



**UNIVERSITI PUTRA MALAYSIA**

***SOCIAL ADAPTATION TOWARD CLIMATE CHANGE AMONG HARUM  
MANIS MANGOES GROWERS AND AGRICULTURAL EXTENSION  
ACTIVITIES IN PERLIS***

**MUHD ARIFF EDZHAM BIN KAMAL BASHAH**

**FP 2017 2**

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**2016/2017**

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ACTIVITIES IN PERLIS**

**BY**

**MUHD ARIFF EDZHAM BIN KAMAL BASHAH**

Thesis Submitted to the Faculty of Agriculture, Universiti Putra Malaysia, in  
Fulfilment of the requirement of PRT 4999 (Final Year Project) for the award of the

**FACULTY OF AGRICULTURE  
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## DECLARATION

This project report entitled Social Adaptation Toward Climate Change Among Harum Manis Mangoes Growers and Agricultural Extension Activities in Perlis is prepared by Muhd Ariff Edzham Bin Kamal Bashah and submitted to the Faculty of Agriculture in fulfilment the requirement of PPT 4999 (project paper) for the award of the Bachelor of Agricultural Science is based on my own original works.

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## ABSTRACT

Climate change is proven to have impacted the agricultural productivity, crop choice, and food security everywhere in the world. However, in agriculture there is a way on how to adapt with the climate change. The mango named “Harum Manis” is a famous agricultural product of Perlis, Malaysia. This fruit only produce in Perlis. By suitable adaptation, it will increase the quality and quantity of the fruits. The demand for the fruit is very high. It also contributed to one of the attractions for tourists to visit the country of Perlis. It contributes to agro-tourism in the state of Perlis. Besides, it makes local branding to Perlis. It provides income to small farmers in the state of Perlis. However, the problem arise for the last seasons are decrease in yield because of the climate change or more specific are El Nino. The general objective of this study is to identify social adaptation towards climate change among Harum Manis growers. The specific objectives are to examine the perception level of respondents towards the impacts climate change and also to determine the relationship between socio demographic factor and perception level of mangoes growers toward their social adaptation to climate change and assessing the perception level of the agricultural extension activities. A questionnaire form was constructed to collect data for this study. This study will be a questionnaire survey to 150 growers in Perlis. The expected result for this study are the perception level of respondents toward the impacts of climate change is moderate and there are significant relationship between socio demographic factors (farm size, age, education level, and income) and perception level of mangoes growers toward their social adaptation of climate change impacts. Data that is collected will be processed by using Statistical

Package for the Social Science (SPSS) using descriptive, Chi- Square and correlation analysis.

The study found that the majority that involves in this industry were grower age range between 51 to 70 years old. Most of grower were Malay and educated up to Highest Malaysian Certificate of Education (STPM) or Skill Certificates. Most of them have incomes up to RM 40000 per season and have been involved in harum manis farming for about 6 to 10 year. From the analysis made, found out that there are moderate level respondent's perception toward Harum Manis cultivation activity. Furthermore, from the result, majority of respondents were at moderate level perception on social adaptation towards impact of climate change. The result shows the total mean is 3.92 that is consider as a high level on perception or view of the risks of climate change. 73.3% of respondents in a high level of perception or view of the risks of climate change while only 26.7% of respondents in a moderate level of perception or view of the risks of climate change. From that, 100% of the respondents were taking action watering their crops more frequently in adaptation in their agricultural activities in the face of climate change/disaster. Then followed by 6.7% of the respondents choose to do crop diversification, planting more shade trees and implementing soil conservation techniques respectively. The growers also take solution in overcoming the problem of climate change/natural disaster. 100% of the respondents choose to take a good manage for plant and irrigation. Majority of respondents were at moderate level on perception toward agricultural agency and extension program.

From the correlation analysis, the result shows a correlation between socio demographic profiles with respondent perception toward climate change. Only education level have positive correlation. Next, respondents perception towards agricultural extension activity shows that respondent's experience in agriculture farming, average total yield per season and net income per season age have a relationship between respondents perceptions toward agriculture extension activity (agency and agricultural officer). Agricultural Department play an important roles to assist farmer in manage their Harum Manis farm. Most farmers are depending to agricultural officer in order to guide them to be a successful farmer.

From this study, a conclusion can be made that the Harum Manis growers easy to adapt to climate change that happened. Most growers already involved in farming for more than 10 years. Various methods have been developed and adapted to prevailing circumstances. However, what happened for the last season is unexpected. This cause the decreased of the yields. But, for the extension activities or services, the authorities must take this issue seriously. This is because, from the results, it shows the extension activities and services at the moderate level. Harum Manis planting activities should be in line with the services and agricultural extension programs. This will ensure that agricultural activity is widely regarded in Perlis.



