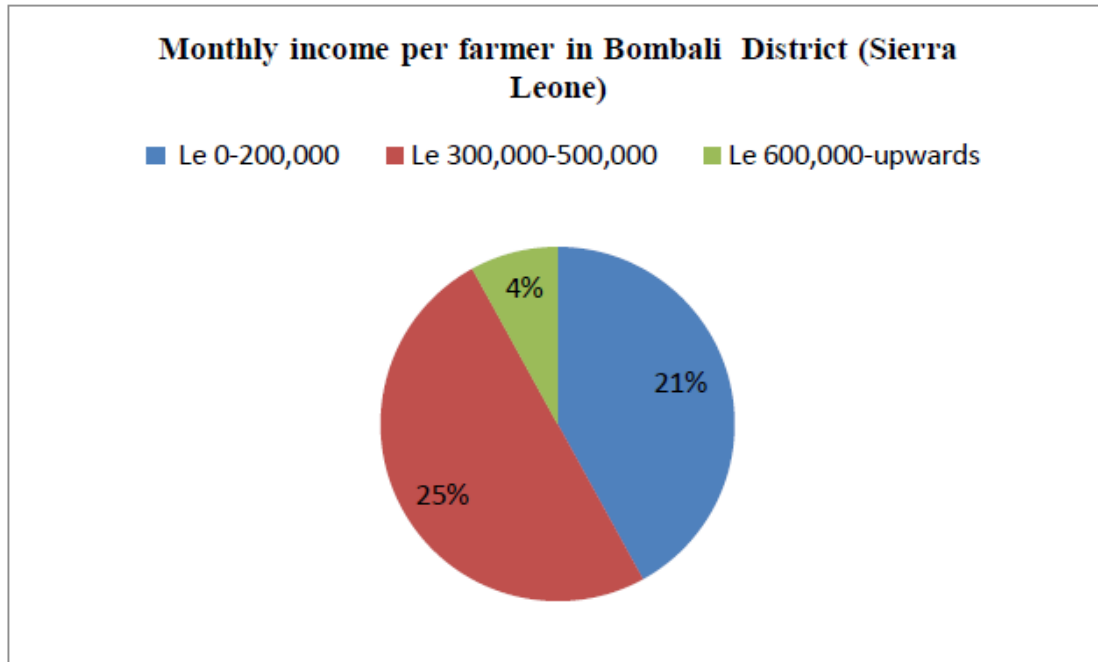


Figure 4.7 above illustrates monthly income generated by farmers in Bombali District (Sierra Leone) and Beypazari District (Turkey)

The new situation caused by climate change in pest controls activities

Years managing crops

Table 4.8 Duration of managing crops by farmers in Sierra Leone and Turkey

Country	Duration of managing crops					Total
	five years	six years	seven years	eight years	ten years	
Sierra Leone	10	15	12	9	4	50
Turkey	15	7	8	10	10	50
Sum	25	22	20	19	14	100
TOTAL						

Figure 4.8 shows the percentage of farmers interviewed both the two countries base on the duration of managing crops. With regards to the duration of crop management by vegetable farmers, out of (50) vegetable farmers in Bombali District (Sierra Leone), (10%) of them have consecutively managed crops almost five (5) years, (15%) have managed for a period of six (6) years, (12%) for a period of seven (7), 9% have managed for a period of eight (8) years while 4% have engaged in crop management for a period of ten (10) years. similarly for Turkey (Beypazari District), out of the (50) vegetable farmers interviewed, (15%) of them have managed crops for a period of five (5) years, (7%) for six (6) years, (8%) for seven (7) years, (10%) for eight (8) years and (10%) for ten (10) years in crop management respectively.

From the data, Turkey (Beypazari District) vegetable farmers have spent up to ten (10) on vegetables farming than Sierra Leone (Bombali District)

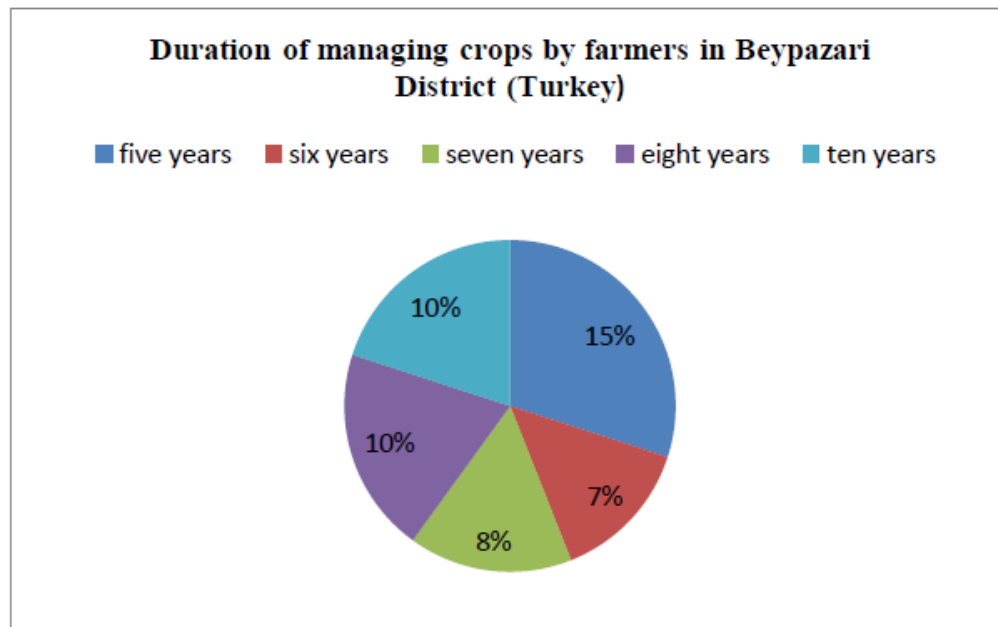
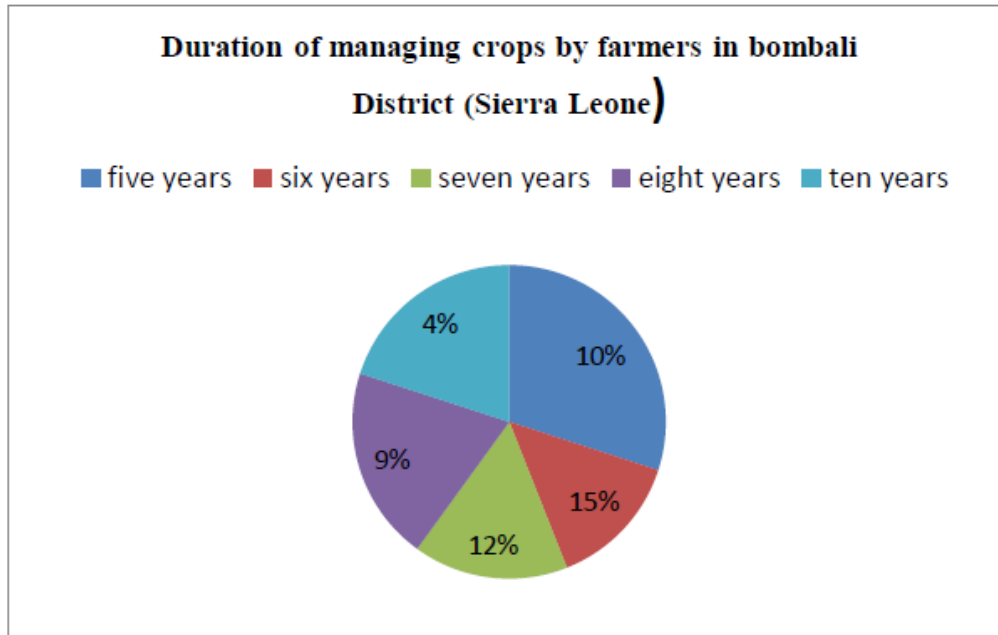


Figure 4.8 above shows the percentage of farmers interviewed both the two countries base on the duration of managing crops

Table 4.9 Hectares of land prepared for crop production by farmers in Sierra Leone and Turkey

Country	Hectares used for crop production					Total
	three Hectares	five Hectares	seven Hectares	eight Hectares	ten Hectares	
Sierra Leone	10	12	13	8	7	50
Turkey	5	10	15	12	8	50
Sum TOTAL	15	22	28	20	15	100

Figure 4.9 illustrates percentage of farmers cultivated various farm size (hectares) for crop production in Bombali District (Sierra Leone) and Beypazari District (Turkey). considering the (50) vegetable famers interviewed in Sierra Leone (Bombali District), (10%) cultivated three (3) hectares, (12%) cultivated five (5) hectares, (13%) cultivated seven (7) hectares, (8%) cultivated eight (8) hectares while seven (7%) cultivated ten (10) hectares for their crop production. Similarly for Turkey (Beypazari District), out of the (50) respondents interviewed, (5%) of farmed on three (3) hectares of land, (10%) cultivated five (5) hectares, (15%) farmed on seven (7) hectares, (12%) cultivated eight (8) hectares while (8%) of them cultivated almost ten (10) hectares of land for crop production.

From the data, Turkey (Beypazari District) use more hectares of land than Sierra Leone (Bombali District).

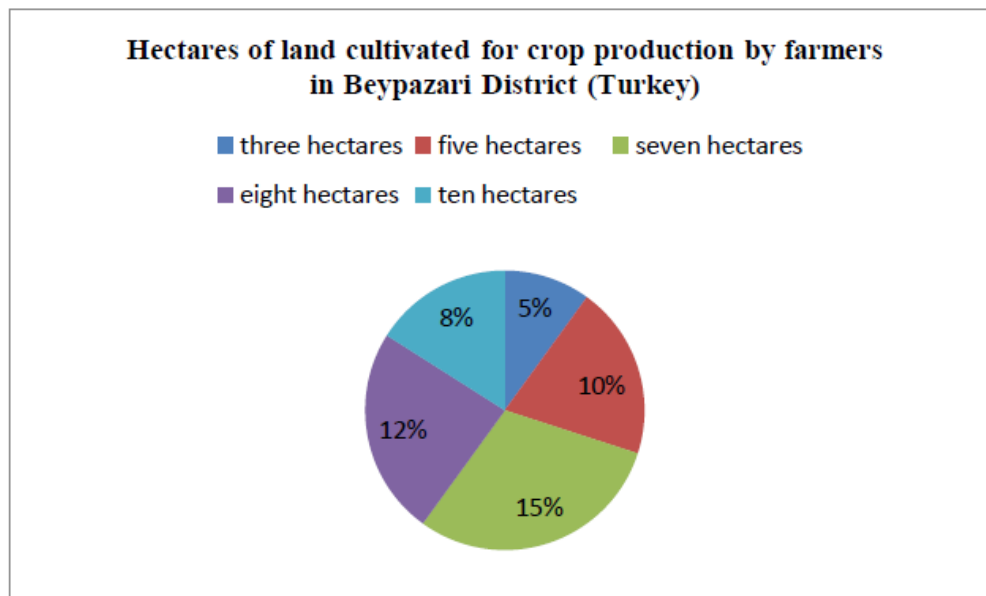
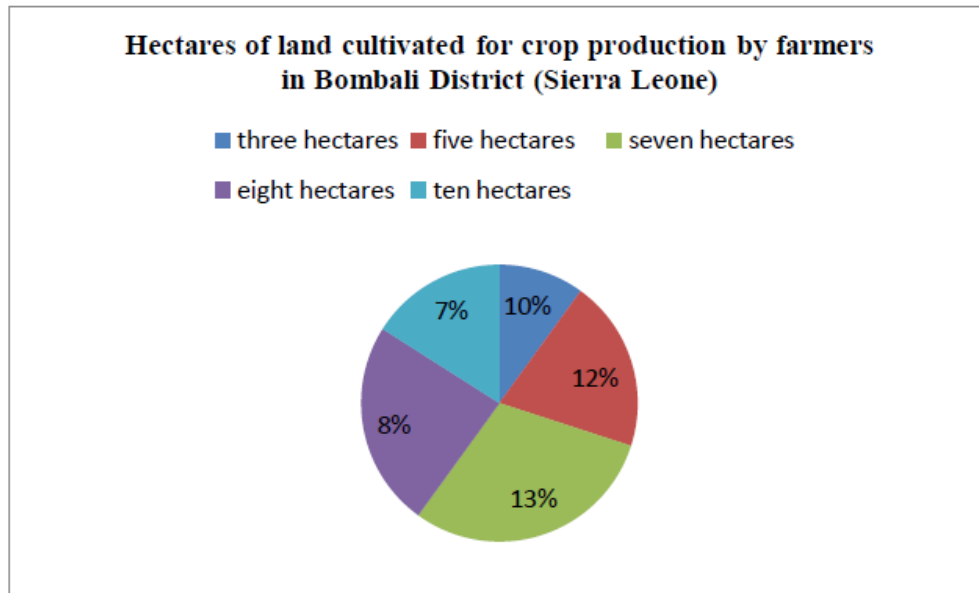


Figure 4.9 above illustrates percentage of farmers cultivated various farm size (hectares) for crop production in Bombali District (Sierra Leone) and Beypazari District (Turkey)

The main vegetable crops

Table 4.10 Type of crop cultivated by farmers in Sierra Leone and Turkey

Country	Bean	Cabbage	Carrot	Lettuce	Wild leek	Onion	Parsley	Pea	Pepper	Radis	Spinach	Tomato	Total
Sierra Leone	5	7	6	3	2	4	5	3	6	2	3	4	50
Turkey	4	6	7	4	4	5	3	4	4	3	4	2	50
Sum TOTAL	9	13	13	7	6	9	8	7	10	5	7	6	100

Figure 4.10 illustrates the type of crops cultivated by farmers in Sierra Leone and Turkey. This crops are beans, cabbage, carrot, lettuce, wild leek onion, parsley, tomato, pepper, pea, radish and spinach both farmers within the two countries respectively. In Sierra Leone (Bomabli District), out of the fifty vegetable farmers interviewed five (5) of them mentioned that they grow beans, seven (7) cabbage, six (6) carrot, three (3) of them mentioned that they grow lettuce, two (2) mentioned that they grow wild leek, four (4) mentioned they grow onion, five (5) mentioned that they grow parsley, three (3) of the vegetable farmers mentioned that they grow pea, six (6) of them mentioned that they grow pepper, two (2) mentioned that they grow radish, three (3) vegetable farmers mentioned that they grow spinach and four (4) of the vegetable farmers mentioned that they grow tomato.

