Sudan university of science and technology
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Impact of Extension Group Contact Methods on Adoption of, Technical Package of, *Hibiscus sabdariffa.L*, By farmers in North Kordofan State

أثر طرق الاتصال الإرشادي الجماعي على تبني المزارعين للحزمة التقنية الخاصة بمحصول الكركدي بولاية شمال كردفان

A Thesis submitted to the Faculty of the Agricultural studies for the Fulfillment of the Requirements for the degree of Ph.D.

in AgriculturalExtension and Rural Development

By

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Dedication

To the Souls of my parents

To my Brothers and Sisters

To my wife and kids

With deep love and respect

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I would like to thank various individuals and institutions, without whose contributions it would have been impossible to carry out this study. I would like to thank the Kordofan University that offered the opportunity to conduct my Ph. D study at Sudan University of Science and Technology through scholarship offered by the Ministry of Higher Education and Scientific Research. I would like to express my appreciations for my academic supervisor Prof. Ali MohaydBannaga , in spite of my delay to complete this study, he never tired in patiently tutoring me, I am also most grateful to Dr. Mohammed Badawi for his willingness to act as my co. – supervisor, I deeply appreciate his guidance that was beyond measure, they kept me going on even when the road was rough. I owed my thanks to Mr. Ahmed Hamadi for his assistance in analysis of the data. Also offered my gratitude to my nephew Adam for his diligence in entering the data.

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Sincere thanks go to the people in the study area, particularly the farmers and their leaders, who volunteered to be interviewed and answering the survey questions. Lastly but not last, I would like to express my sincere graduate to my wife Khadiga for her care and patience, Thanks also to my family for their emotional support that encouraged me to complete my study.

Abstract

This study aimed at assessing the impact of some extension group contact methods such as (extension meetings, field and home visits, fields demonstrations and farmer field schools. (F.F.Ss) on farmers adoption of *"Hibiscus sabdariffa, L"* Production technical package such as (Using of improved varieties, using of hand peeling tools or "Gargara" as well as adoption of other recommended cultural practices such as (seed rate, sowing date, plant spaces, cultivation and harvesting date" by the farmers in North Kordofan State (N.K.S)

The study also aimed at identifying the association between farmers' socio-economic characteristics such as (Age, gender, family size, education level, farm size, farmer experience … etc)andtheir impact on adoption of hibiscus technical package.

For achieving the aims of this study, asocial survey methods was used, and a multi- stage stratified random simple sample procedure were used for selection of 130 farmers out of the total population 1420 hibiscus growers, the selected sample were distributed in 13 villages and in three localities namely Rahad (4 villages), Um Rwaba (5 villages) and Sheikan (4 villages)

Primary data were collected through a well structured questionnaire that consists of two parts, the first part concerned with socio economic characteristics of the respondents, the second is concerned with measuring the extent and importance of each extension contact method.

The primary data was analyzed by descriptive statistics using frequency distribution and percentages also Chi-square test at a level of significance (0.05) used to detect the association between variables, statistical package for social science (SPSS) were used for data analysis.

The results showed that only minority 6.2% of the respondents were those who always attend extension meetings, 68.5% of the respondents never participated in training sessions, also majority of the respondents have low participation in many of the agricultural activates conducted in the study area as 67.7% of them never participated in field days, 65.5% never participated in field visits and 63.8% never attend in field demonstration. Adoption of using hand peeling tool, and use of improved hibiscus seed varieties in the study area was highly associated with attending traning session and attending extension meetings, at a level of (0.00) of significance. Thus, the extension programme carried out by Practical Action and EidElNile NGO were of limited influence on farmers' adoption of recommended hibiscus production technical package.

On the basis of the findings of the study the following recommendations was drawn:

1. Framers should be strongly encouraged to attend and participate in extension activities in field days, field visits, field demonstration (F.F.Ss) to get necessary information concerning hibiscus production.
2. Community training centres need to be constructed supported with audio visual system to train villagers on crop production and improved technologies.
3. Farmers organizations and producers co-operations and village developing committees must be strengthened to provide a wide range of activities and support.

المستخلص

هدفت هذه الدراسة لتقييم اثر بعض طرق الاتصال الارشادية مثل: الاجتماعات الارشادية، الزيارات الحقلية والمنزلية، الحقول الايضاحية ومدارس المزارعين الحقلية ... الخ على تبني المزارعين بولاية شمال كردفان للحزمة التقنية الموصى بها لتطوير انتاج محصول الكركدي مثل استخدام التقاوي المحسنة واستخدام الة الحصاد اليدوي او القرقارة، بعض العمليات الحقلية الاخرى الموصى بها لانتاج المحصول مثل: "كمية التقاوي، مواعيد الزراعة والمسافات بين النباتات والعزيق ومواعيد الحصاد."

كما هدفت هذه الدراسة للتعرف على الخصائص الاجتماعية والاقتصادية مثل: العمر، النوع، حجم الاسرة ومستوى التعليم والخبرات المزرعية واثر هذه الخصائص على تبني المزارع للحزمة الخاصة بمحصول الكركدي.

لتحقيق اهداف الدراسة استخدم الباحث المسح الاجتماعي، وتم اختيار عينة طبقية عشوائية متعددة المراحل مكونة من 130 مزارعاً من مجتمع الدراسة البالغ حوالي 1420 مزارعاً من مزارعي الكركدي حيث كان المفحصون المختارون موزعون على 13 قرية تتبع لثلاثة محليات هي شيكان (4 قرى)، الرهد (4 قرى) ام روابه (5 قرى)، جمعت المعلومات الاولية عن طريق استمارة استبيان صممت لهذا الغرض، مكونة من جزئين حيث الجزء الاول خاص بالخصائص الاجتماعية والاقتصاديةللمزارع والجزء الثاني خاص بقياس مدى واهمية الطرق الاتصالية الارشادية. وقد تم تحليل البيانات الاولية التي تم الحصول عليها بالتحليل الوصفي باستخدام التوزيع التكراري والنسبة المئوية، واختيار مربع كاي بمستوى معنوية (0.05) لتحديد علاقة الارتباط بين المتغيرات وفق برنامج الحزم الاحصائية للعلوم الاجتماعية.