## ABSTRAK

Perubahan iklim terbukti memberi kesan produktiviti pertanian, pilihan tanaman dan keselamatan makanan dunia. Walau bagaimanapun, dalam bidang pertanian ada cara bagaimana untuk menyesuaikan diri dengan perubahan cuaca. Mangga yang dinamakan "Harum Manis" adalah produk pertanian terkenal Perlis, Malaysia. Buah ini hanya berhasi di Perlis. Dengan penyesuaian yang sesuai, ia akan meningkatkan kualiti dan kuantiti buah-buahan. Permintaannya sangat tinggi. Ia juga menyumbang kepada salah satu tarikan kepada pelancong untuk melawat negeri Perlis. Ia menyumbang kepada agro-pelancongan di negeri Perlis. Selain itu, ia menghasilkan penjenamaan tempatan kepada Perlis. Ia menyediakan pendapatan kepada petani kecil di negeri Perlis. Walau bagaimanapun, masalah yang timbul pada musim lepas adalah penurunan dalam hasil kerana perubahan cuaca atau lebih khusus El Nino. Objektif umum kajian ini adalah untuk mengenal pasti penyesuaian sosial terhadap perubahan cuaca di kalangan penanam Harum Manis. Objektif khusus adalah untuk mengkaji tahap persepsi responden terhadap kesan perubahan iklim dan juga untuk menentukan hubungan antara faktor demografik sosio dan tahap persepsi penanam mangga ke arah penyesuaian sosial mereka kepada perubahan iklim dan menilai tahap persepsi aktiviti pengembangan pertanian. Borang soal selidik telah dibina untuk mengumpul data untuk kajian ini. Kajian ini akan menjadi satu kajian soal selidik kepada 150 penanam di Perlis. Hasil yang diharapkan untuk kajian ini adalah tahap persepsi responden terhadap kesan perubahan cuaca adalah sederhana dan terdapat hubungan yang signifikan antara faktor-faktor sosio demografi (saiz ladang, umur, tahap pendidikan, dan pendapatan) dan tahap persepsi penanam mangga ke arah sosial mereka adaptasi daripada kesan perubahan iklim. Data yang dikumpul

akan diproses dengan menggunakan Pakej Statistik untuk Sains Sosial (SPSS) dengan menggunakan deskriptif, Chi- Square dan analisis korelasi.

Kajian ini mendapati bahawa majoriti yang terlibat dalam industri ini penanam lingkungan umur antara 51 hingga 70 tahun. Kebanyakan penanam adalah Melayu dan mendapat pendidikan sehingga Sijil Pelajaran Malaysia Tertinggi Pelajaran (STPM) atau Sijil Kemahiran. Kebanyakan mereka mempunyai pendapatan sehingga RM 40000 setiap musim dan telah terlibat dalam pertanian selama kira-kira 6 hingga 10 tahun. Daripada analisis yang dibuat, mendapati bahawa terdapat persepsi tahap sederhana responden terhadap aktiviti penanaman Harum Manis. Tambahan pula, dari hasil, majoriti responden berada pada tahap sederhana persepsi di adaptasi sosial terhadap kesan perubahan cuaca. Hasilnya menunjukkan jumlah min ialah 2.87 yang adalah dianggap sebagai tahap sederhana kepada persepsi atau pandangan mengenai risiko perubahan cuaca. Seramai 73.3% daripada responden di tahap yang tinggi persepsi atau pandangan mengenai risiko perubahan iklim manakala hanya 26.7% daripada responden di tahap sederhana persepsi atau pandangan mengenai risiko perubahan cuaca. Dari itu, 100% daripada responden telah mengambil tindakan menyiram tanaman mereka lebih kerap diadaptasi dalam aktiviti pertanian mereka dalam menghadapi perubahan cuaca/bencana alam. Kemudian diikuti oleh 6.7% daripada responden memilih untuk melakukan kepelbagaian tanaman, menanam lebih banyak pokok naungan dan masing-masing melaksanakan teknik pemuliharaan tanah. Penanam juga mengambil penyelesaian dalam mengatasi masalah perubahan cuaca/bencana alam. 100% daripada responden memilih untuk mengambil yang baik yang diuruskan bagi loji dan pengairan. Majoriti responden berada pada tahap sederhana kepada persepsi terhadap agensi pertanian dan program lanjutan.