Likewise for Turkey (Beypazari District), out of the fifty (50) vegetable farmers interviewed four (4) mentioned that they grow beans, six (6) mentioned that they grow cabbage, seven (7) mentioned that they grow carrot, four (4) of the vegetable farmers mentioned that they grow lettuce, four (4) of the vegetable farmers mentioned that they grow wild leek, five (5) vegetable farmers mentioned that they grow onion, three (3) of the vegetable farmers grow parsley, four (4) of the vegetable farmers mentioned that they grow pee, four (4) of the vegetable farmers mentioned that they pepper, three (3) mentioned that they grow radish, four (4) vegetable farmers mentioned that they grow spinach and only two (2) mentioned that they grow tomato respectively.

From the data, Sierra Leone (Bombali District) farmers grow more cabbage, pepper and tomato, than Turkey (Beypazari District).

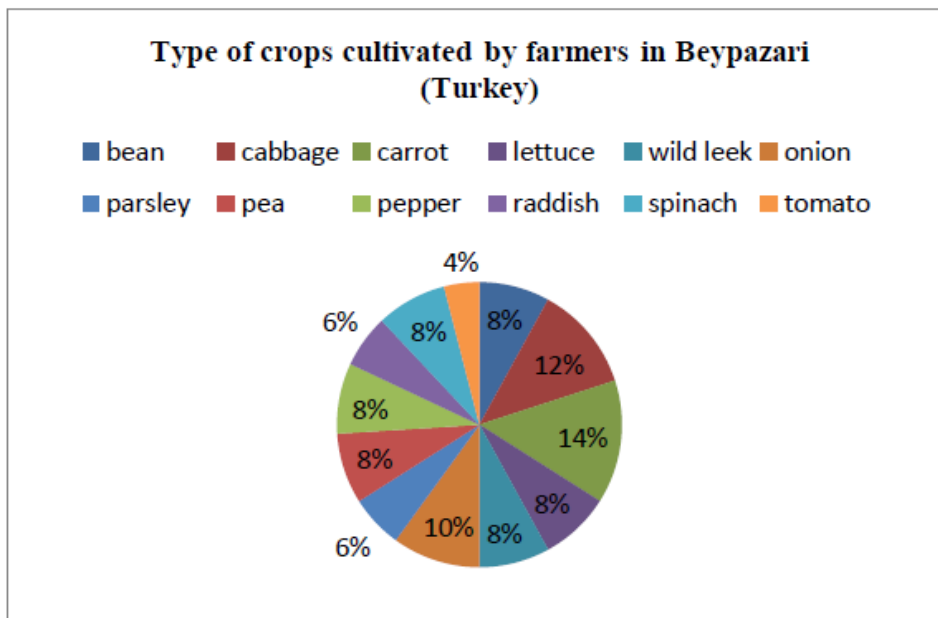
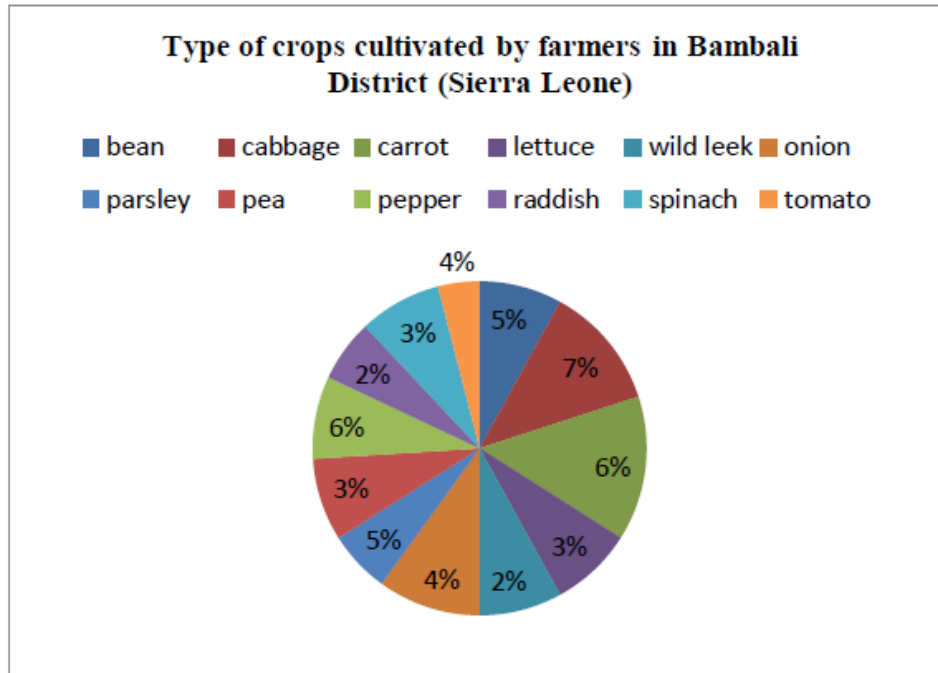


Diagram 4.10 above shows the percentage of farmers engaged in the production of different type of crops in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Identify the factors affecting farmer decisions making process on pest control activities

However with further discussion with the vegetable farmers on pest control activities within the two countries (Sierra Leone and Turkey), most of them use the following strategy in pest control decisions which is communicating and coordinating management practices between the producer and the agricultural consultant on adopt cultural practices as a first line of defenses such as plan and implantation of new verity selection and accurately identify pest and species composition and quantify population and also develop a scouting technique ,control plans and monitoring the ecology of the insect pest it intercropping relationships in the agricultural field. Notwithstanding, some of the major factors affecting their decision making is the Field Topography and Crop and Variety Selection.

Receiving any training on pest management for your vegetable farm

Table 4.11 vegetable farmers that received training on pest management

Country	Training received on pest management		Total
	Yes	No	
Sierra Leone	15	35	50
Turkey	45	5	50
Sum TOTAL	60	40	100

Figure 4.11 illustrates percentage of farmers who received pest management training and those who do not received any training on pest management in Bombali District (Sierra Leone) and Beypazari District (Turkey). Out of the total farmers, (50) that were interviewed in Sierra Leone (Bombali District), (15%) received training on pest management while (35%) are not. Similarly for Turkey (Beypazari District), (45%) of the interviewed farmers received training on pest management while (5%) received no training.

From the data, there are more vegetable farmers in Turkey (Beypazari District) that received training on pest management compare to Sierra Leone (Bombali district).

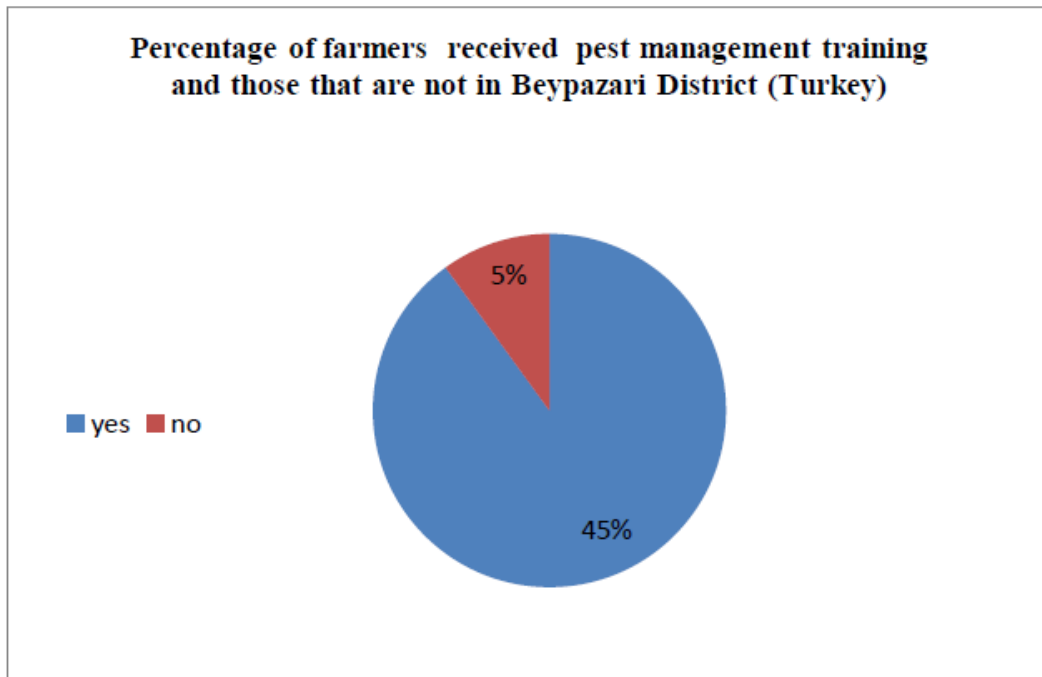
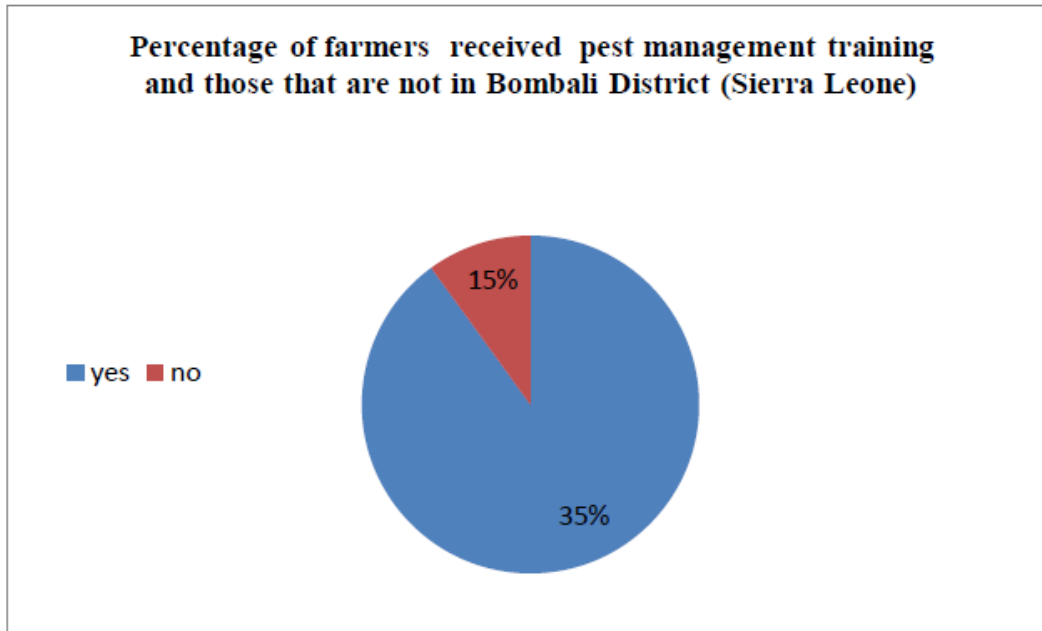


Figure 4.11 above illustrates percentage of farmers who received pest management training and those who do not received any training on pest management in (Sierra Leone) and (Turkey)

If yes which of the following

Table 4.12 Methods of pest management

Country	Biological	Chemical	Mechanical	Trapped	Total
Sierra Leone	10	30	5	5	50
Turkey	15	25	7	3	50
Sum TOTAL	25	55	12	8	100

Figure 4.12 illustrate various methods of pest management, the vegetable farmers interviewed in Sierra Leone (Bombali District) and Turkey (Beypazari District) used biological, chemical, mechanical, and trapped methods of pest control. In addition, out of the fifty (50) vegetable farmers interviewed ten (10) of them used Biological methods of pest management, thirty (30) of them used chemical methods of pest management, five (5) used mechanical methods and five (5) of them used trapped method. Similarly for Turkey (Beypazari District) fifteen (15) of the vegetable farmers interviewed used Biological method, twenty five (25) adopt the chemical method, seven (7) practiced the mechanical method while three (3) of the farmers chose the trapped method of pest control.