وقد اوضحت النتائج ان الاقلية حوالي 6.2% من المفحوصين هم الذين حضروا الاجتماعات الارشادية، وان الاغلبية 68.5% من المفحوصين لم يحضروا فترات التدريب،

كما ان اغلب المفحوصين لم يشاركوا في الانشطة الارشادية الزراعية التي عقدت بمنطقة الدراسة حيث 67.7% لم يشاركوا في ايام الحقل، 65.5% لم يحضروا الزيارات الحقلية، 63.8% لم يشاركوا في الحقول الايضاحية.

أن تبني إستخدام آلة ابلحصاد اليدوي وإستخدام البذور المحسنة يرتبط معنوياً بحضور التدريب والاجتماعات الارشادية بمستوى معنوياً 0.00.

وقد اوضحت الدراسة ان البرامج التي قدمتها منظمة براكتكل اكشن ومنظمة ايد النيل بالمنطقة كان لها تأثير محدود على تبني المزارعين للحزمة الخاصة بانتاج المحصول.

وبناء على نتائج الدارسة فقد اقترح الباحث التوصيات التالية:

1- ضرورة تشجيع المزارعين على الحضور والمشاركة في الانشطة الارشادية مثل ايام الحقل، الزيارات الحقلية والمنزلية والحقول الايضاحية ومدارس المزارعين الحقلية للحصول على المعلومات الخاصة بانتاج المحصول.
2- ضرورة انشاء مراكز للتدريب المجتمعي ودعمها بالمعينات السمعية والبصرية لتلعب دوراً في التدريب على مستوى القرية.
3- تنظيمات المزارعين وجمعيات المنتجين ولجان التنمية بالقرى يجب دعمها وتقويتها.

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CHAPTER ONE

INTRODUCTION

1:1 Background:

Agriculture is the largest sector of the Sudan economy accounting for about 35-40% of gross domestic product (G. D. P) and about 85% of the labour force. It is the main source of food whether directly through domestic food production or indirectly through the provision of foreign exchange for the importation of inputs used in production of food. With regard to the type of technology used the majority of the farmers are small rain fed subsistence producers. It is estimated that 70% of those who engaged in agriculture in the country as a whole depend upon traditional agriculture (Craig G. M 1991).

The traditional rain fed sub-sector occupies an area of 18 million Feddan, it covers 40% of the total cultivated land and contributes about 25% of the agricultural production, the sector produces millet, sorghum, sesame, groundnuts, gum Arabic and hibiscus or Karkadeh, all of which are considered to be both cash and subsistence crop (Sudan Federal Ministry of agriculture 2004).

North Kordofan state (N.K.S) depends on traditional rain fed sub-sector through shifting cultivation for producing cash crops and food grains that are characterized by low productivity. N.K.S composed of different type of soils varying from sandy in the

North to Goez and clay in the middle and south – The state characterized by low rainfall, ranging from 300-600 mm.

The choice of the selected crops is based on their adaptability to the soil and their importance as major food or cash crops in the state.

Although farmers are able to produce some crops like millet, sorghum, sesame, groundnuts &Karkadeh ….etc for their household requirements, they do not have sufficient produce to earn money for their house hold expenditure, particularly during intensive drought seasons.

1:2 Statement of the problem

Roselle(*Hibiscus sabdariffa,L.*) or Karkadeh as known in Sudan, is one of the promising cash crop for dry areas, resistant to drought, tolerant to poor soil fertility, it is a source of income for small scale farmers throughout western Sudan ,especially in N.K.S , an improving in it's production provides an excellent opportunity to empower poor farmers in North Kordofan State. But the adopted production system have limited the contribution of this crop to improvement of community livelihood, strategy needs to be developed to keep this crop production a live in North Kordofan State. Thus ,an initiative implemented by Non-governmental organization(N.G.Os)which was Practical Action in partnership with community based organization EidElNile

NGO, operate in NKS with objective of improving farmers livelihood focusing on changing the practices of hibiscus cultivation and harvesting techniques amongst the producers through introducing improved varieties (Abu Shankel , Abu Najama , Betera) to replace widely grown varieties , as these improved varieties have many good characteristics concerning crop quality for export. Also improved harvesting techniques such as using hand peeling tools , have being developed and introduced as a means to ease peeling operation and improve the crop quality ,save the time and labour. Project team also organized field visits for farmers from the project area to the locations of demonstration farm to learn and exchange knowledge with each other and carry out different exercises . Thus , an important question could be : Does these project programmes have any(positive or negative) impact on adoption of these recommended package ?This , study is an attempt to assess the impact of used extension contact methods in integration of hibiscus technical package among the farmers in the study area . Are there , any socio – economic factors (age, gender , family size ,…et c) be expected to affect the adoption rate for these technical package . The farmers , their needs and interest , their believes

and culture and which method of communication will serve them better .

1:3 Research question:

Overallquestion: What are the common contact methods that could be expected to influence adoption of some recommended technological packages necessary for hibiscus or Karkadeh crop production. Also are there any socio-economic factors (e.g. sex, Age, family size, farm size, education level…etc) may be expected to affect adoption rate for these technical packages.

Specific questions:

- To what extent each of the used extension contact methods affect the adoption of hibiscus technical packaged to improve the crop export quality. Example:-

(i) What is the effect of the training received by the beneficiaries on changing farmers' knowledge and attitudes towards hibiscus as a main cash crop.

(ii) What is the effect of demonstration farm on: farmers use of improved varieties or export quality seed.

- What is the effect of acceptance of using hand peeling tools as a means to improve export quality of the crop and save time and expand crop production.

(iii) What is the effect of field visits on adoption of hibiscus cultural practices (e.g. improved variety seeds sowing date, seed rate,…etc).

(iv) Effect of farmers field schools (F.F.Ss) on changing farmers' attitude towards adopting the mentioned technical packages.

- What are the percentages of adoption rate for every recommended hibiscus production practice among the farmers who are exposed to different extension communication methods e.g.:-
- The percentage of adoption rate for using improved variety seed of hibiscus.
- Percentage of adoption rate for using hand peeling tools.
- What is the relationship between adoption rate for every practice and the communication method used to disseminate each of them?
    - To what extent do some socio-economic characteristics of the farmers influence their adoption of different hibiscus technical packages e.g farmers .(Age, Sex, Family size, Farm size, Farmer experience and Educational level…etc.).