Daripada analisis korelasi, hasilnya menunjukkan kaitan antara profil sosio demografik dengan persepsi responden terhadap perubahan cuaca. Hanya tahap pendidikan mempunyai hubungan yang positif. Seterusnya, responden persepsi terhadap aktiviti pengembangan pertanian menunjukkan pengalaman responden dalam pertanian pertanian, purata jumlah hasil setiap musim dan pendapatan bersih setiap umur musim mempunyai hubungan antara responden persepsi ke arah aktiviti pengembangan pertanian (agensi dan pegawai pertanian). Jabatan Pertanian memainkan peranan penting untuk membantu petani dalam menguruskan ladang Harum Manis mereka. Kebanyakan petani bergantung kepada pegawai pertanian untuk membimbing mereka untuk menjadi petani yang berjaya.

Dari kajian ini, kesimpulan boleh dibuat bahawa penanam Harum Manis mudah untuk menyesuaikan diri terhadap perubahan iklim yang berlaku. ini kerana, kebanyakan penanam sudah menceburi dalam bidang pertanian ini lebih dari 10 tahun. Pelbagai cara telah dibuat dan disesuaikan dengan keadaan yang berlaku. Tetapi, apa yang berlaku pada musim lepas diluar jangkaan penanam menyebabkan hasil menurun. Tetapi, untuk aktiviti atau perkhidmatan pengembangan, pihak yang berwajib harus mengambil masalah ini dengan serius. hal ini kerana, dari hasil yang dapat, ia menunjukkan aktiviti dan perkhidmatan pengembangan berada di tahap sederhana. Aktiviti penanaman Harum Manis perlu seiring dengan perkhidmatan dan program pengembangan pertanian. Ini akan memastikan aktiviti pertanian di Negeri Perlis dipandang luas.

## CONTENTS

<b>DECLARATION.....</b>	<b>i</b>
<b>ACKNOWLEDGEMENTS.....</b>	<b>ii</b>
<b>ABSTRACT.....</b>	<b>iii</b>
<b>ABSTRAK.....</b>	<b>vi</b>
<b>LIST OF TABLES.....</b>	<b>xiii</b>
<b>LIST OF FIGURE.....</b>	<b>xvi</b>
<b>CHAPTER 1 INTRODUCTION.....</b>	<b>1</b>
1.0 Introduction .....	1
1.1.1 National Agriculture Policy .....	2
1.2 Fruits Industry .....	3
1.2.1 Production.....	3
1.2.2 Demand.....	4
1.3 Mango Industry .....	5
1.3.1 History .....	5
1.3.2 Harum Manis Mango (MA 128).....	7
1.3.3 Area.....	7
1.3.4 Mango Growers .....	7
1.4 Climate Change and Agriculture Production .....	8
1.5 Social Adaptation .....	9
1.6 Problem Statement .....	9

1.7 Objective of Study .....	11
1.7.1 General Objective .....	11
1.7.2 Specific Objectives .....	11
1.8 Significance of Study .....	12
1.9 Thesis Organization.....	12
<b>CHAPTER 2 LITERATURE REVIEW.....</b>	<b>14</b>
2.1 Introduction .....	14
2.2 Harum Manis Mango (MA 128) .....	14
2.3 Climate Change .....	15
2.4 Social Adaptation .....	16
2.5 Technology Transfer .....	16
2.5.1 Definition .....	16
<b>CHAPTER 3 METHODOLOGY.....</b>	<b>19</b>
3.0 Introduction .....	19
3.1 Location of Study .....	19
3.2 Source of Data .....	20
3.2.1 Primary Data .....	20
3.2.2 Secondary Data .....	21
3.3 Respondents.....	21
3.4 Questionnaire Design .....	21
3.5 Data Analysis Techniques .....	23
3.5.1 Descriptive Analysis .....	23

3.5.2 Chi-Square Analysis .....	23
3.5.3 Correlation Analysis .....	24
<b>CHAPTER 4 RESULT AND DISCUSSION.....</b>	<b>26</b>
4.0 Introduction .....	26
4.1 Descriptive Analysis.....	26
4.1.1 Respondents Demographic Profiles.....	26
4.1.2 Respondents' Farm Profiles.....	34
4.1.3 Respondent's Opinion toward Harum Manis Cultivation .....	41
Problem Need to Overcome.....	41
4.1.4 Perception of Social Adaptation (Community Adaptability) of Respondents on the Effects of Climate/Natural Disaster.....	49
4.1.5 Summary of Perception Level of Social Adaptation .....	68
4.1.6 Adaptation in Their Agricultural Activities in The Face of Climate Change/Natural Disaster .....	69
4.1.7 Barriers of Farmers in Adapting to the Changes in Climate/Natural Disasters.....	70
4.1.8 Solution of Farmers in Overcoming the Problem of Climate Change/Natural Disaster .....	71
4.1.9 Respondent's Opinion toward Agricultural Agency and Extension Program .....	73
4.2 Chi-square Analysis Result .....	84
4.3 Correlation Analysis Result.....	95