From the data, Turkey (Beypazari District) vegetable use more of chemical in pest management compare to Sierra Leone (Bombali District)

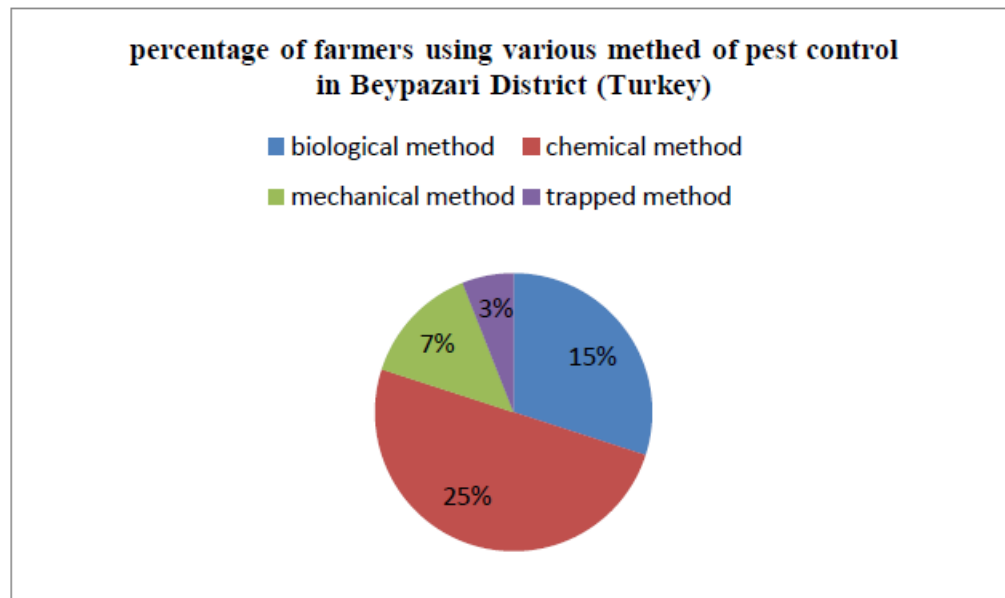
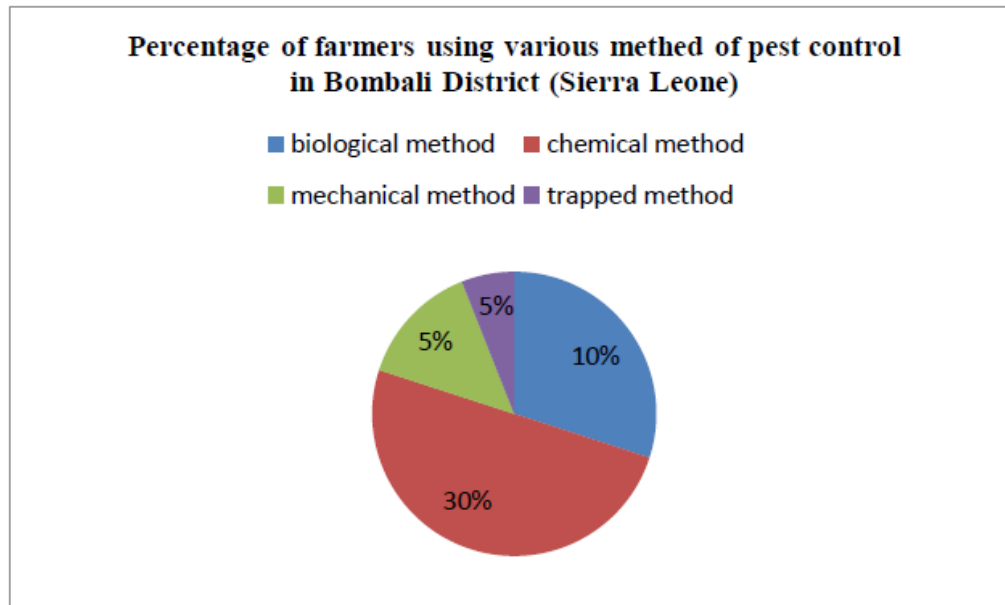


Figure 4.12 above shows the percentage of farmers using various method of pest control in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Practice crop rotation

Table 4.13 Practice crop rotation

Country	Practice crop rotation		Total
	Yes	No	
Sierra Leone	18	32	50
Turkey	35	15	50
Sum TOTAL	53	47	100

Figure 4.13 illustrates percentage of farmer practiced crop rotation and those not practicing such method in Bombali District (Sierra Leone) and Beypazari District (Turkey). in Sierra Leone (Bombali District), out of the (50) vegetable farmers interviewed (18%) of them practice the system while (32%) are not. Likewise Turkey (Beypazari District), (35%) of the farmers practiced crop rotation while (15%) were not.

From the data, vegetable farmers in Turkey (Beypazari District) practices crop rotation than vegetable farmers in Sierra Leone (Bombali District).

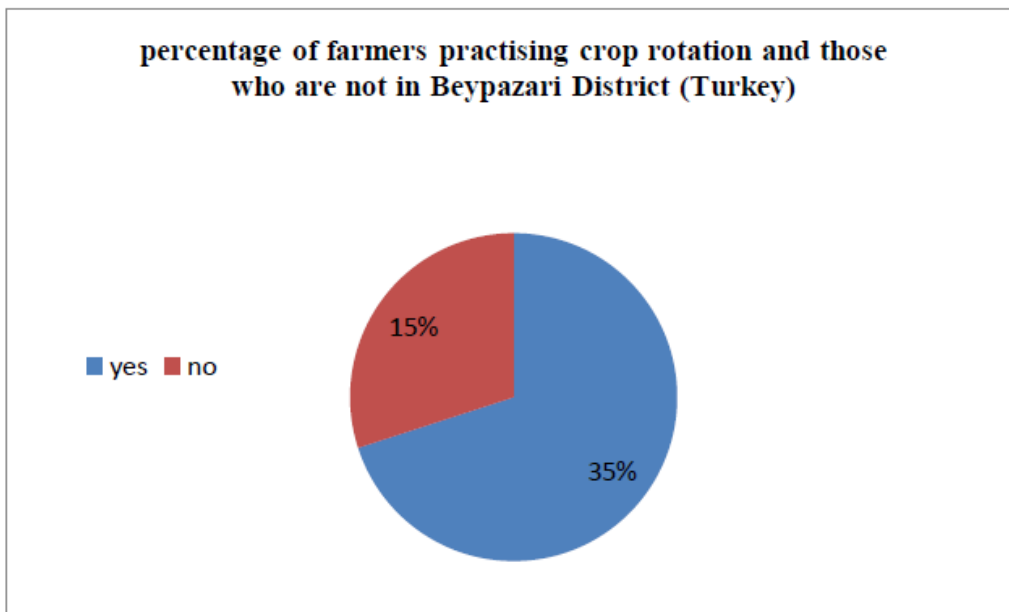
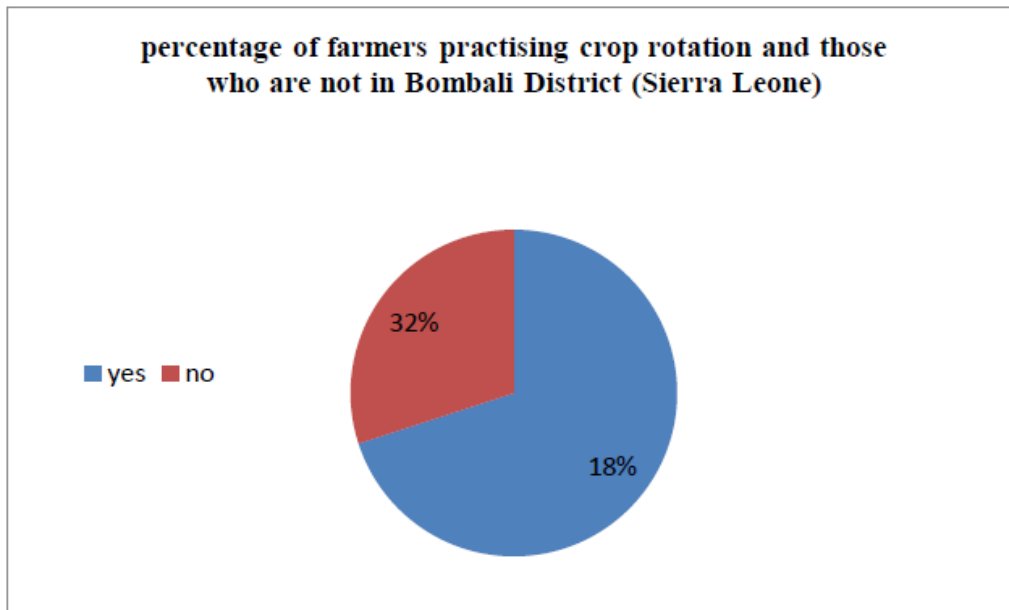


Figure 4.13 above represent illustrates percentage of farmer practiced crop rotation and those not practicing such method in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Answer for question number 14 is yes, which crops?

Table 4.14 Practice crop rotation and the type crops

Country	rice	ground nut	maize	cassava	Total
Sierra Leone	20	15	10	5	50
Turkey	15	15	10	10	50
Sum	35	30	20	15	100
TOTAL					

Figure 4.14 shows Percentage of respondent's base on the use of different crops for crop rotation in Bombali District (Sierra Leone) and Beypazari District (Turkey). with respect to the (50) targeted vegetable farmers in Sierra Leone (Bombali District) regarding crop use for their crop rotation practices, (20%) of them normally use rice for the rotational practice, (15%) chose groundnut, (10%) prefer maize while (5%) selected cassava as a choice for such practices. Similarly, out of the (50) of vegetable farmers interviewed in Beypazari District (Turkey), (15%) of the farmers chose rice for rotational practice, (15%) selected groundnut, (10%) prefer maize while (10%) used cassava for the above purpose.

From the data, vegetable farmers in Bombali District (Sierra Leone) use rice for crop rotation compare to Turkey (Beypazari District).

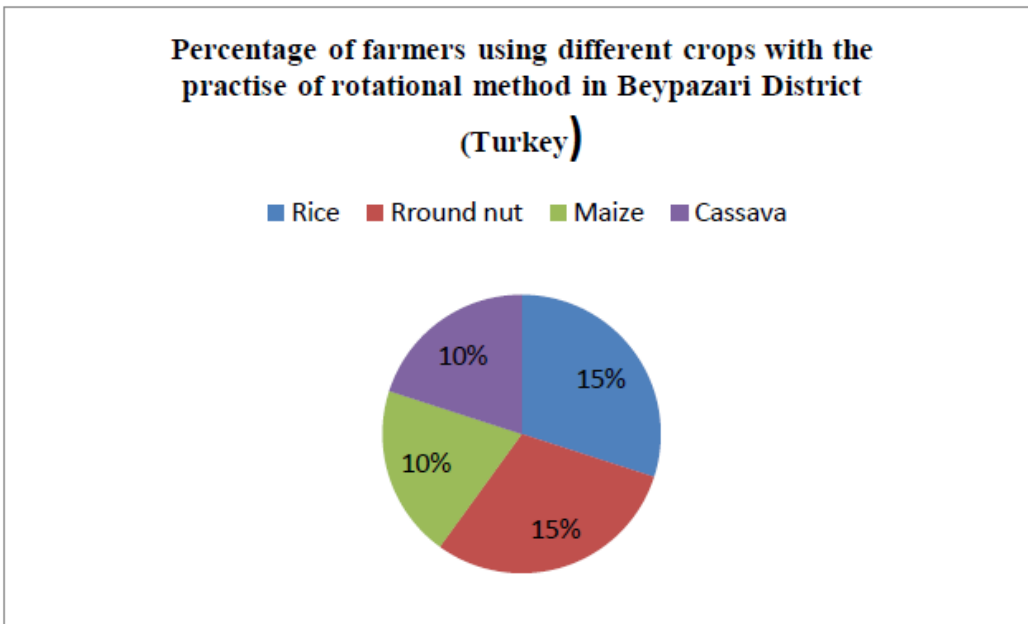
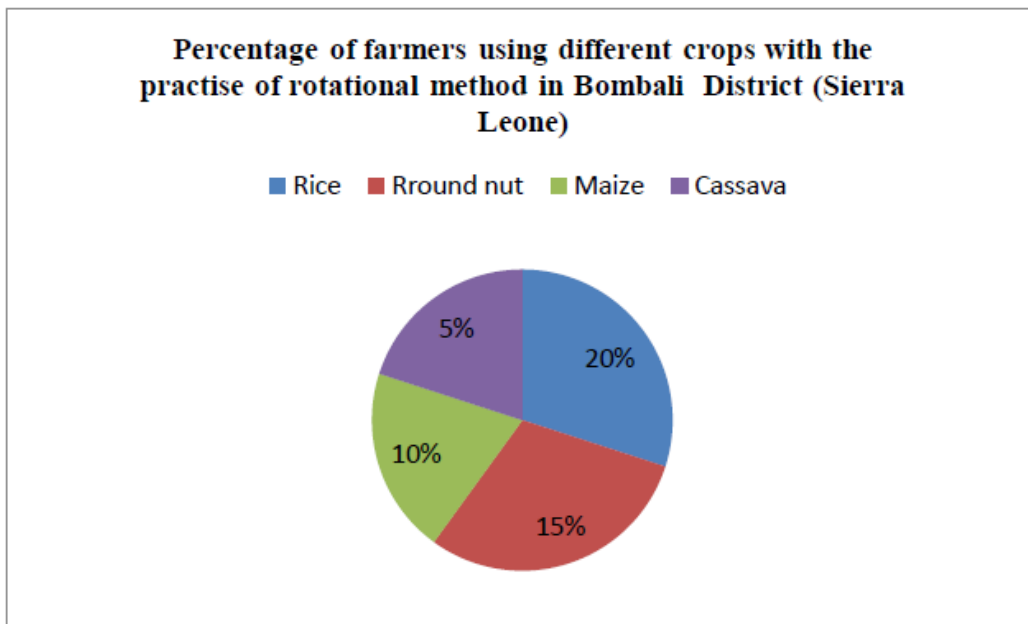