1:4 Objectives of the study:

Overall**objective**, is to assess the impact of some used extension contactmethods, and the impact of other socio-economic factors on adoption of some recommended hibiscus technical packages.

Specific objectives:-

1- To describe the socio-economic characteristics of the farmers reached with agricultural information through extension contact methods used by NGO, working in the study area .

2- To identify the main extension contact methods mostly used in the project Area to contact with farmers .

3- To examine the effectiveness of the different extension methods used by the extension system to transfer the recommended practices in the project area.

4- To identify the problems encountered by thefarmers in the study area to get necessary information concerning the hibiscus crop production,.

5- To draw from the study, finding and suggestions for planning effective communication strategy to improve extension system in North Kordofan state as general .

1:5 Importance of The Study:-

The importance of this study comes as a result of the importance of hibiscus or Karkadeh as a promising cash crop in N.K.S and as agricultural export crop in the country as a whole, and improving the production of this crop through supporting research and extension activities may lead to improvement in small scale farmers production and hence improvement in their income &livelihood. The importance of the study also may be seen from its contribution to develop best practices in hibiscus production, selecting appropriate technologies or tools necessary to poor farmers to improve production & crop export quality.

Finally ,it would be an opportunity to adapt already existing technology developed by the farmers themselves '. thus , adapting experiences and knowledge to serve the local social and economic needs with affordable coasts.

1:6 Hypotheses of the study:

Over all hypotheses:

Adoption of technological packages related to hibiscus crop production is significantly associated with small farmers' exposure to different agricultural extension communication methods in the study area.

Sub-hypotheses:-

1- Socio- economic characteristics of the respondents significantly influences their adoption for hibiscus technical package.

2- Farmers misunderstanding of and negative attitudes towards the economic importance of hibiscus as cash crop hindering them to access agricultural extension activities.

3- Farmers facing some difficulties in getting timely access to some agricultural extension services :

- Attending demonstration farms.
- Attending meeting and field visits.

4- Extension contact methods used by extension agents in the study area have limited role in transferring knowledge and experiences necessary for hibiscus crop production.

5 -No differences between male and female in the study area in their adoption for hibiscus crop production technical package

1:7 List of the study variables:

Independent variables	Dependent variables
1-Socio-economic variables (i) Age (ii) sex (iii) family size (iv) farm size (v) Educational level (vi) Farmers' experience 2- *Some used extension communication methods*: a-Extension meetings b- Farm or field visits. c-Training d- Demonstration farm. e- Farmers field schools (F.F.Ss) f- Farmer – to- farmer g- Contact with village development committees-.) *4-Characteristics of innovation as perceived by the farmers:* -	*Adoption or integration of recommended hibiscus technical packages e.g:-* a- Using improved variety seeds of hibiscus:. Abu Shankel , Abu Najama and Betera b- Using hand peeling tools in crop harvesting c- Recommended practices : seed rate , sowing date, plant spaces , cultivation and harvesting date .

1:8 Research Methodology:

The field survey was used to collect data from three localities or rural communities of 13 villages and the total sample size was 130 respondents.

Data would be collected by using closed ended questionnaire, and the data were organized and summarized coded and (SPSS) was used in data analysis.

1:9 Research organization:

The research is consist of five chapters, **chapter one**: is introduction , Which is presented the statement of the problem ,objective of the study, importance of the study and hypotheses of the study.**chapter two** : is literature review , which is presented in four parts part one reviews the concept of communication with other related issues including , basic element of communication ,communication methods , factors influencing communication process and choosing communication strategies,--.etc). Part two of the literature revise presents selective review of the concept of extension and other related issues, such as the obstacles of effective links in agricultural extension and future of agricultural extension in Sudan. part three reviews model of diffusion and adoption in agricultural extension ,part four of the literature reviews the Hibiscus or Karkadeh production technologies and the related extension activists to stimulate the increased adoption of better farming practices **chapter three** : review the methodology of the study , the instrument used to collect information from respondents , and the explanation of different statistical analysis procedures used for testing the hypotheses of the study .

Chapter four: is comparative analysis of characteristics of the farmers group. The results of chi-square analysis for measuring the significance of the observed differences between the two groups of

farmers especially with respect to their exposure to extension services and their rate of knowledge and adoption of the recommended crop production practices.

Chapter five: represents the summary of results, conclusion and recommendations for further improvement.

CHAPTER TWO

LITERATURE REVIEW

2:1 Concepts of Extension with other Related Issues:

2:1:1 Agricultural Extension Historical prospective:

It is not known where or when the first extension activities took place. It is known however, that Chinese officials were creating agricultural policies, documenting practical knowledge, and disseminating advice to farmer at least 2000 years ago.

The birth of the modern extension service has been attributed to events that took place in Ireland in the middle of the 19^{th} century: between 1851-1845 Irish potato crop was destroyed by fungal disease and a severe famine occurred. The British Government arranged for "practical instructors" to travel to rural areas and teach small farmers how to cultivate the crops.

Swanson (1984), stated that: the use of the term "Extension" originated in England in 1866 with the system of "University Extension" which was taken up first by Cambridge and Oxford

universities and later by other educational institutions in England and other countries.

The term "University Extension" was first used by universities of Cambridge and Oxford to describe teaching activities that extended the work of the institutions beyond the campus. Most of these early activities were, not, however related to agriculture. It was not until the beginning of the 20th century, when colleges in the United States (US) started conducting demonstrations at agricultural shows and giving lectures to farmers clubs, that the term "Extension service" was applied to the type of work that we now recognized by that time.

The objective of " University Extension" was to take the educational advantages of university to ordinary people.

Swanson and Claar (1984) were stated that: the Land Grant colleges in the United States were influenced by " University Extension" movements and other related extension-type activities that were also expanding in scope during this period. Therefore, the formal establishment of the agricultural extension work in U.S.A. was really the integration of these different extension-type thrusts. The spread of agricultural extension–type activities in Europe, Australia, New Zealand and Canada to parallel events in the United States, but their organization developed some what differently.

The demands for extension-type came largely from the agricultural societies and, in some cases, were organized by them. In other cases, these activities were institutionalized as part of the national ministry of agricultural extension systems included a co-operative dimension that provided support to both the national and local levels, particularly through these farm organizations.