<b>CHAPTER 5 CONCLUSION AND RECOMMENDATION.....</b>	<b>96</b>
5.0 Introduction .....	96
5.1 Summary and Conclusion .....	96
5.2 Recommendations .....	98
5.3 Limitation of Study .....	99
<b>REFERENCES.....</b>	<b>101</b>



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## LIST OF TABLES

Table	Title	Pages
4.1	Age of Respondents	27
4.2	Gender of Respondents	28
4.3	Race of Respondents	28
4.4	Marital Status	29
4.5	Education Level of Respondents	30
4.6	Education in Agriculture	31
4.7	Respondent's Main Occupation	32
4.8	Respondents' Others Occupation Than Mangoes Farmer	32
4.9	Respondents' Experience in Agriculture (years)	33
4.10	Respondents' Farming Category	35
4.11	Land Ownership	35
4.12	Mangoes Variety	36
4.13	Other Plants That are Planted by Respondents	37
4.14	Harum Manis Average Total Yield Per Season (tan/relong)	38
4.15	Harum Manis Average Total Yield Last Season (tan/relong)	39
4.16	Net Income per Season	41
4.17	Problems That Need to Overcome in This Harum Manis Sector	42
4.18	Perception on Production Operating	43
4.19	Perception Level Towards Production Operating	44
4.20	Perception on Capital, Costs, Financial and Income	45
4.21	Perception Level Towards Capital, Costs, Financial and Income	45
4.22	Perception on Technology and Infrastructure	46
4.23	Perception Level Towards Technology and Infrastructure	47
4.24	Perception on Workers or Farm Labours	47
4.25	Perception Level Towards Workers or Farm Labours	48
4.26	Perception on Sales, Marketing, Promotion and Product	48
4.27	Perception Level Towards Sales, Marketing, Promotion and Product	49
4.28	Perception on Perception or View of The Risks of Climate Change	50
4.29	Perception Level Towards Perception or View of The Risks of Climate Change	50
4.30	Perception on The Ability to Cope With Change (Financially and Emotionally Flexibility)	51
4.31	Perception Level Towards The Ability To Cope With Change (Financially and Emotionally Flexibility)	52
4.32	Perception on Interest and Attractions in Adapting to Climate Change	52
4.33	Perception Level Towards Interest and Attractions in Adapting to Climate Change	53
4.34	Perception on The Ability to Plan, Learn and Restructure	54
4.35	Perception Level Towards The Ability to Plan, Learn and Restructure	54



4.36	Perception on Loyalty to The Agriculture Profession	55
4.37	Perception Level Towards Loyalty to The Agriculture Profession	55
4.38	Perception on Occupation (age, education and attitude to work elsewhere)	56
4.39	Perception Level Towards Occupation (age, education and attitude to work elsewhere)	57
4.40	Perception on Family characteristics	57
4.41	Perception Level Towards Family characteristics	58
4.42	Perception on Loyalty to The Residence	58
4.43	Perception Level Towards Loyalty to The Residence	59
4.44	Perception on Size of Business and Approach	59
4.45	Perception Level Towards Size of Business and Approach	60
4.46	Perception on Financial Status	60
4.47	Perception Level Towards Financial status	61
4.48	Perception on The Diversity of Life	61
4.49	Perception Level Towards The Diversity of Life	62
4.50	Perception on Local Environmental Knowledge	62
4.51	Perception Level Towards Local environmental knowledge	63
4.52	Perception on Awareness, Values and Attitudes Towards The Environment	64
4.53	Perception Level Towards Awareness, Values and Attitudes Towards The Environment	64
4.54	Perception on Access to The Climate Technology, Information and Expertise	65
4.55	Perception Level Towards Access to The Climate Technology, Information and Expertise	66
4.56	Perception on Formal and Informal Networking	66
4.57	Perception Level Towards Formal and Informal Networking	67
4.58	Perceptions of Equity in Access to Resources	67
4.59	Perception Level Towards Perceptions of Equity in Access to Resources	68
4.60	Summary Level of Social Adaptation	68
4.61	Respondents Adaptation in Their Agricultural Activities in The Face of Climate Change/Natural Disaster	70
4.62	Barriers of Farmers in Adapting to The Changes in Climate/Natural Disasters	71
4.63	Solution of Farmers in Overcoming the Problem of Climate Change/Natural Disaster	72
4.64	Agriculture Agency That Farmers Know and Have Been Involved With	73
4.65	Agricultural Officer Visiting Frequency	74
4.66	Methods are Used by Agencies and Agricultural Officers to Communicate With Farmers	75
4.67	The Perception on Agriculture Agency	76
4.68	The Perception Level of Respondent Toward Agriculture Agency	77
4.69	The Perception on Agriculture Officer	78
4.70	The Perception Level of Respondent Toward Agriculture	78