Figure 4.15 above represents Percentage of respondents' base on the use of different crops for crop rotation in Bombali District (Sierra Leone) and Beypazari District (Turkey)

The new climate conditions

Table 4.15 New weather affecting pest control at current locations

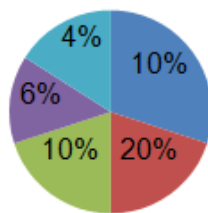
Country	Unpredictable temperature	Low growing season	High temperature	High moisture	Strong rainfall	Total
Sierra Leone	10	20	10	6	4	50
Turkey	15	10	10	7	8	50
Sum TOTAL	25	30	20	13	12	100

Figure 4.15 shows the new weather affecting pest control at the current locations of the farmers. Of the farmers interviewed both in Sierra Leone (Bombali District) and Turkey (Beypazari District) experienced unpredictable temperature, low growing season, high temperature, high moisture content, and strong rain fall in their respective locations. However, out of the fifty (50) vegetable farmers interviewed in Sierra Leone (Bombali District), ten (10) of the vegetable farmers interviewed lamented the unpredictable temperature, twenty (20) mentioned the low growing season, ten (10) elaborated on the high temperature, six (6) mentioned high moisture content while four (4) of them emphasis on the strong rainfall. Similarly for Turkey (Beypazari District), fifteen (15) of the vegetable farmers interviewed emphasize the unpredictable temperature, ten (10) lamented on the low growing season, ten (10) of them elaborated on the high temperature, seven (7) mentioned high moisture while eight (8) of the stressed rain fall.

From the data, Beypazari District (Turkey) experienced unpredictable temperature compared to Bombali District (Sierra Leone). And also in Bombali District (Sierra Leone) experienced low growing season compared to Beypazari District (Turkey).

Percentage of farmers responded with respect the new weather affecting pest control in Bombali District (Sierra Leone)

- Unpredictable temperature
- Low growing season
- High temperature
- High moisture
- Strong rain fall



Percentage of farmers responded with respect to the new weather affecting pest control in Beypazari (Turkey)

- Unpredictable temperature
- Low growing season
- High temperature
- High moisture
- Strong rain fall

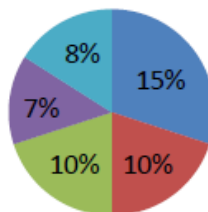


Figure 4.15 above represent Percentage of farmers responded regarding the new weather affecting pest control in Bombali District (Sierra Leone) and Beypazari District (Turkey)

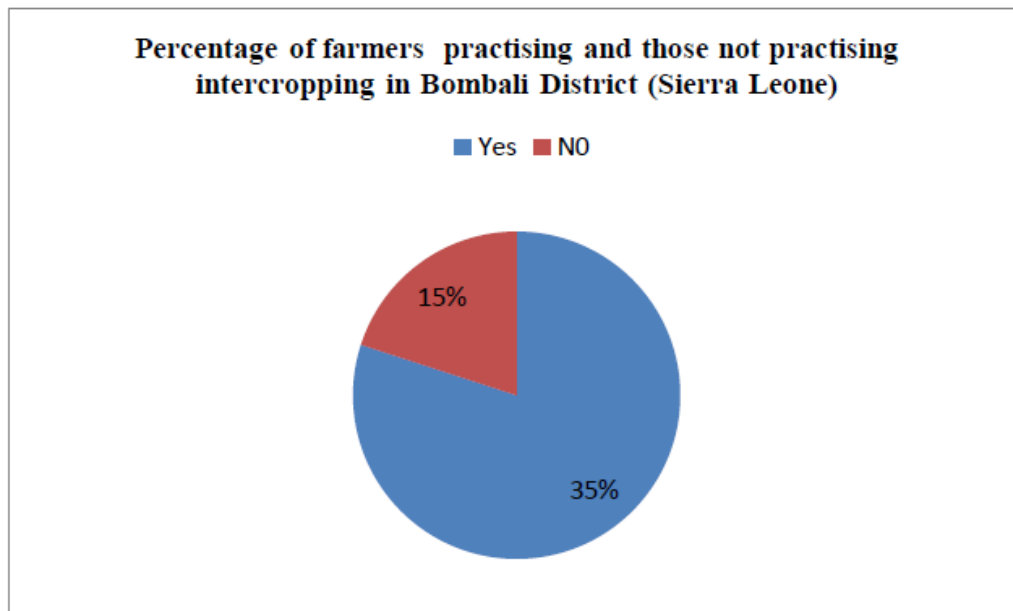
Practice inter-cropping

Table 4.16 Practice of inter- cropping

Country	Farmers practicing intercropping		Total
	Yes	No	
Sierra Leone	35	15	50
Turkey	40	10	50
Sum TOTAL	75	25	100

Figure 4.16 Percentage of farmers practicing intercropping and those not practicing such method in Bombali District (Sierra Leone) and Beypazari District (Turkey). with regards to the target population of farmers (50) interviewed in Bombali District (Sierra Leone), (35%) of them practiced intercropping while (15%) were not. Likewise Turkey (Beypazari District), an estimated percentage of (40%) farmers practiced intercropping while (10%) were not.

From the data, Turkey (Beypazari District) vegetable farmers practice intercropping than vegetable farmers in Sierra Leone (Bombali District)



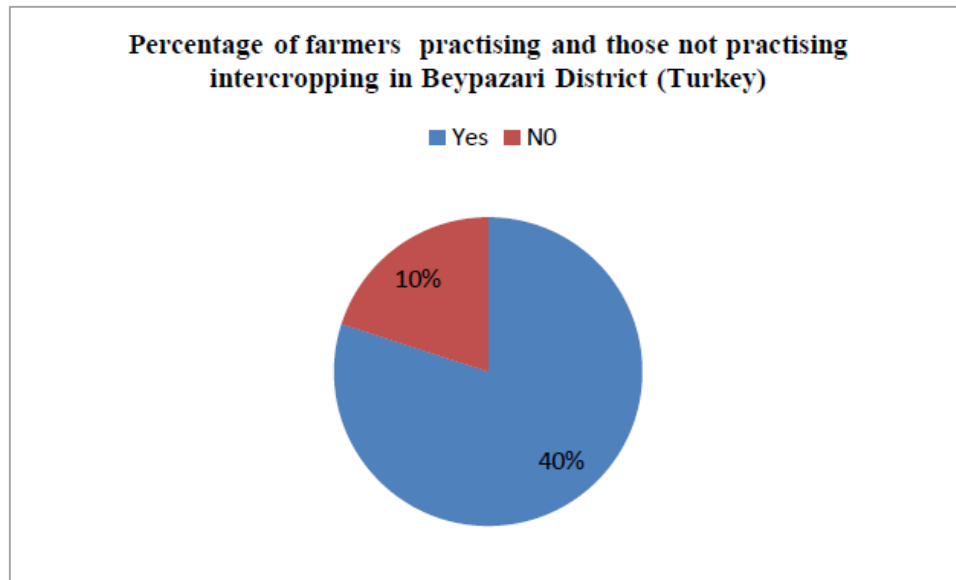


Figure 4.16 above represent Percentage of farmers practicing intercropping and those not practicing such method in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Answer for question number 17 is yes, which crops

Table 4.17 Crops use for intercropping by farmers in Sierra Leone and Turkey

Country	Crops use for intercropping					TOTAL
	Rice & Maize	Rice & Pepper	Pepper & Tomato	Lettuce & Cabbage	Spinach & Radish	
Sierra Leone	20	10	6	7	7	50
Turkey	15	15	10	6	4	50
Sum TOTAL	35	25	16	13	11	100

Considering crop use for intercropping, of the one hundred (100) vegetable farmers interviewed in Sierra Leone (Bombali District) and Turkey (Beypazari District) they intercropped rice and maize, rice and pepper, pepper and tomato, lettuce and cabbage, Spinach and radish respectively.

In Sierra Leone (Bombali District), out of the fifty (50) vegetable farmers interviewed, twenty (20) of the farmers intercropped rice and maize together, ten (10) intercropped rice and pepper, six (6) intercropped pepper and tomato, and seven (7) intercropped lettuce and cabbage while seven (7) intercropped spinach and radish together. Similarly for Turkey (Beypazari District), out of fifty (50) vegetable farmers, fifteen (15) of the vegetable farmers interviewed intercropped rice and maize altogether, fifteen (15) of them intercropped rice and pepper, ten (10) of the farmers intercropped pepper and tomato, six (6) of them intercropped lettuce and cabbage while four (4) of them intercropped spinach and radish altogether.

Use any pesticides in your vegetable garden, If yes, which of the following do you use

Table 4.18 illustrates the various pesticides used

Country	insecticides	herbicides	fungicides	Total
Sierra Leone	20	20	10	50
Turkey	15	15	20	50
Sum TOTAL	35	35	30	100

Figure 4.17 Percentage of farmers using various pesticides on their crop production in Bombali district (Sierra Leone) and Beypazari District (Turkey). Considering the percentage of targeted farmers, out of the (50) in Bombali District (Sierra Leone), (20%) of the farmers applied insecticides for pest control, (20%) used herbicides while (10%) applied fungicides. With regards to farmers interviewed in Beypazari District (Turkey), (15%) of the farmers interviewed used insecticides, (15%) applied herbicides while (20%) applied fungicides.

From the data, vegetable farmers in Bombali District (Sierra Leone) used more insecticides than Beypazari District (Turkey), while Beypazari District (Turkey) used more fungicide than Sierra Leone (Bombali District).

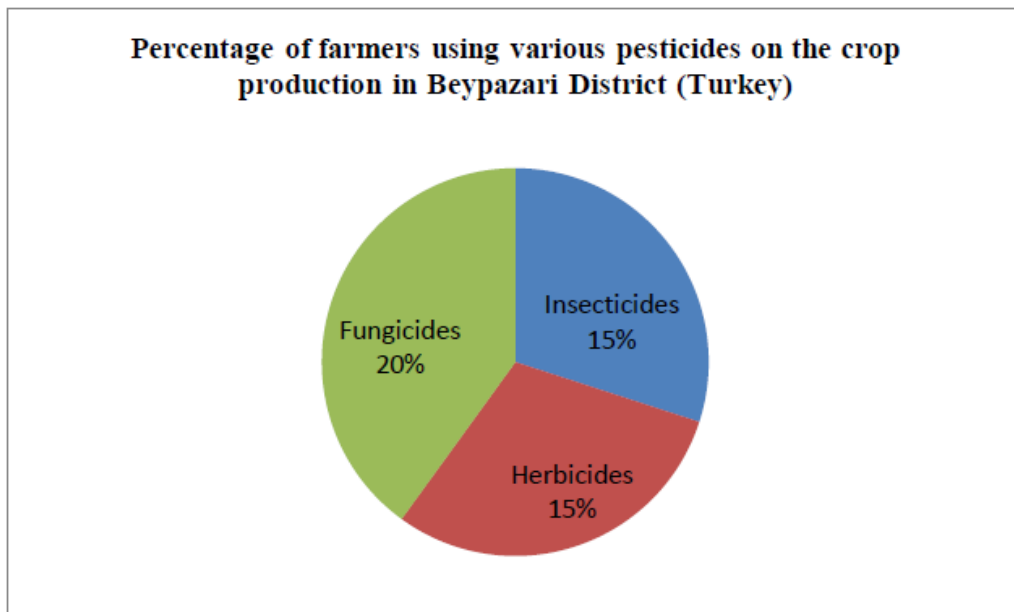
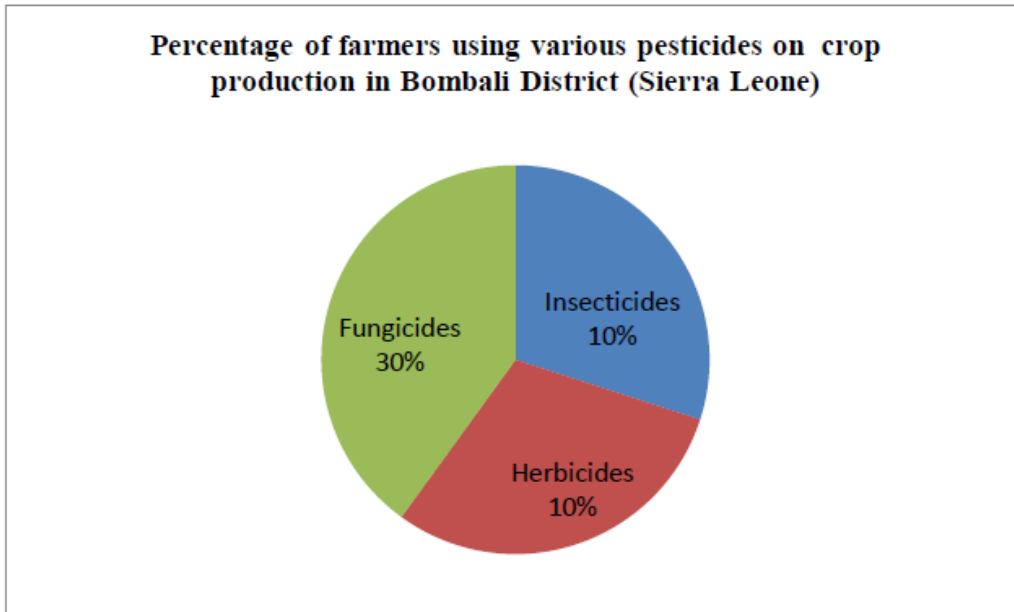