The development of extension services in modern Asia has differed from country to country. Despite the variations it is possible to identify a general sequence of four periods or "generation" "colonial agriculture; Experimental stations were established in many Asian countries by colonial powers. The focus of attention was usually on export crops such as rubber, tea cotton and sugar. Technical advice was provided to plantation managers and large land owners; Assistance to small farmers who grew subsistence crops was rare, except in time of crisis.

Diverse top-down extension: After independence, commodity-based extension services emerged from the remnants of the colonial systems with production targets established as part of five years development plans, in addition, various schemes were initialed to meet the needs of small farmers, with support from foreign donors.

Unified top-down extension: During the 1970s and 80s, the T and V system were introduced by the World Bank. Existing

organization were merged into a national services. Regular messages were delivered to groups farmers promoting the adoption of "Green Revolution technologies".

Diverse bottom-up extension: when World Bank funding came to an end,. The T&V system collapsed in many countries leaving behind a patch work of programmes and projects funded from varies other sources. The decline of central planning, combined with the growing concern for sustainability and equity, has resulted in participatory methods gradually replacing top-down approaches.

The fourth generation was well-established in some countries while, it has, only just begun in other places. Also because, few third world countries had well established colleges of agriculture or an agricultural university when they became independent so every country agricultural extension was attached to the ministry of agriculture.

Compared to 20 years ago, agricultural extension now received considerably less support from donor agencies. Among academics working fields in this field, some have recent argued that the agricultural extension needs to be reinvented as a professional practice. Other authors have abandoned the idea of extension as distinct concept, and prefer to think in term of "knowledge system" which farmers are seen as experts rather than adopters.

2:1:2 Some Meanings of Extension:

E. Swanson, Burton (1984), stated that:" Agricultural Extension" is a difficult term to define precisely because it organized in different ways to accomplish a wide variety of objectives.

There is no widely or single accepted definition of extension, but there has a variety of meaning to different people, and from this spectrum of interpretation, there are many definitions of extension each of which deserve attention.

Kelsey & Hearn (1963), defined " Agricultural Extension" as a system of out-of-school education for rural people (adult, youth, …etc), to help them through educational procedures to improve farming methods, techniques, as its an integrated work held by the government, agricultural colleges and the farmers, with task to serve farmers need and to develop them..

Van den Ban & Hawkins (1979) regarded extension as purposive communication designed to assist people in solving their problems.

H. Maunder (1973), define, " Agricultural Extension" as a service or system which assists farm people , through educational procedures in improving farming methods and techniques, increasing production efficiency and income, bettering their levels of living and lifting social and educational standard of rural life.

H. Axinn, George (1985) defined agricultural extension as a non-formal education system whose cliental are rural people, and

whose content is primarily agriculture (including crops, live stock production, marketing as well as fisheries, foresting and rural development).

Gabriel (1991), added to say:" Extension" is always a complex process rather than static activity mostly extension include a problem solving perspective, a process of non-formal education directed towards people in rural areas, offering advice and information to help them overcome their problems. This aim to increase, production improve their standard of living and efficiency of the farming farm. Extension may also try to alter farmers' attitude towards their difficulties through discussion and decision-making on overcoming problems.

Despite the various definitions to agricultural extension it seems likely that there is a general agreement on some official points that: Agricultural extension has been described as a system of out-of-school education for rural people. Also Extension is a series of embedded communication interactions that are meant, among others to develop and \ or induce innovations which supposedly help to resolve problematic situations.

The central task of extension is to help rural families to help themselves by applying science, whether physical or social, to the daily routines of farming, home-making and family and community living. Also agricultural extension involve assistance to

farmers to help them identifying and analyze their production problems and become aware of the opportunities for improvements. Extension personnel have the task of bringing scientific knowledge to farm families in the farms and homes. To bring farm people into contact with sources of practical and useful information through organized group action. Teach farmers improved farming practices, new techniques and more productive or more efficient technologies or packages of technologies.

The term "Extension" was first used to describe adult educational programmes in England, in the second half of the 19th century. These programmes helped to expand-or-extend the work of universities beyond the campus and into the neighbouring community. The term was later adopted in USA, while in Britain it was placed with "adversary service" in the 20th century.

Fiasal (2009) stated that: A number of other terms are used in different parts of the world to describe the same or similar concept; **Dutch:** use the word "**Voorliching"** which means lighting the path way a head to help people find their way. **German**: use the work **"Beratung**" which means "advisory work" which implies that experts can give advice on the best way to reach your goal, but leaves you with the final responsibility for selecting the way**.** **French**: speak of:"**Vulgarisalion**" which tress the need to simplify the message for the "common man". The **Spanish**: sometimes use

"**Capacitacion**"(Training capacity building) which indicates the intention to improve people abilities although normally it used to mean training. **Arabic**: use the word "**Al-ershad**" which means guidance 0r stimulating clientele to go in a desirable direction.

However, there are some common meanings for the term, but extension involves the continuous use of communication of information to help people from sound opinions and made good extension include all the activities that contribute to transfer of technology and information in agriculture.

In discussion of what extension "really is" there is usually considerable confusion in that current practice is not distinguished from ideal practice.

2:1:3 Agricultural Extension work with different targeted group:

Swanson (1984), stated that: Agricultural extension, as public sector institution has an obligation to serve the needs of all agricultural producers, either directly or indirectly. There are multiple client groups in rural communities who have different needs; these groups include not only large and small farmers, but also women and young farmers. Therefore, if the objectives of "growth with equity" which was adopted by the world conference on Agrarian Reform and rural Development (WCARRD) in1979,

is to be achieved then the technological and related needs of these different client groups must be identified and solved.

Within the rural areas, what are the common and /or competing interests between large and small farmers, male and female farmers, and established and young farmers, must be considered before the implications of deferent technological alternatives.

Rolling (1983), calls those larger, more progressive farmers as high access farmers; they have somewhat better education, greatest access to land, capital credit, and inputs, they generally are more tied closely to information net work.

In the Third World, and in Sudan particularly most of those operating in agriculture are low access farmers, they generally operating at or near the substance level, with very limited access to resources particularly land and capital, and with minimal capacity to handle risk. Thus', they must be the major area of concern for a country and its development objectives.