	Officer	
4.71	Contribution of Agriculture Agency to Farmers	79
4.72	Activities Provided by Agriculture Agencies Specialized in Harum Manis Plants That Farmers Know	80
4.73	How Many Times Have Farmers Participated in Training That Organized by Agricultural Agencies Within a Year for Harum Manis Plant	81
4.74	The Perception on Agriculture Agency Services Related in Climate changes/Natural Disasters	83
4.75	The Perception Level on Agriculture Agency Services Related in Climate changes/Natural Disasters	83
4.76	Relationship Between Demographic Profiles with Perception or View of The Risks of Climate Change	84
4.77	Relationship Between Demographic Profiles with The Ability To Cope With Change (Financially and Emotionally Flexibility)	85
4.78	Relationship Between Demographic Profiles with Interest and Attractions in Adapting to Climate Change	86
4.79	Relationship Between Demographic Profiles with The Ability to Plan, Learn and Restructure	86
4.80	Relationship Between Demographic Profiles with Occupation (age, education and attitude to work elsewhere)	87
4.81	Relationship Between Demographic Profiles with Family Characteristics	88
4.82	Relationship Between Demographic Profiles with Financial Status	88
4.83	Relationship Between Demographic Profiles with The Diversity of Life	89
4.84	Relationship Between Demographic Profiles with Local Environmental Knowledge	90
4.85	Relationship between Demographic Profiles with Access to the Climate Technology, Information and Expertise	90
4.86	Relationship Between Demographic Profiles with Formal and Informal Networking	91
4.87	Relationship Between Demographic Profiles with Perceptions of Equity in Access to Resources	92
4.88	Relationship Between Demographic Profiles with Perceptions of Respondents Toward Agriculture Extension Activity (agency)	93
4.89	Relationship Between Demographic Profiles with Perceptions of Respondents Toward Agriculture Extension Activity (Agriculture officer)	93
4.90	Relationship Between Demographic Profiles with Agricultural Agency Services on Climate Change/Natural Disaster	94
4.91	Correlation Between Socio Demographic Profiles with Respondent Perception Toward Climate Change	95

## LIST OF FIGURE

<b>Figure</b>	<b>Title</b>	<b>Pages</b>
4.1	Age of Respondents	27
4.2	Gender of Respondents	28
4.3	Race of Respondents	29
4.4	Marital Status	29
4.5	Education Level of Respondents	30
4.6	Education in Agriculture	31
4.7	Respondent's Main Occupation	32
4.8	Respondents' Others Occupation Than Mangoes Farmer	33
4.9	Respondents' Experience in Agriculture (years)	34
4.10	Respondents' Farming Category	35
4.11	Land Ownership	36
4.12	Mangoes Variety	37
4.13	Other Plants That are Planted by Respondents	38
4.14	Harum Manis Average Total Yield Per Season (tan/relong)	39
4.15	Harum Manis Average Total Yield Last season (tan/relong)	40
4.16	Net Income per Season	41
4.17	Problems That Need to Overcome in This Harum Manis Sector	42
4.18	Respondents Adaptation in Their Agricultural Activities in The Face of Climate Change/Natural Disaster	70
4.19	Barriers of Farmers in Adapting to The Changes in Climate/Natural Disasters	71
4.20	Solution of Farmers in Overcoming The Problem of Climate Change/Natural Disaster	72
4.21	Agriculture Agency That Farmers Know and Have Been Involved With	73
4.22	Agricultural Officer Visiting Frequency	74
4.23	Methods are Used by Agencies and Agricultural Officers to Communicate With Farmers	75
4.24	Contribution of Agriculture Agency to Farmers	79
4.25	Activities Provided by Agriculture Agencies Specialized in Harum Manis Plants That Farmers Know	80
4.26	How Many Times Have Farmers Participated in Training That Organized by Agricultural Agencies Within a Year for Harum Manis Plant	81

# CHAPTER 1

## INTRODUCTION

### 1.0 Introduction

This chapter briefly explained the introduction of social adaptation toward climate change among Harum Manis growers. Objectives and the significance of the study also included in this chapter. The last part of the chapter, it will clarify overall of the thesis organization.

### 1.1 Malaysia Agriculture

Agriculture sector plays a greater role in the affairs of any state or economy. It is one of the key economic sectors of a nation of which contributions made to a nation's well-being are of great importance. The transformation in agriculture sector as proposed by the Malaysian government has shown positive achievements.