Figure 4.17 above represent Percentage of farmers using various pesticides on their crop production in Bombali District (Sierra Leone) and Beypazari District (Turkey)

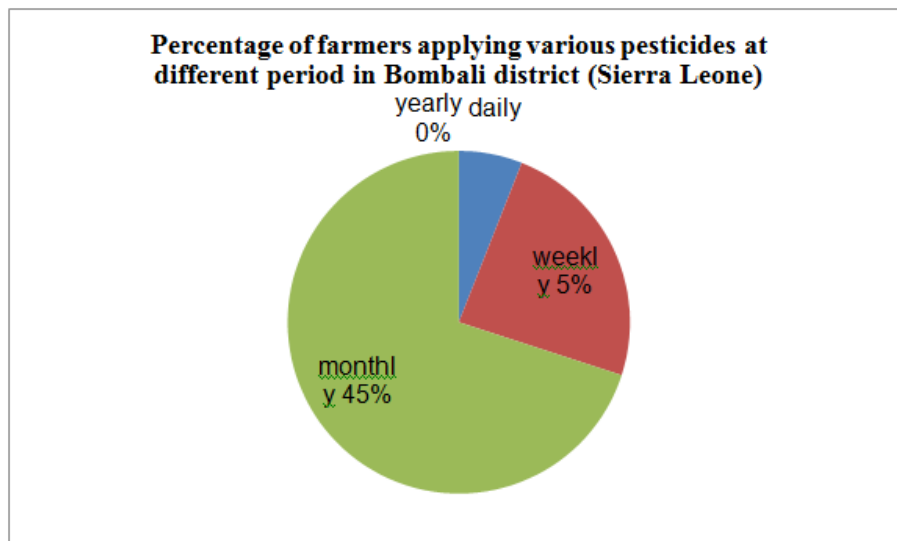
Frequency of using Pesticides

Table 4.19 the period of applying such pesticides by farmers in Sierra Leone and Turkey

Country	Daily	Weekly	Monthly	Yearly	Total
Sierra Leone	0	5	45	0	50
Turkey	3	12	35	0	50
Sum TOTAL	3	17	80	0	100

Figure 4.18 percentage of respondents applying various pesticides at different period in Bombali District (Sierra Leone) and Beypazari District (Turkey). However, out of the total percentage of farmers (50) interviewed in Bombali District (Sierra Leone), (0%) applied pesticides daily, (5%) applied weekly while (45%) applied monthly. however, no farmer interviewed in Sierra Leone (Bombali District) applied pesticides yearly. Similarly for Turkey (Beypazari District), (3%) of the farmers applied pesticides daily, (12%) applied weekly while (35%) applied monthly. No farmer interviewed in Beypazari District (Turkey) applied pesticides year.

From the data, vegetable farmers in Sierra Leone (Bombali District) applied pesticides monthly than Beypazari District (Turkey).



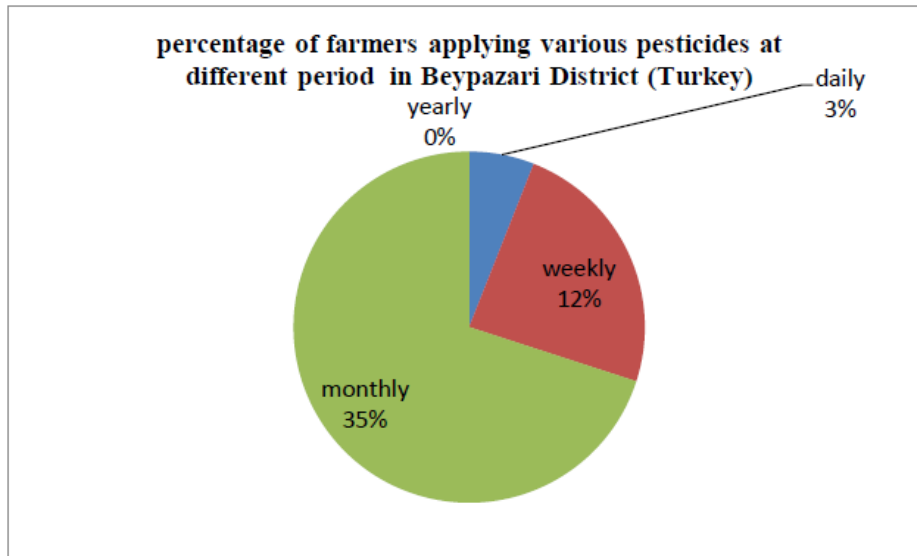


Figure 4.18 above represent percentage of respondents applying various pesticides at different period in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Level of agreement regarding the effect of pesticides on the following categories

Table 4.20 Various negative impacts of using pesticides encountered by farmers in Sierra Leone and Turkey

Country	Affect humans health	Affect livestock	Affect marine resources	Affect crops	Total
Sierra Leone	20	10	9	11	50
Turkey	25	10	5	10	50
Sum TOTAL	45	20	14	21	100

Figure 4.19 shows the various negative effects of pesticides encountered by farmers in Sierra Leone (Bombali District) and Turkey (Beypazari District). Out of the fifty (50) vegetable farmers interviewed in Sierra Leone (Bombali District), twenty (20) of the farmers interviewed responded on the human health effect, ten (10) of them responded on the effect of livestock, nine

(9) on the effect of marine resources, while eleven (11) of the responded on the effect it has on crop production. Similarly for Turkey (Bey pazari District), out of the fifty (50) vegetable farmers interviewed, twenty five (25) of the vegetable farmers elaborated on the human health effect, fifteen (15) on the effect of livestock, thirteen (13) lamented on the effect of marine resources while twelve (12) of the farmers mentioned the effect it has on crop production respectively.

From the data, vegetable farmers in Bey pazari District(Turkey) agreed more that pesticides have negative affect human health compare to Sierra Leone (Bombali district).

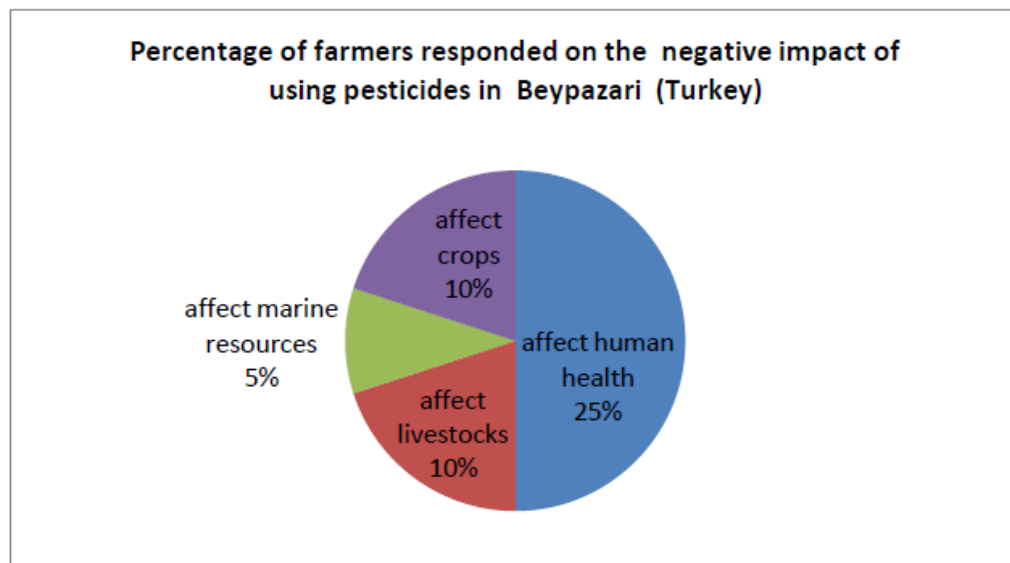
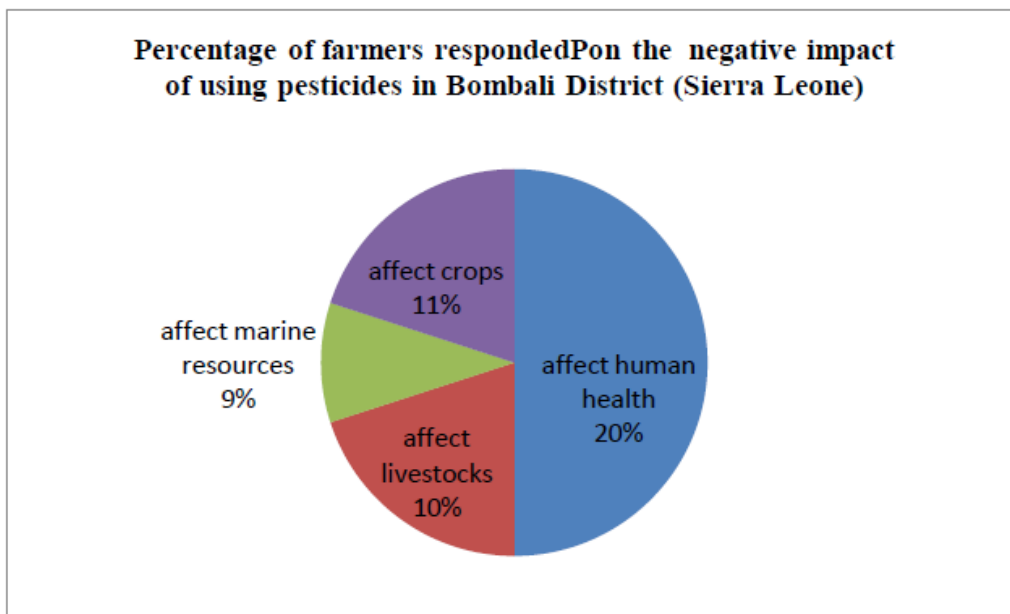


Figure 4.19 above represent Percentage of respondents’ responded base on the negative impact of using pesticides in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Farmers’ practices on pesticides.

Table 4.21 Farm practice on pesticides

Country	Mixing Pesticides		Use Personal Protective		Read Pesticides Manual	
	Yes	No	Yes	No	Yes	No
Sierra Leone	45	5	45	5	20	30
Turkey	48	2	40	10	47	3
Sum TOTAL	93	7	85	15	67	33

Figure 4.20 Percentage of farmers practiced mixing and non-mixing of pesticides in Bombali District (Sierra Leone) and Beypazari District (Turkey). However, out of the percentage of the targeted farmers, (50) in Bombali District, (45%) of the farmers practiced mixing of pesticides while (5%) were not. Likewise Turkey (Beypazari District), (48%) of the farmers interviewed yes for the mixing of pesticides while (2%) say no to it.

From the data, vegetable farmers in Turkey (Beypazari District) practiced more mixing pesticides than Vegetable farmers in Sierra Leone (Bombali District).