Swanson (1984), stated that: Too often the policy decision, about what types of technology should be developed and extended to farmers in less developed countries is either ignored or made by research workers who do not carefully consider the implication of different technological alternatives.

The concept of high access and low access farmers is proposed to explain why some types of so-called improved agricultural

technology is not being adopted by small farmers. A basic premise of extension has been that agricultural technology will diffuse from more progressive farmers to most other farmers in rural communities.

According to the previous perspective high access farmers tend to have high access resources so that it is easer to develop technology that suits their conditions than that it develop to fit within the narrow margins of low access and resources poor farmers. But sometimes resources endowment of small farmers may be sufficiently different to make some types of agriculture technology inappropriate for their operating conditions serious efforts must be made to develop agricultural extension services into systems which serve the broad masses of small agricultural producers instead of only a few high-access farmers. Also Extensions objectives shift to providing income generating opportunities to small farmers; increase equity in rural areas to broad intergraded rural development.

Swanson (1984) stated that: women as target group, representing a significant proportion of small farmers and farm works in the Third World.

Estimates of women's contribution to agricultural production very widely, but all estimates that women constitute a significant preparation of agricultural labour force in developing countries.

Van den Ban and Hawkins stated that: The fact is that, large proportion of agricultural work in many countries is done by women, where as in most of these countries only a small proportion of agricultural extension agents are women. This imbalance can made it difficult to reach such an important target group.

Swanson (1984), stated that: The situation of women farmers in the extension process has been similar to that of small farmers. Both women and men small farmers receive less attention then their overall contribution merits.

Van den Ban and Hawkins (1991) concluded that: For African women who manage their own farmers, this situation is exacerbated. Extension organization wishing to support the role of women should analyze which activities men and women perform in agriculture in their area, what access both groups have too different resources, who benefits from production and control income, what information needs of farm women are and through which communication channels this information might be provided.

Swanson, Rolling and Jigging (1984) stated that: In some countries women are largely responsible for food crop production, while men primarily grow cash crops. In other cases, joint farming is carried out, and there is particular division of labour between men

and women that has been worked out over time, often men do land cleaning, ploughing …etc while women do planting, weeding and harvesting. In other rarely cases women are frequently the heads of the house hold, In charge of all agricultural production (due to temporary or permanent absence of the man in search of other work or other factors.

Swanson (1984) concluded that: there are numerous reasons to explain why women have not benefited from agricultural extension, one of these, is that extension inappropriately directs its effort to men, there is little or no improved technology extension extended to women farmers who grow the traditional food crop. There also too little research being carried out to improve these crops, women are unable to obtain the credit and purchased inputs needed to utilize the new technology. Furthermore, where women have little or no contact with extension services, then the production problems they face are seldom known to extension feed-back system. Thus research cannot develop technology suited their needs.

Finally, mush more attention should be given to the training and employment of women in all aspects of agricultural extension work. The important action that the extension administrators, supervisors, technical specialist and field workers should take to resolve some of the problems facing the women in agriculture as

stated by Swanson: extension services should be gender-sensitive when organizing extension activities so that the women farmers have full and appropriate access to meeting administrations, field days and other activities that increase their farm production and income. This may require separate meeting; in other cases opportunities for joint participation of both men and women extension activities may be cultural acceptable; and then women should be strongly encouraged to attend. It may be necessary to organize women into functional groups to increase their access to credits, inputs and even marketing services. In this case they will need leadership and management training to operate these self-management groups effectively.

Rural young people or youth were the other target groups that have received too little attention in extension programme. Swanson and Clear (1984), stated that, the United Nation (UN) defined youth as individual from 15 to 24 years of age. It is estimated that about 20%of the world's population falls in the youth category. There will be approximately over 70 % of the population who live in rural areas are youth and the majority of them are victims of rural poverty.

These young people tend to have a very low level of functional literacy; they have a fear of formal learning situation. There is frequently an obligation to work as family or casual labour from a

very early age, often for long hours during busy season, but they are virtually unemployed during slack season, they want to leave the rural areas, and farming in particular and they confronted with diminishing farm size and the prospect of living near or below the poverty level. Special efforts are needed for practical training of the rural youth in agriculture, home economic, group-leadership and progressive rural living, as well as income-earning skills training. There is enormous potential for agricultural extension to improve the future of rural youth through the development of community-based rural youth and young farmer organization by providing training in improving methods of agricultural production …etc, and by organizing extension programmes that would contribute to better family life. Therefore, agricultural extension should be organized in different ways to achieve different objectives of these programmes. The objectives can be categorized under four major headings: leadership development, civilization development, personal development and career or occupational development.

2:1:4 Agricultural Extension Strategies for Technology Utilization:

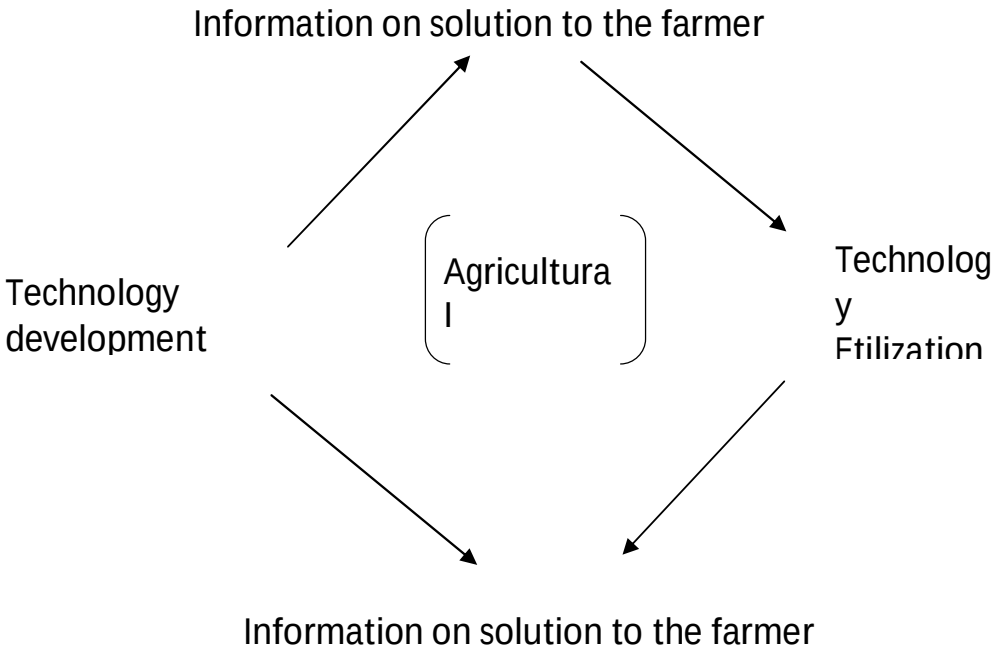
In most countries and in Sudan particularly the Agricultural Extension Service is one of the department**s** of the ministry of agriculture. Van den Ban (1991) stated that: uses the service as one

of its instruments to realize its agricultural development policy. If agricultural extension and research are organized in the same department, linkage between research and extension becomes relatively easy.