The agriculture sector has contributed to the Malaysian economy development since our independence with the Gross Domestic Product (GDP) of 46% in 1957, only at that time they were focused on agriculture and mining activities (Ninth Malaysian Plan; Dewan Rakyat, 2006). Time by time, there will be great achievement on agriculture toward economy. Nowadays, agriculture becomes one of the tools to overcome poverty and unemployment problems in the world, including Malaysia. It focuses on the high quality of production; value added products, and large scales of farming.

As of 2011, agriculture is the third largest contributor to national gross domestic product (GDP) after the services sector and the construction sector. Approximately 12% of Malaysian GDP in 2011 was contributed by the agriculture sector. There are great expectations of this sector in the years to come. It was one of the highlighted issues during Tun Abdullah Ahmad Badawi's tenure as Malaysia's Prime Minister. Abdullah strongly believed that this industry can generate wealth and reduce poverty particularly among those from rural areas. Based on statistics, agriculture industry generates approximately 12 percent to the national gross domestic product (GDP) and also reduce unemployment rate in Malaysia.

#### **1.1.1 National Agriculture Policy**

As for the agriculture policy in Malaysia, the First National Agriculture Policy (NAP1) (1984-1991) emphasized on the expansionary policy that focused on the commodity crops, such as palm oil and cocoa. The objectives of the (NAP1) was to maximization of income through optimal utilization of resources in the sector. It is also to increase the food production for local market such as paddy, vegetables, fruits and poultry.

It was followed by the Second National Agriculture Policy (NAP2) (1992-1998), which brought the reforms in developing agriculture based industry, and in accordance with the industrial strategy to increase higher earnings through the enhancement in productivity and also to add on to the country's foreign exchange revenue (Ninth Malaysian Plan; Dewan Rakyat, 2006). This policy encouraged alternatives use of agricultural lands for higher value added activities.

In the 3rd National Agricultural Policy (NAP3), during the period of 1998 to 2010, the government had set a vital plan for the development of agriculture and forestry for 2010. The policy was enacted to ensure the important role of agriculture in national development that can be sustained and upgraded in facing new challenges in agricultural development. This policy concerned on food security, increase productivity and competitiveness, inflation and also enhances export of domestic food production.

## **1.2 Fruits Industry**

### **1.2.1 Production**

Malaysia is a Tropical Climate Country and produce many varieties of Tropical fruits. The climate in Malaysia makes it very suitable for a huge variety of fruits to be grown locally. It is interesting to note that tropical fruits are often viewed as exotic in the west, opening possibilities for export. Among the fruits produced in Malaysia are durian, rambutan, mango, papaya, star fruit, watermelon, pineapple and jackfruit. The fruit production sector in Malaysia has always contributed a small but important piece of the agriculture scene. The sector pales in comparison to the oil palm or rubber sectors in terms of total land allocation, production and returns.

Department of Agriculture recorded about 22 types of fruit trees that are grown through the country with an area of 281,223 in 2006 but decreased in size to 275,650 in 2009. However the production of local fruit was increased from 1,429,154 metric ton in 2006 to 1,699,800 in 2009. In 2010 the area planted with

fruit tree are estimated about 282,680 which can produce about 1,767,800 metric tons of fresh fruit. Orchard area in Peninsular Malaysia was 221,100 hectare, Sabah 18,150 hectare, Sarawak 36,100 hectare and Wilayah Persekutuan Labuan only 300 hectare in 2009. The largest tropical fruit producer was Johor with 59,450 hectare which able to produce about 535,680 metric tonnes of fresh fruits in 2009. Even though the area of planting decreased, but the production of local fruit was increased.

However this does not mean that there is no potential for fruit production. In the year 2000, Malaysia was the world's second biggest producer of watermelon, besides being a leading exporter for papaya and star fruit. The competitiveness of the fruits sector has, unfortunately, been in decline since the boon of the 1990's, but as previous exploits have shown, Malaysia has sufficient potential to be a leading exporter in tropical fruits.

In terms of production, the fruit sector comes under the smallholder sub-sector, which means that most fruits in Malaysia are produced by small companies or private farms (with few medium or large producers), on smaller pieces of land and in smaller quantities. This poses quite a problem for the sector, as the presence of too many smallholders means that the planting methods are likely to be less advanced and thus reduce production volume and quality.

### **1.2.2 Demand**

Good climate in Malaysia makes it suitable for a huge variety of fruits to be grown locally. There are more than 100 kinds of fruits are cultivated. However, these fruits were classified into two groups, namely seasonal and non-seasonal fruits. Seasonal



fruits produce fruits at specific times within the year. The major season for most fruits usually falls from June until August. Some popular seasonal fruits are the durian, rambutan, mangosteen, and pulasan. For the non-seasonal fruits produce fruits throughout the year. Some of the popular non-seasonal fruits are papaya, banana, and watermelon.