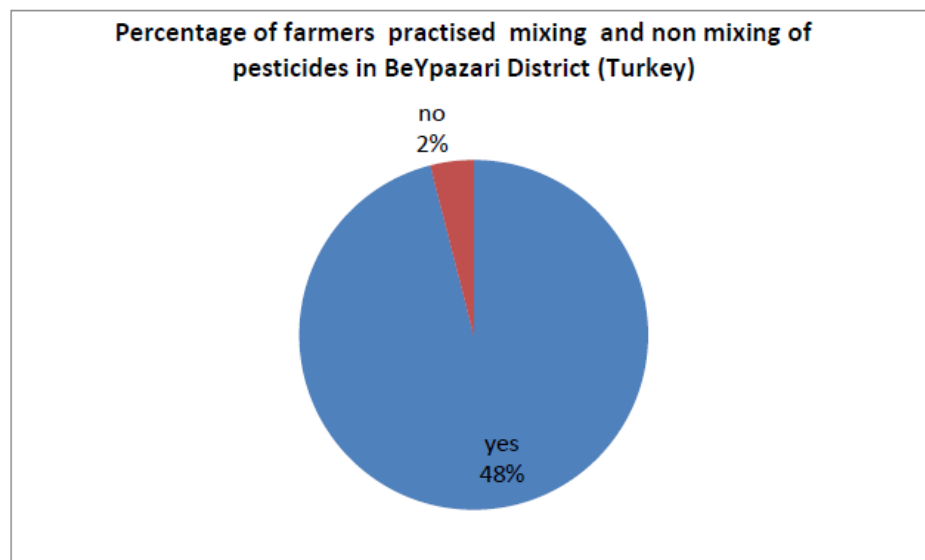
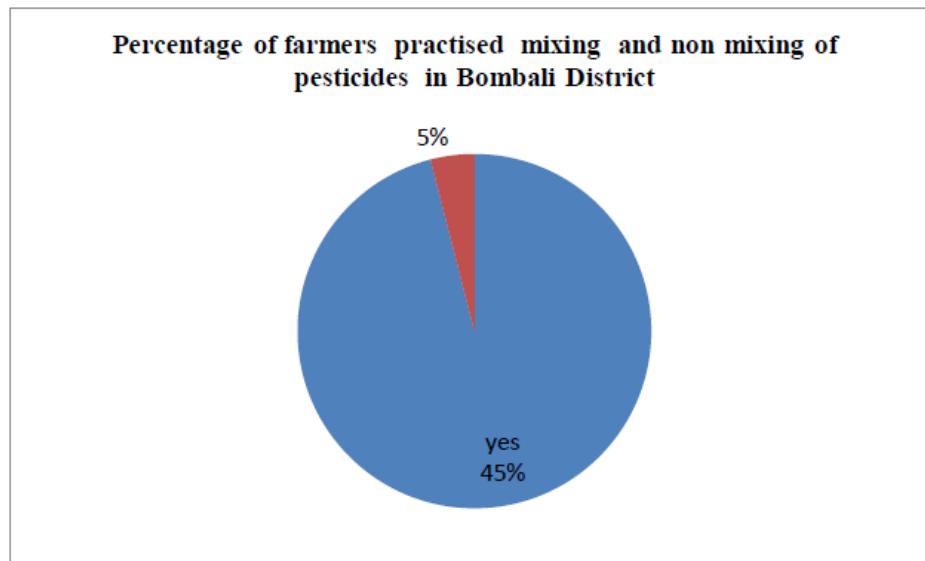


Figure 4.20 above represent Percentage of farmers practiced mixing and non-mixing of pesticides in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Figure 4.21 Percentage of farmers that read pesticides manual and those who were not in Bombali District (Sierra Leone) and Beypazari District (Turkey). In Sierra Leone (Bombali District), out of the (50) farmers interviewed, (20%) normally read pesticides manual while (30%) are not. Similarly for Turkey (Beypazari District), (47%) of the interviewed farmers usually read pesticides manual while (3%) of them are not.

From the data, vegetable farmers in Turkey (Bey pazari District) read pesticides manual than vegetable farmers in Sierra Leone (Bombali District).

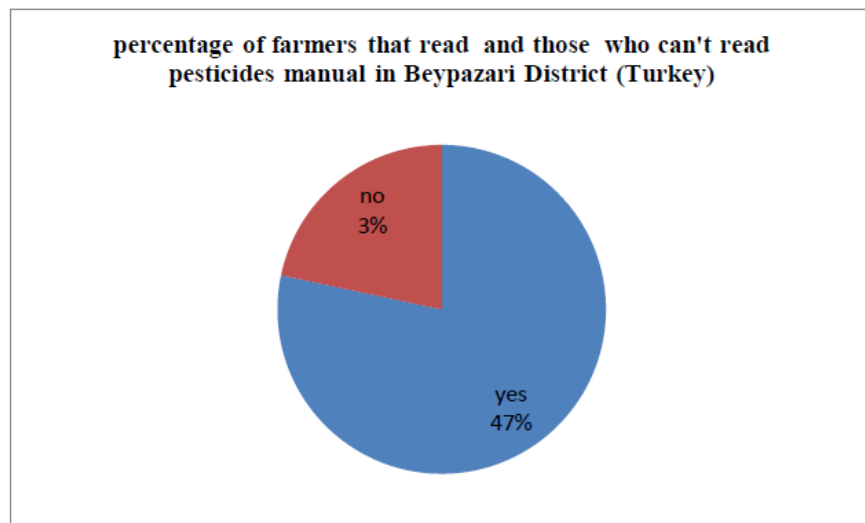
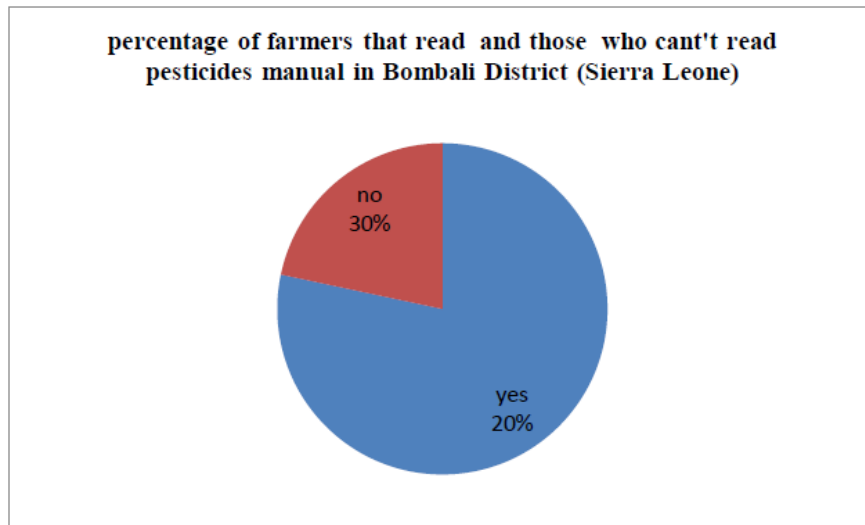


Figure 4.21 above Percentage of farmers that read pesticides manual and those who were not in Bombali District (Sierra Leone) and Bey pazari District (Turkey)

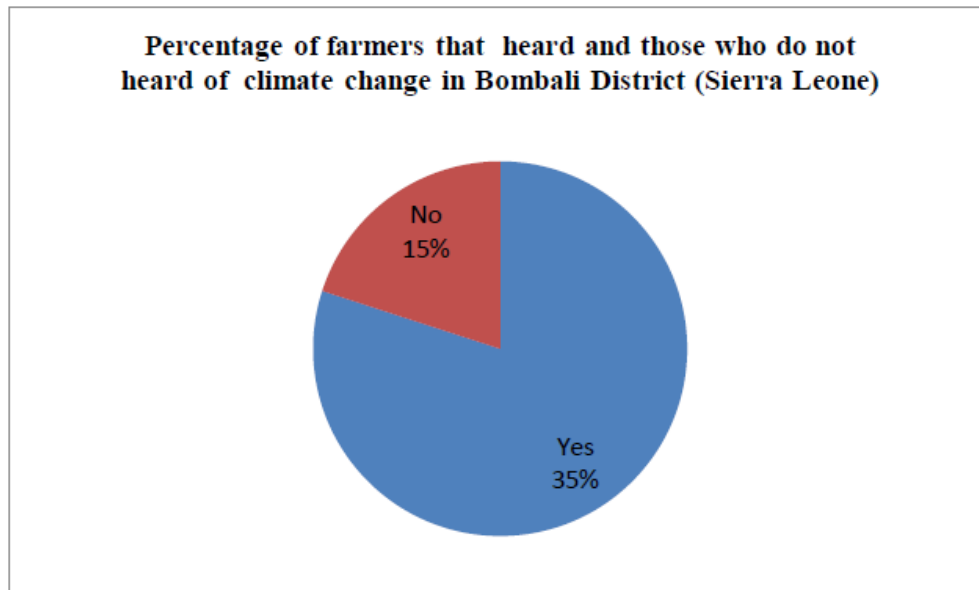
The Perception of farmers on the causes of change in climate in pest control activities

Heard about the expression climate change

Table 4.22 Hearing about the expression of climate change

Country	Have you ever heard about the expression climate	
	Yes	No
Sierra Leone	35.0	15.0
Turkey	40.0	10.0
Sum total	75	25

Figure 4.22 Percentage of farmers that heard about climate change and those who are not in Bombali District (Sierra Leone) and Beypazari District (Turkey). In Sierra Leone (Bombali District), out of the targeted (50) farmers that were interviewed, (35%) have previously heard about climate while (15%) have never heard about that. Likewise Turkey (Beypazari District), (40%) of the farmers interviewed had heard about climate change while (10%) are not.



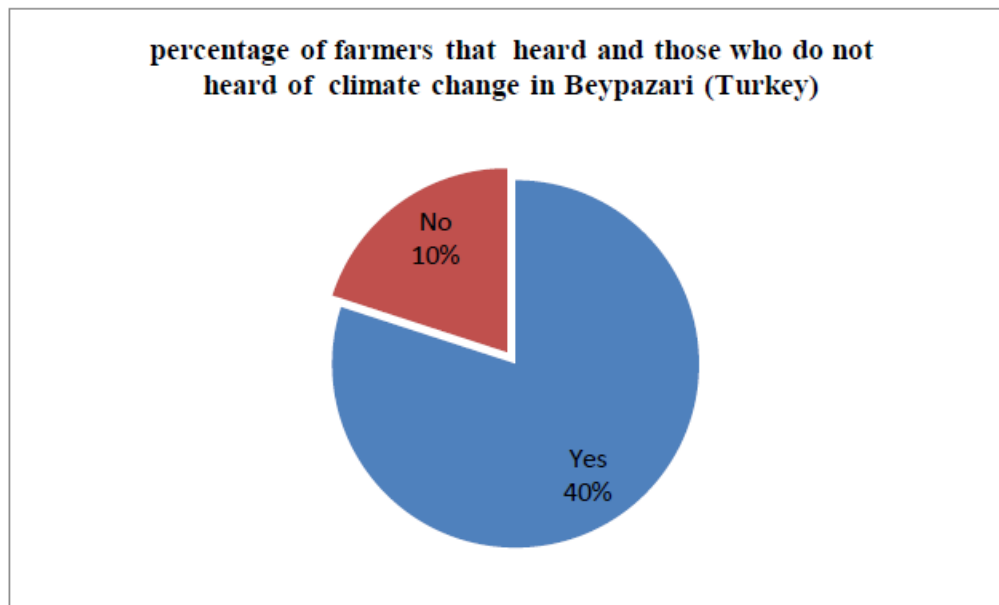


Figure 4.22 above represent Percentage of farmers that heard about climate change and those who are not in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Information about climate change

Table 4.23 shows the sources of enquiring information for climate change and the belief in climate change as a problem.

Believe that climate change is a problem

Out of the one hundred (100) vegetable farmers interviewed, fifty (50) of the vegetable farmers in Sierra Leone (Bombali District) believed that climate change is a problem and also fifty (50) in Turkey (Beypazari District) believed that climate change is a problem.

Table 4.23 Sources of enquiring information for climate change and believes in climate change as a problem

Country	Source of enquiring information for climate change				Believe in climate change as a problem		
	Agriculture institution	Mass media	University	Lead farmer	Yes	No	Don't know
Sierra Leone	5	40	3	2	50	0.0	0.0
Turkey	10	30	5	5	50	0.0	0.0
Total	15	70	8	7	100	0.0	0.0

Figure 4.23 Percentage of farmers acquired information on climate from various channels in Bombali District (Sierra Leone) and Beypazari District (Turkey). In Sierra Leone (Bombali District), out of the targeted population of farmers of (50), (5%) of them sourced information about climate change through agricultural institution, (40%) acquired information through media, (3%) and (2%) extracted information on climate change through university and fellow farmers respectively. Similarly for Turkey (Beypazari District), out of the 50 vegetable farmers in interviewed, (10%) of them access information about climate change through agricultural institution, (30%) acquired information through media, (5%) of them through university while (5%) access information through fellow farmers.

From the data, vegetable farmers in Sierra Leone (Bombali District) acquired more information from media compared to Turkey (Beypazari District).