Formulating a strategy for designing and implementing an extension programme aimed at technology transfer and utilization, require to develop realistic extension strategy that will result in broad-based technology utilization, in doing so, extension objectives must be specified, client categories need to be identified, and appropriate extension methods must be selected.

Swanson (1984), stated that: most people would agree that extension should be involved in a two-process of transmitting problem solving information to farmers and information on farmer problems back agricultural research.

Figure (2:1) A simple conception of technology development, transfer and utilization:

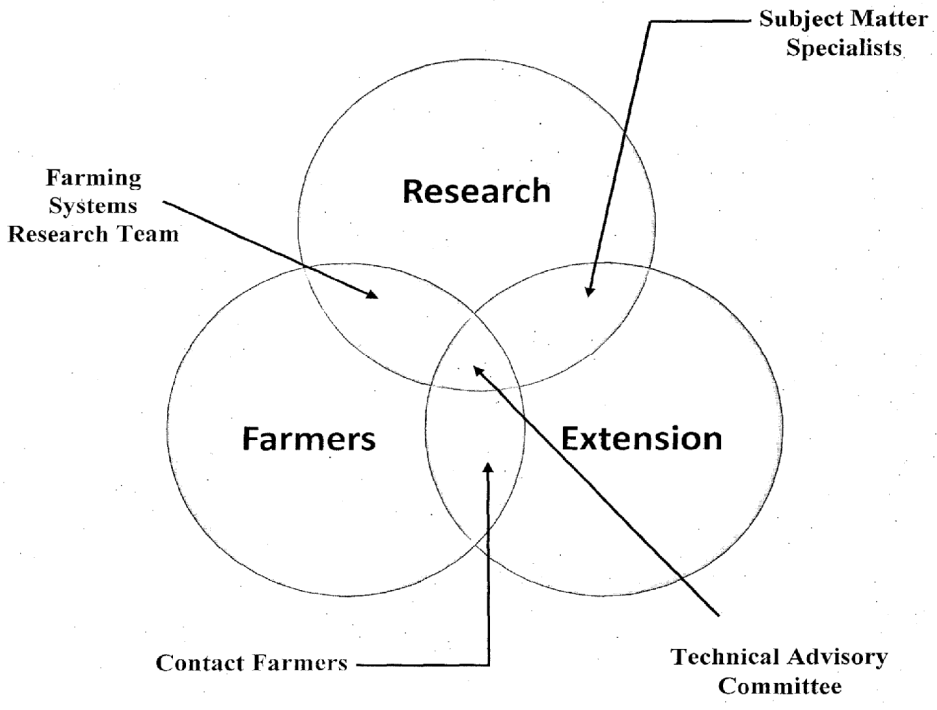


Source : Swanson, B.E (1984), Agricultural Extension a reference Manual FAO Rome

According to the previous figure, extension workers become directly involved in a two-ways process of transmitting problem solving information to farmers and information on farmers problems back to agricultural research.

The main criticism is that: In case where field extension workers are poorly trained. It may be overly optimistic to expect them to be able to clearly identified and articulate farmers problems back too researchers. An alternative approach, depicted to have agricultural research become directly involved in identifying farmers problems and then working to solve them directly through farming system research approach.

Figure (2:2) An alternative conception to technology development, transfer and utilization system.



Swanson (1984) stated that improving the flow of information about farmers' problems either directly to researcher, or indirectly

Source : Swanson, B.E (1984), Agricultural Extension a reference Manual FAO Rome

organizational and leadership skills, so they effectively articulate their problems and needs are essential features of an effective technology development, transfer and utilization system.

Farmers will utilize new agricultural technology only if they want to know how to have the capacity to do so. However motivation and knowledge are seldom sufficient conditions, especially when working with small farmers in developing countries. In fact small farmers farm in an optimal way, given their conditions and goals. Thus, new opportunities are essential before changes in farming practices will occur.

Benor and Harrison (1977) suggested that in area where traditional agricultural practices was predominated, the technical recommendation to be introduced, initially starting with low-cost, improved management practices, such as better seed-bed preparation, use of good seed (including improved varieties, improving weeding …etc and other essentially low-cost input.

According to this perspective using low-cost improved management practices should increase the income of farmers. They gain confidence in these new practices and the extension workers

they be more willing and financially able to try other types of technology that require purchased inputs.

Swanson, Rolling and Jigging (1984) reported that: as small subsistence farmers made the transition from using improved varieties and better cultural and management practices to the use of purchased inputs. It is necessary to organize farmers into functional groups to increase their access to inputs, credits possibly marketing and other services. These self-managed farmer organizations, might later take the form of co-operative and /or credits societies depending on the key limiting factors to the provision of these different inputs and services in local community. Farmer organizations are necessary, especially in influencing agricultural policy and articulating the needs and problems of the farmer community to agr-services agencies. It is difficult to imagine that an effective technology development, transfer and utilization system can emerge without farmers becoming better organized. It is appear quite probable that agricultural extension can only play a limited role in helping farmers to become organized , these farmers organization can play a major future role in gaining additional resources from agricultural research and extension services (if these institutions are responsive to farmers needs and problems).

Extension programmes must be farmer-oriented and must reflect the introduction of specific practices and new technology that will increase farm income and farmers must be able to move towards its own goals and be consistent with farmers' position in terms of his level of agricultural development.