The Third National Agriculture Policy (1998-2010) have been classified that 15 types of fruit as high potential fruits to be exploited to advance the fruit industry. This consists of five (5) types of seasonal fruits, five (5) types of non-seasonal fruits and five (5) popular fruits, but unexploited fruits. The seasonal fruits are: durian, rambutan, mango, jackfruit and citrus. The non-seasonal fruits are watermelon, pineapple, papaya, banana, and star fruit. The unexploited fruit category comprises of mangosteen, ciku, guava, cempedak and duku langsung.

### **1.3 Mango Industry**

#### **1.3.1 History**

Mango, *Mangifera indica* L., is a member of the family Anacardiaceae. Mango has become naturalized and adapted throughout the tropics and subtropics. There are over 500 classified of mango varieties, some of them have evolved and have been described throughout the world. The genus of *Mangifera* consists of 69 species and mostly restricted to tropical Asia. The Mango (*Mangifera indica*) is a popular evergreen fruit tree natural to South-Eastern Asia. It has been cultivated for over 4000 years during which time it has spread to other tropical and sub-tropical countries. It is the only species grown extensively and commercially in India,



Philippines, tropical Australia, the lowlands of South-East Africa, in Hawaii and in the lowlands of Central and South America.

The mango is probably a more important fruit in the tropics than the apple in the temperate zones. It is universally considered as one of the finest fruits in the world. The fruit is a good source of vitamins A and C. The most important use of mango is as a dessert fruit when ripe, but there are also other food uses in different preparations from ripe and unripe fruits. Mango can be processed into mango juice and concentrate, jams, jellies, preserves, pies, chutneys and ice cream. Unripe fruit can be pickled.

Mango or Mangga (*Mangifera indica*) has many popular clones grown in Malaysia and the most popular among all was Clone MA224 (Chok Anan). This clone was popular in Perak, Melaka, Selangor, Sarawak and few other states. There was about 9,375 hectare of mango area in 2009 with total production of 24,510 metric ton.

Main production area of mango in Malaysia was located at Daerah Jasin Melaka (463 ha) followed by Daerah Alor Gajah Melaka (419 ha) and Daerah Kuching Sarawak (271 ha). Other popular mango clones in Malaysia was Clone MA 128 (Harum Manis), MA 162 (Foo Fatt / Golek), MA 165 (MAHA), MA 204 (Melele) and MA 223 (Nam Dok Mai). The least popular clones in 1980'es was Clone Apple Mango and planted as ornamental tree in housing area and produce a high yield especially on the coastal area. The local popular small mango was Mangga Pauh and Mangga Telur.

### **1.3.2 Harum Manis Mango (MA 128)**

Harum manis is a popular fruit and only in the state of Perlis. The fruit is aromatic and thick yellowish flesh tastes good and is sure to captivate anyone who tried it. Harum Manis season is around the end of April/early May to early June. Usually the fruit expires before entering June. Although many have tried planting trees Harum Manis abroad Perlis, the results are not as such does not flourish, no fruit, no sweet taste and so on. This is because of the weather and land in Perlis quite unique and different from other states in Malaysia.

This factor makes Harum Manis very special place where it is really lush and very sweet fruits in Perlis alone. The mango is Perlis' unique delicacy and is best produced in the state due to its soils and climate suitability.

### **1.3.3 Area**

There are 316 growers that registered under state Department of Agriculture. This comes from the three districts in Perlis. The total area that planted Harum Manis in Perlis are 1208.87 ha.

### **1.3.4 Mango Growers**

Perlis are divided into three districts. There are Kangar, Arau and Padang Besar. At every district, there have Harum Manis grower. Total growers that registered under Department of Agriculture Perlis are 316 growers. This is total for the three (3) districts.

## 1.4 Climate Change and Agriculture Production

Climate change is the variety in worldwide or territorial atmospheres after some time. It reflects changes in the fluctuation or normal condition of the climate after some time scales going from decades to a large number of years. These progressions can be brought about by procedures inner to the Earth, outer strengths (e.g. varieties in daylight force) or, all the more as of late, human exercises. In late utilization, particularly with regards to natural arrangement, the expression "climate change" often refers just to changes in cutting edge atmosphere, incorporating the ascent in normal surface temperature known as an Earth-wide temperature boost. Now and again, the term is likewise utilized with an assumption of human causation, as in the United Nations Framework Convention on Climate Change (UNFCCC, 1994).