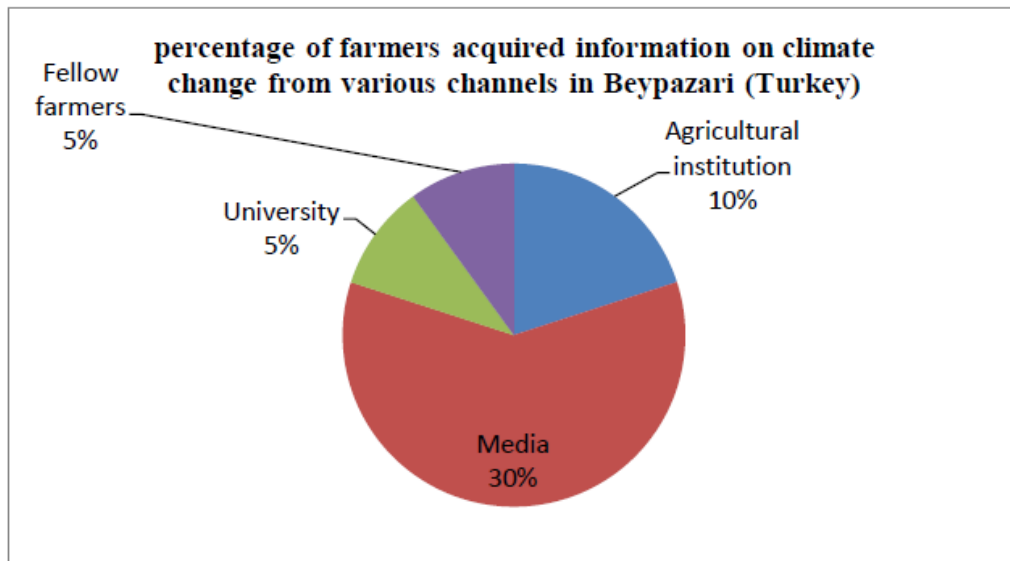
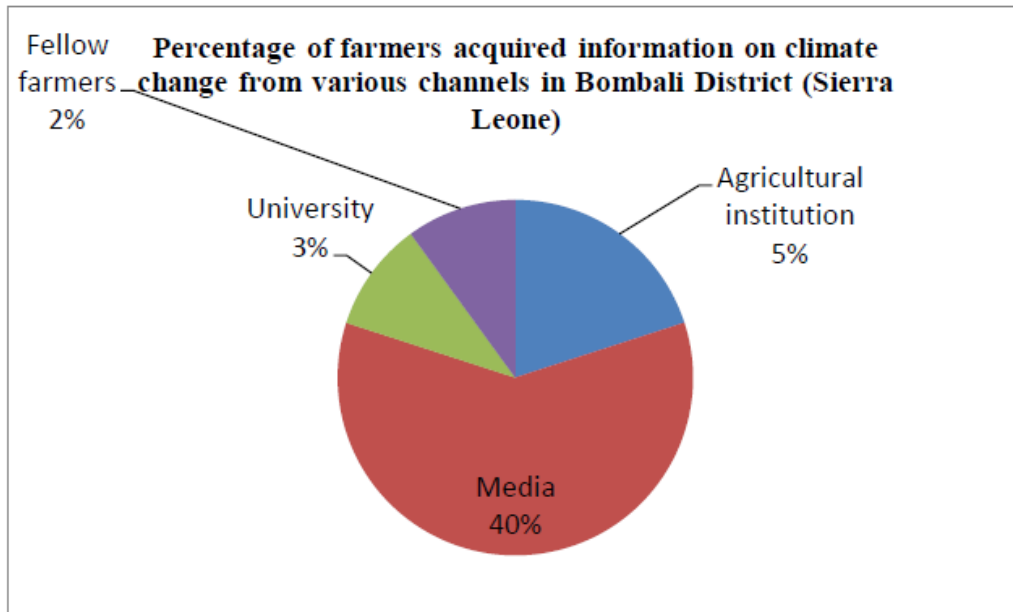


Figure 4.23 above represent Percentage of farmers acquired information on climate from various channels in Bombali District and Beypazari District (Turkey)

Worry about climate change

Table 4.24 How much do you worry about climate change

Country	Not at all	Very little	Kind off	Too much	Total
Sierra Leone	10	15	15	10	50
Turkey	20	10	10	10	50
Sum TOTAL	30	25	25	20	100

Figure 4.24 Percentage of farmers responded with regards their level of worries about climate change in Bombali District (Sierra Leone) and Beypazari district (Turkey). In Sierra Leone (Bombali District), out of the targeted (50) farmers interviewed, (10%) of the farmers were not worried at all about climate change, (15%) worried very little, (15%) have kind off worried while (10%) have too much worried about climate change. Likewise Turkey (Beypazari District), (20%) of the farmers interviewed were not at all worried about climate change, (10%) are very little worried, (10%) are kind off worried while (10%) have too much worried about climate change.

From the data, vegetable farmers in Sierra Leone (Bombali District) are more very little or kind of worried about climate change compared to Turkey (Beypazari District).

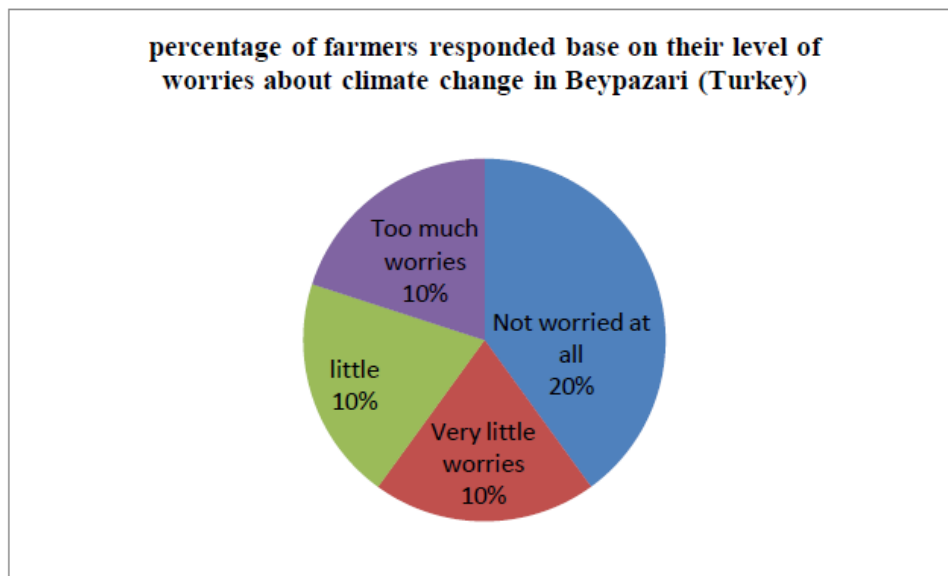
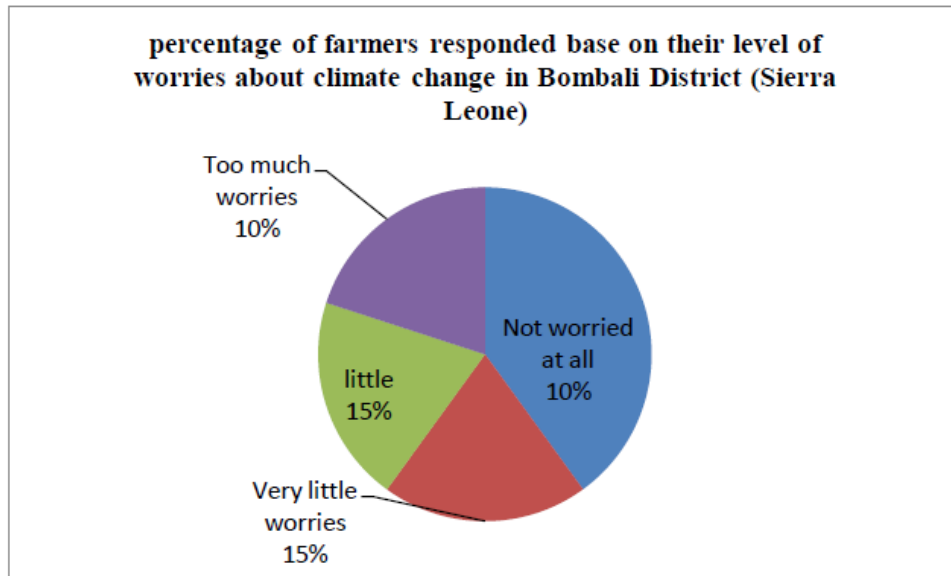


Figure 4.24 above represent Percentage of farmers responded with regards their level of worries about climate change in Bombali District (Sierra Leone) and Beypazari District (Turkey)

Thinking about in relation with the climate change

Table 4.25 Thinking about in relation with the climate change

Country	Change in crop yield	Global warming	Soil erosion	Drought	Total
Sierra Leone	30	10	5	5	50
Turkey	35	5	5	5	50
Sum TOTAL	65	15	10	10	100

Figure 4.25 Percentage of farmers base on their thoughts about climate change in Bombali District (Sierra Leone) and Beypazari District (Turkey). out of (50) farmers interviewed in Sierra Leone, (30%) of them have the feeling of thoughts that climate change may cause change in crop yield, (10%) deliberated on the causes of global warming, (5%) lamented on the causes of soil erosion while (5%) mentioned that climate change may cause drought. Similarly for Turkey (Beypazari District), an estimated percentage of (35%) of farmers interviewed deliberated on change of crop yield as a result of climate change, (5%) emphasized on global warming due climate change, (5%) lamented on soil erosion while (5%) deliberated on drought as a result of climate change.

From the data, vegetable farmers in Turkey (Beypazari District) thinks that change in crop yield in relation to climate change more compare to Sierra Leone (Bombali District)

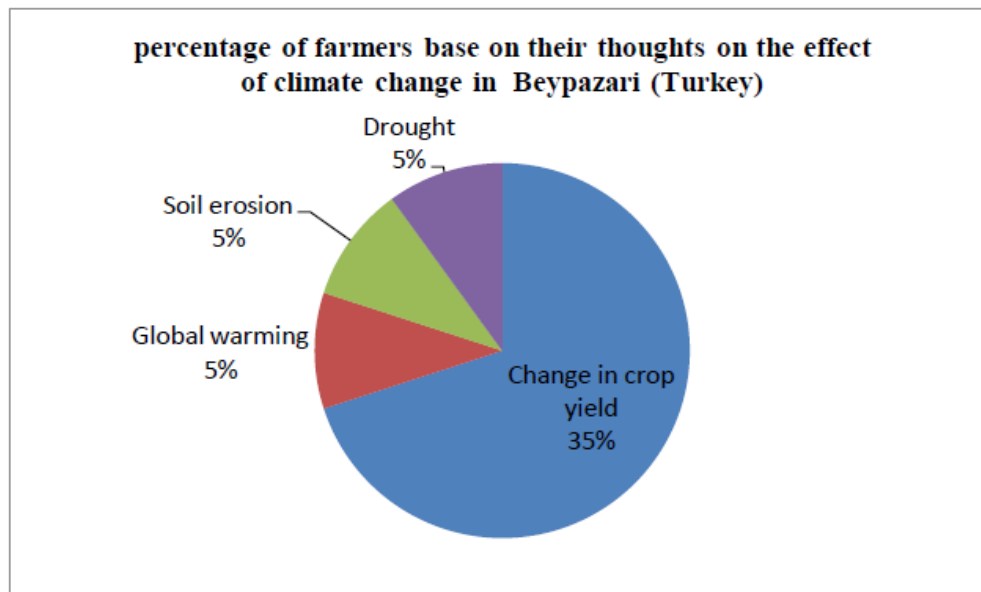
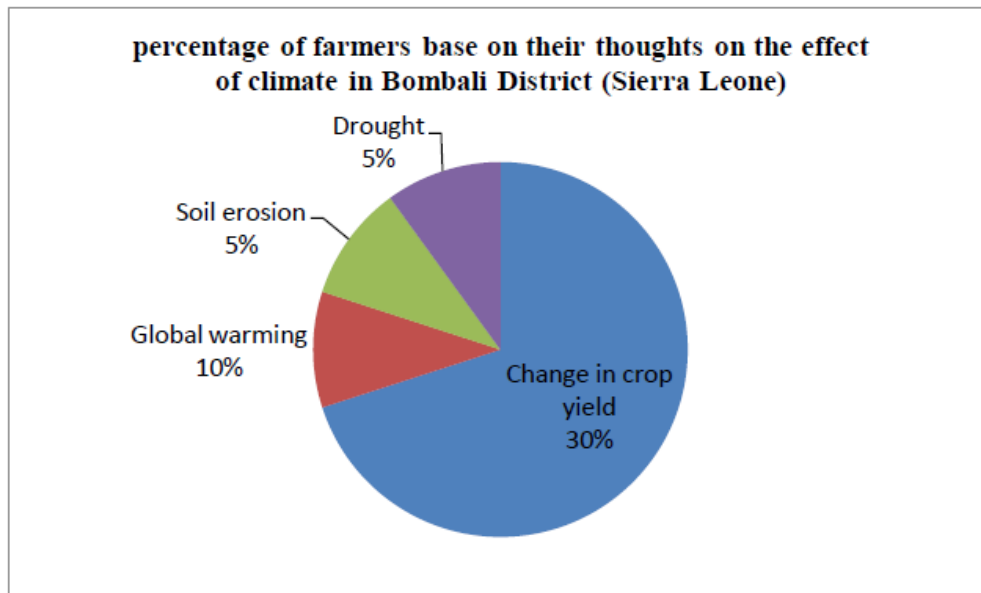


Figure 4.25 above represent Percentage of farmers' base on their thoughts about climate change in Bombali District (Sierra Leone) and Beypazari District (Turkey)

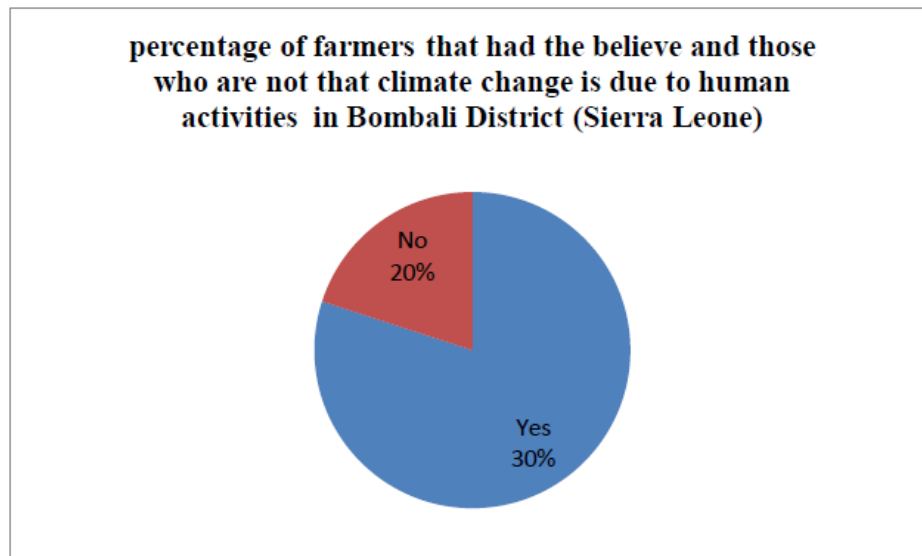
Believe that climate change is due to human activities

Table 4.26 Believe that climate change is due to human activities

Country	Yes	No	Total
Sierra Leone	30	20	50
Turkey	40	10	50
Sum	70	30	100
TOTAL			

Figure 4.26 Percentage of farmers had the believe and those who are not that climate change is due to human activities in Bombali District (Sierra Leone) and Beypazari District (Turkey). In Sierra Leone (Bombali District), out of the (50) farmers interviewed in Sierra Leone (Bombali District), (30%) of the farmers believe that climate change is cause by human activities while (20%) are not. Similarly for Turkey (Beypazari District), out of the (50) farmers targeted, (40%) of them believe that climate change is cause by numerous human activities while (10%) are not.