Researchers worked with a group of farmers in North Kordofan State, to find out what farmers know about Karkadeh (Hibiscus) technical packages, the crop improved varieties and hand peeling tools, and how these packages affect the production of the crop. Suitable extension communication methods could be implemented to transfer these technical know ledges. Although different communication methods were used in the study area the farmers contacted by this project (practical actions) lacked some of the detailed information that is necessary for understanding of why certain cultural practices are necessary of hibiscus crop.

2:2 Communications in Agricultural Extension:

2:2:1 Basic Concepts and Important Principles of Communication:

There are number of views towards the meaning of communication. However, there is some common meaning for the concept of communication, one of which is that "Communication" originated from the word "commmunis" which means "common". Communication therefore is an act, by which a person shares

knowledge, feelings, ideas and information in way such that each gains a common understanding of the meaning intent and use the message.

Leagans (1971), defined communication as it is a process by which two or more people exchange ideas, facts, feelings or impression in ways that each gains a common understanding of the message. In essence, it is the act of getting a sender and a receiver tuned together for practical message or series of massages.

Rogers and Kincaid (1981), stated that: communication is two-way process of convergence rather than as one-way, linear act, in which one individual seeks to another in order to achieve certain effects.

Rogers (2003) concluded to say: communication is a process by which participants create and share information, with one another in order to reach mutual understanding.

Van den Ban, A.W. and Hawkins H.S (1988) stated that: communication is the process of sending and receiving messages through channels which establishes common meaning between a source and a receiver. The nature of the information exchange relationship between pair of individuals determines the condition under which a source will or will not transmit the innovation to the receiver and the effect of such a transfer.

Adams (1982), stated that: communication is a process by which information is passed from a source to a receiver, communication

channels provide the means by which the information is transmitted.

Finally, the main focus of all communication definitions is that communication is two-way process. It has sender and receiver. Therefore it is essential for facts to be transmitted in such a manner that the meaning intended is conveyed and the receiver understand the use of the message. Thus, communication becomes a process of meaningful interaction where by a person not only sends but also receives and understands the message. Communication has always a purpose. Van den Ban and Hawkins (1988), said when describing communication process the accent can be placed in its elements, stages that takes place in communication, participation activities of those involved.

Musa Hagou (2000), stated that: communication could be seen as a way of interaction or sharing ideas, values, attitudes through discussion and dialogue, "i.e. participation approach". Also communication could be seen as "giving of information, ideas, attitudes, values, this mainly through ' top-down approach'. Sometimes communication could be seen as q way of seeking information, ideas, values, attitudes …etc. Here the audience will not be waiting passively to be (tackled) by change agents' advices, ideas, attitudes …etc, but they will exert effort and seeking information by themselves.

2:2:2 Mass Communication Methods:

Mass media are those channels of communication which can expose large number of people to the same information at the same time. They include media which convey information by sound (Radio, audio cassettes) moving picture (TV, films, video, and print (posters, newspapers, leaf lets) “Oakley &Garforth 1958”

Swanson 1984 stated that these methods are particularly useful in making large number of people aware of new ideas, and practices, or alerting them to Sudan emergencies, while the amount of detailed information that can be transmitted by mass media is limited.

Van den Ban &Hawkins 1988, stated that: the mass media appears to have little direct influence when its finally time to make a decision. Thus, the attraction of mass media to extension services is the high speed and low cost with which information can be communicated to people over wide area – once stimulated or made aware through mass media , farmers will seek additional information from neighbouring, friends, extension workers or progressive farmers in the area.

There are several communication media that are available and expected to convey extension news and information to the farmers in the study area:radio& TV as communication media rely on the audio or visual senses, either alone or in combination, help to

overcome the barriers of illiteracy and offer special advantages as radio &TV are the least expensive media for sending messages to large number of people simultaneously, but there is a little opportunity for themselves or to provide feedback the sender, also not considering the cultural difference, among the group. The language used in radio and television sometimes is difficult for many rural people to understand.

Musa (2000) stated that: radio reaches more people faster than any other means of communication reaches many who read little or not at all, reached others unable to attend extension meetings, reached people at all economical levels, reached people seldom by other means of communication, reached different people at the same time, but provided no effect feedback, messages were short lived and could not address farmers specific needs.

Conventional extension methods and better marketing of produce through farmers' co- operative society should be adopted to address these issues.

2:2:3 Types and tools of communication:

There are many different types and methods of communication. Early human beings communicate through symbols and gestures. Later the spoken word in the form of language was used for communication. As technology developed, written words and

media were used in addition to symbols, gestures and spoken words.

Tanoubi and etal (1995), stated that human beings almost communicated by using words in spoken or written forms, without using language. It becomes impossible, to communicate exactly the meaning that are necessary to interpret ideas, impressions and reactions that transmitted from the sender to receiver. But the written or spoken words / language were not only tools or methods for human beings communication; non-verbal communication is often given secondary importance.

Communication can be categorized into four different types, depending on the nature of interaction. These types includes: intrapersonal communication, interpersonal communication, inter-group communication and mass communication.

First intrapersonal communication, where by a person interact with himself /herself. This type is intrinsic or reflective.

The second type is interpersonal communication. Where is one-to-one interaction or interaction among a small group. It is most commonly used, practiced form mo0f communication. Van den Ban and Hawkins (1988), stated that: interpersonal communication, communication context is face-to-face and message flow tends to be two-way as there is a sender and receiver. The amount of feed back readily available is high. There

is high possibility to adjust message to audience and the number of participant is limited.

According to Van den Ban and Hawkins (1988), the main limitation of this type (interpersonal communication) is that, its speed to reach large audience is relatively low and the cost per person reached is high. The best example for this type of interpersonal communication is farmer-to-farmer communication and the extension agent and farmers communication.

The third type of communication is inter-group communication where by interaction between different groups take place. It has an advantage over the previously mentioned types because of better feedback which makes it possible to reduce some of the misunderstanding that may develop between an extension agent and a farmer. There is, also, greater reaction between the farmers themselves. Van den Ban and Hawkins (1988), concluded to say: This interaction provides the opportunity to exchange beneficial or useful experiences in order to integrate information from farmers and extension agents, as well as to exert influence on group members ' behaviour and norms.

But often it reach one select part of the target group because only those farmers who are more interested in extension and /or those farmers who are members of certain farm organizations come to meeting.

Lectures, demonstrations and group discussion are the examples of group methods.