Agriculture is one of the sectors greatly affected by extreme climate change. Farming is the development of creatures, plants, parasites, and other life frames for sustenance, fiber, bio fuel and different items used to maintain human life. Agriculture production is the output of the yield. Usually it is measured as the ratio of agricultural output to agricultural inputs. The climate change is crucial in deciding product execution furthermore one of the real potential dangers to national sustenance security and reasonable horticulture for a nation. Physical harm, loss of yield collect, drop in efficiency are a few cases of immediate and backhanded impact of the outrageous climate change.

## **1.5 Social Adaptation**

Social adaptation is an adjustment in conduct of a man or gathering in light of new or altered encompassing. Social adaptation happens during the time spent socialization furthermore with the guide of mechanism of social control, which incorporate social weight furthermore the situations. It is the procedure by which such solidarity comes into, and proceeds in, this positive connection. The environment is both physical, or material, and social, or otherworldly. Adaptation might be aloof or dynamic. Uninvolved physical adaptation involves natural advancement and its substantial change. By dynamic material adaptation is implied the intentional alteration of the living being or gathering to suit its surroundings, or the change of the earth to make it great forever.

## **1.6 Problem Statement**

Harum Manis is synonymous with the state of Perlis. It indirectly contributes to the economy in the state of Perlis. In fact, it is also opened up business opportunities to farmer in the Perlis no matter big or small-scale farmers. Since lately, the industry is seen to increase agro-tourism for the state of Perlis. This is due to the uniqueness of this fruit that is only successfully produced in Perlis, it indirectly has attracted tourists to come to Perlis. Harum Manis is suitable for planting in Perlis because of the climate in this country, when people eat this fruit, they not only can feel the passion fruit can feel this even once the climate or weather in Perlis. It makes local branding to Perlis..

However, problems that comes out is could the Harum Manis Mango meet the demands of the consumer since this mango only available in Perlis. If not, how do they will do to the industry to achieve the demands for the future?

The second problem in the infrastructure and technology that growers have will affect the production of the fruit whether get higher or lower yields. Is the technology that they have is enough.

The third problem, lack of knowledge and technical of the Harum Manis Grower will effect for their production of fruit. Since Perlis are is the best place to planted Harum Manis, so the growers just take for granted to plant without any knowledge?

The fourth problem is about climate change. With the onset of climate change in our country today such as global warming and El Nino, can the fruit production increased to meet demands. If the production were reduced, what will happen about the financial cost and market? What is most important of all is how social adaptation was taken among farmers toward climate changes.

The research questions for this study are:

- 1) What are the impacts of climate change among Harum Manis mangoes grower?
- 2) What is the perception level of mangoes growers toward their social adaptation of climate change impacts?

- 3) What is the relationship between social demographic factors and perception level of mangoes growers toward their social adaptation of climate change impacts?
- 4) What is the perception level of the agricultural extension activities?

## **1.7 Objective of Study**

### **1.7.1 General Objective**

The main objective of this research is to identify social adaptation toward climate change among Harum Manis mangoes growers and agricultural extension activities.

### **1.7.2 Specific Objectives**

Specifically, the objectives are:

- 1) To clarify the respondents' profile
- 2) To identify the level of respondents' perceptions of climate change in the cultivation of Harum Manis mango.
- 3) To study the relationship between the social demographics factor and perception level toward climate change.
- 4) To assess respondents' perceptions level of social adaptation on the impacts of climate change.
- 5) Assessing the perception level of the agricultural extension activities.

## **1.8 Significance of Study**

The study intends to provide a clear picture of the level of social adaptation toward climate change among Harum Manis growers. Also, this study will make known the level of implementation of these practices. To provide a clear picture of the level of social adaptation toward climate change among Harum Manis growers to manage the climate changes risk. From the research, it should be increase in growers' awareness on adaptation toward climate change.

This study is significant to a grower. As a grower, they play an important role as a supply and also the producer. To produce good and quality of fruits, they need to take care from all the factors like environment, suitability of soil, history of the place and others. The results of this study will enable growers to formulate appropriate ways to improve both quantity and quality of production of Harum Manis toward climate change.

## **1.9 Thesis Organization**

This section will cover the organization of this study. All in all, this study is comprised of five (5) chapters.

Chapter 1 gives an introduction gives a better perspective on the agriculture scene in Malaysia, with focus on the fruits sector. This is in turn related to Harum Manis Mangoes, giving a clearer view on the issues addressed in this study. It includes the

introduction, problem statements, research questions, objectives and significance of the study.

Chapter 2 uses references from previous literature, summarizing them to better understand the situation that this study is trying to address. It gives important information regarding the social adaptation toward climate change among Harum Manis mangoes growers.

Chapter 3 details the methods used in this study to obtain and analyze data.

Chapter 4 summarizes the results of this study, and Chapter 5 puts forth a suitable conclusion based on the results obtained and provides some suggestions for future study in this field.



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