From the data, vegetable farmers in Turkey (Beypazari District) believe more that climate change is cause by the numerous human activities compared to Sierra Leone (Bombali District).



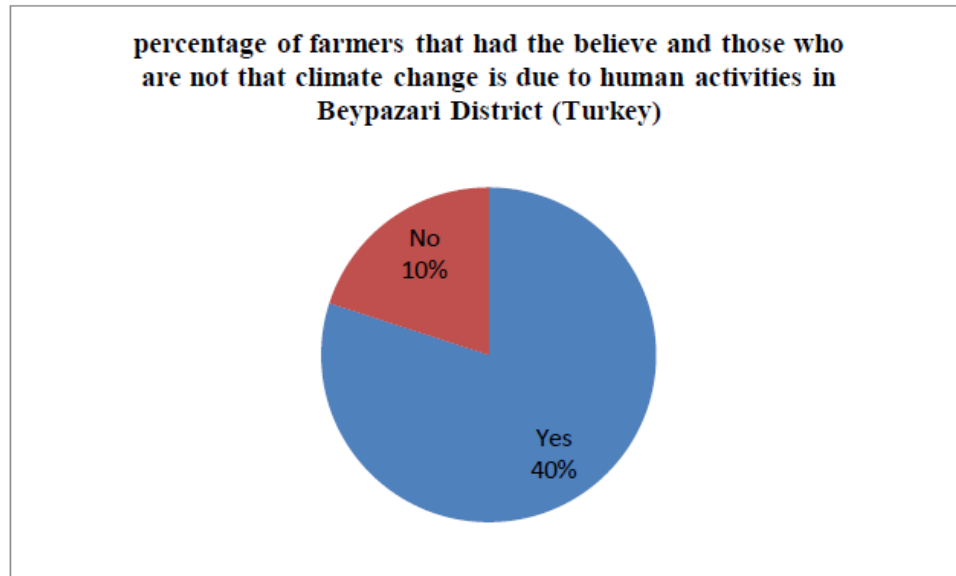


Figure 4.26 above represent Percentage of farmers had the believe and those who are, not that climate change is due to human activities in Bombali District (Sierra Leone) and Bey pazari District (Turkey)

Reasons for climate change

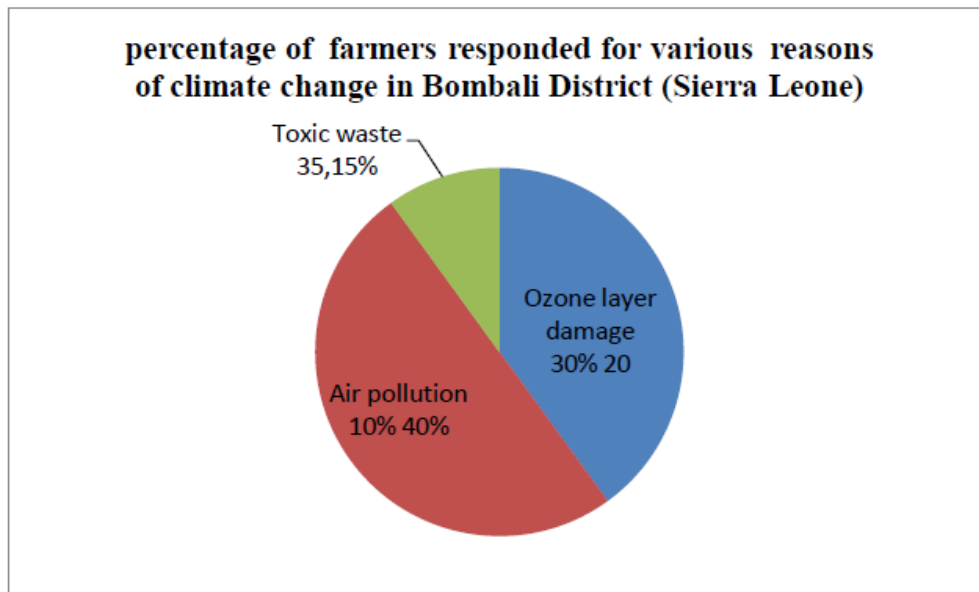
Table 4.27 reasons for the climate change

Country	Reasons for the climate change					
	Ozone Layer Damage		Air Pollution		Toxic Waste	
	Yes	No	Yes	No	Yes	No
Sierra Leone	20.0	30.0	40.0	10.0	35	15
Turkey	30.0	20.0	45.0	5.0	40	10
Total	50	50.0	85	15	75	25

Figure 4.27 Percentage of farmers respondents base on the various reason for climate change in Bombali District (Sierra Leone) and Bey pazari District (Turkey). considering the percentage of

targeted farmers in Sierra Leone (Bombali District) out of the (50), (30%) of the farmers says yes ozone layer damage as a main cause of climate change and (20%) says no, (40%) says yes on air pollution as a cause while (10%) says no, on toxic waste (35%) says yes and (15%) says no. similarly for Turkey (Beypazari District), out of the (50) farmers interviewed, (30%) says yes on ozone layer damage as a cause of climate change and (20%) says no ,(45%) says yes on air pollution while (5%) says no and on toxic waste (40%) says yes and (10%) says no.

From the data, majority of the vegetable farmers in Turkey (Beypazari District) mentioned ozone layer damage and air pollution are the main reason to climate change compare to Sierra Leone (Bombali District).



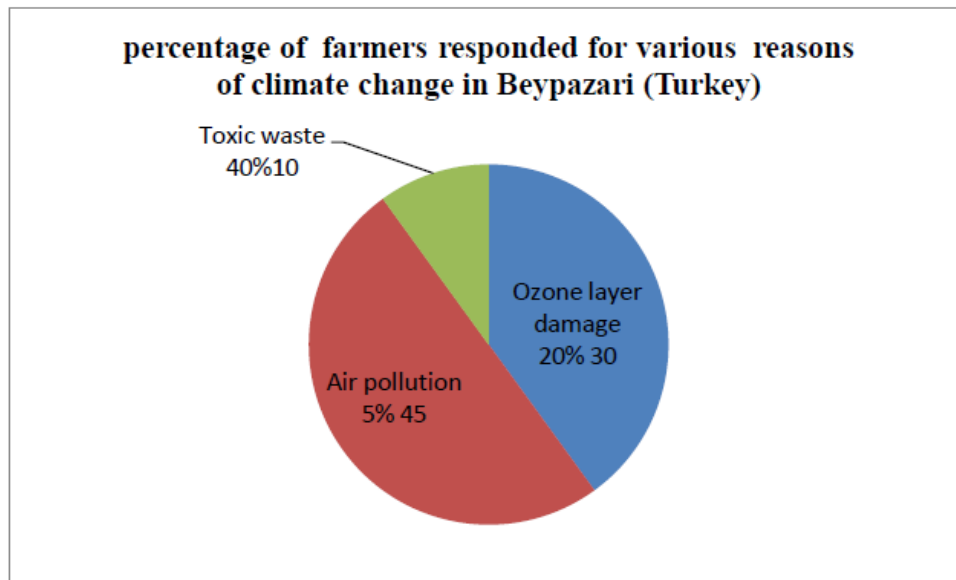


Figure 4.27 above represents Percentage of farmers' responded base on the various reasons for climate change in Bombali District (Sierra Leone) and Beypazari District (Turkey)

DISCUSSION AND CONCLUSIONS

Overall objective of this study was the effect of climate change on vegetable farmers in pest control decisions (Case study Sierra Leone (Bombali district) and Turkey (Beypazari district)) with specific objectives such as, to identify the new situation caused by climate change in pest controls activities, to identify the factors affecting farmer decisions making process on pest control and the Perception of vegetable farmers on the causes of change in climate in pest control activities. The study was limited to Bombali district, Sierra Leone, and Beypazari district, Turkey. Data collection mainly targeted household heads.

A survey research design was adopted based on which a verified questionnaire was developed. The population for this study is both male and female household heads in these chiefdoms. The size of the sample for this study was determined by purposive sampling. The sampling technique used to carry out the selection of the respondents is two stages. Stage one was a purposive selection of the project areas (areas mostly vegetable production). Stage two was respondent selection. Purposive sample technique was used in the selection of household heads for the study. The information was collected by using a survey; the questionnaire was administered by the researcher himself and three (3) enumerator to the vegetable farmers.

The data collected was entered and analyzed by simple descriptive analysis by using SPSS.

From the findings of this study include. There are more Male household head than female household, from the data, this shows that there are more household head in Beypazari District (Turkey) than Bombali District (Sierra Leone).

an majority of the vegetable farmers are within the age brackets of (39-48) years this presents the active farmers in vegetable production, seventy (70%) of the respondents were married, from the data, there are more married vegetable farmers in Turkey (Beypazari District) than Sierra Leone (Bombali District) and also there are more divorced vegetable farmers in Sierra Leone (Bombali District) than Turkey (Beypazari District) an average of twenty two (22%) of the respondents do not attended school, also (93%) of them were household heads, the household size for majority of the vegetable farmers is between six (6) people, from the findings the household heads income for Turkey (Beypazari District) is between 5000tl-10000tl and for Sierra Leone (Bombali District) is between le300,000-le500,000.

From the finding of the study, a large number of the respondent in Turkey (Beypazari District) have received pest management training and only few Sierra Leone (Bombali District) vegetable farmer have received pest management training, and the majority received training on the chemical method of pest control.

From the finding, the majority of the vegetable farmers practice crop rotation, and in Sierra Leone (Bombali District) is rice and groundnut and for Turkey (Beypazari District) is rice and maize.

According to the study low growing season is the new weather conditions that have affected farmers pest control activates the most at their current location and most of the farmers practice inter cropping and rice and maize are the major crops they use for inter cropping.

The study revealed majority of the farmers use pesticides and these pesticides are herbicides and insecticides and they only use such chemicals monthly.

According to the studies, pesticides affected human health.

The study revealed the farm practices of vegetable farmers are mixing pesticides, use Personal Protective and Read Pesticides Manual According to the findings from the study, major of the vegetable farmers in Turkey (Beypazari District) and Sierra Leone (Bombali District) have heard about climate change from mass media and they believe in climate change as a problem

From the finding, the majority of the farmers not at all worried about climate change, and the first thing they think relation to change in climate is change in crop yield.

The study revealed the farmers' believed that climate change is due to human activities and the reason is air pollution

The following conclusions were drawn from the study:

Male household heads are more than female household head.

Most of the household head were within the age bracket of (39-49) years, these shows that there are more youth engaged in vegetable production. since most of them were married and tend to adopt adequate knowledge on the effect of climate change in their environment and how to control pest activities in their vegetable farms. None educated household head were very few among. The household size is six (6) people which adopt adequate knowledge on the effect of change in climate on vegetable farmers in pest control decisions. From the study the respondent main income is vegetable farming.

From the data, the household head preference is adequate knowledge on the effect of climate change in their environment.

Recommendations

The following recommendations were drawn from the study;

1. Vegetable farmers in Sierra Leone should receive training on pest management. In addition, other alternatives for the method of pest control should be made available to rural households to avoid the effect of the use of chemicals.
2. The study recommends that support is needed to promote higher production of crops.
3. According to what the study revealed, low growing season affected farmers most due to climate change, collaborative efforts from stakeholders in Turkey and Sierra Leone to create adequate awareness on the use of pesticide.

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