The fourth type of communication is mass communication, where by a large body (million of people) of people addressed, the same message can be transmitted to all receivers, with relatively rapid speed, to large audiences, and the cost per person reached is low and there was possible effect for knowledge change,

Rogers (2003) reported that, mass media channels are means of transmitting messages that involved a mass medium, such as radio, television, news-papers and so on, which enable a source of one or few individuals to reach an audience of many. Mass medium, such as radio, TV, news-papers and magazines are the least expensive media for sending messages to large number of people.

Recent studies suggest that mass media can play a greater role in the process of change than earlier had been possible. Media fulfill certain functions in our societies and in changing these societies. These include: setting the agenda on important discussion topics, transferring knowledge, forming and changing opinions and changing behaviour.

Despite the obvious importance of mass communication, however, the message flow in mass communication tend to be one-way; the amount of feed-back readily available was low. There is no chance

for interaction between the sender and the receiver. There is small possibility to adjust message according to the feed-back.

According to Van den Ban and Hawkins (1988) there are many conflicting views on the impact of mass media on rural population. Some say that mass media plays a very important role in introducing knowledge, opinions and entertainment from outside the local community. In some less industrialization countries people are inclined to accept authority, including authoritarian messages from the media.

Others believe there is a wide gap in culture, Language and interests between rural people in less industrialization countries and those writing or broadcasting for the media. Hence rural people will be disinclined to accept messages from these media even if they had ready access to them. It seems probable that those media have gained the confidence of rural people in less industrialized countries can have considerable impact.

Finally, the use of mass communication must consider the role these media can play in an extension programme, and how can be used effectively, how these media can be used to ensure the meaning of the message as clear as possible, and pay very brief attention to the choice of the mass media to be used and the differences between the mass media and interpersonal communication.

According to Swanson (1984) and Van den Ban and Hawkins (1988) comparison between mass media, interpersonal communication and group communication method help us to develop insight into the advantages of group methods over the other communication methods. Face-to-face interaction is expensive.

However, in that extension workers are commonly expected to serve rather large farmers audience. It is for that reason group communication methods serve the number of audience to be reached beside the possible feed-back readily available which is necessary to reduce some of the misunderstanding that may be develop between extension agents and a farmer also, reduce the cost per person among the audiences to be reached.

Researchers finding about the effect of the different extension communication methods provide us with important information for choosing the most effective methods with low cost to meet the needs and situation of the audience.

2:2:4 Elements of Communication:

The main elements of the communication process can be represented in a simple descriptive model. The SMCRE model (course, message, channel receiver and effect) as depicted in the figure below:-

Source (S)----Message (M) ----Channel (C) ---Receiver (R)----Effect (E) Feedback

Source: the SMCRE model: a model adapted from Van den Ban and Hawkins (1988) Agricultural Extension Communication among human beings is a complicated process and the imagery of the electronic mass media which is conveyed by the term (SMCRE) is inappropriate. But for the purpose of explication one can use the SMCRE to analysis communication process in extension programme to indentify the principle factors which may influenced the situation. According to Van den Ban and Hawkins (1988), the Source (S) sends his message (M) through a channel (C) to a receiver (R). The receiver decodes the message and develops an idea in his mind which he may or may not use (the effect of communication), the source observes this effect and uses it to evaluate the effect of his message.

The source must use the feedback continuously to evaluate the meaning the receiver gives the extension agent an opportunity to repeat or to clarify the message. Swanson (1984) stated: Extension workers as a prime example of sender, the source of some communication must rely on others for information to initiate communication with the farm audience. It is useful to view extension personal not only as one of many initiators of

communication with farmers but, also, as key initiators (sender) in development process.

Swanson (1984) continued to say: there is an unlimited number of roles extension workers might be expected to perform, including advocate, teacher, organizer, enforcer of regulation, planner and communication specialist. Another major role of extension workers is to access farmers needs, both with respect to the type of technology that will fit into their farming scheme and the skill level and information needed to promote successful transfer of appropriate technology and to establish ties with source of knowledge and to establish exchange relationship with farmers.

The message (M) is an idea or opinion, concept emotion and attitude that the sender or the source (S) going to have share them the receiver(R). Message content is selected and structured by communicators or sender, then transmitted through a medium (C) to be received by a receiver (R).

Swanson (1984) suggested that the message prepared by an extension worker must be clear as to its purpose. Objectives must be specified. The content must bee relevant to the audience and directly linked to the intent or purpose of the communication.

M. BadranShukri (1996), added to say, an extension message is a new idea or practices that an extension agent transfer them to the farmers to be adopted and used to improve and increase their farms

production. So the content of the message must be relevant to client intellectual, educational, social and economical abilities and capabilities. Also the message must be relevant to communication channels that used to transfer or to communicate this message.

To search the goals the treatments of the message must be such as to be attractive and incentive to audience interest. Communication channels (C) are the various methods available to any communicator in reaching an audience with the message. (Swanson 1984).

Rogers (2003) stated that b: A communication channel is the means by which a message gets from a source (S), to receiver (R). The nature of the information exchange relationship between a pair of individuals determines the condition under which a source will or will not transmit the innovation to the receiver and the effect of such a transfer. Communication channels can be categorized as either mass media channels or interpersonal channels in nature. Mass media channels are means of transmitting messages that involve a mass media such as radio, television, newspapers and so on. Which enable a source (S) of one or two individuals to reach an audience of many, where as interpersonal channels involved a face-to-face exchange between two or more individuals.

Rogers (2003), suggested that: Mass media channels are more effective in creating knowledge of innovations, where as

interpersonal channels are more effective in forming and changing attitudes towards a new idea, and thus, in influencing the decision to adopt or reject a new idea. Also, interpersonal channels are more effective in persuading an individual to accept a new idea, especially if the interpersonal channel links two or more individuals who are similar in socio-economic status, educational or other important ways. As reported by Swanson (1984): Direct face-to-face interaction via spoken ward is preferable in that it allows for questions to be raised and, in general two-way communication to be easily and successfully accomplished. However face-to-face is expensive.

Communication channels (C) play different role in diffusion of new technologies and agricultural innovation. The process of influence through different communications channels vary according to the objectives of communication the audiences to be communicated, and the message to be conveyed.

Van den Ban and Hawkins (1988) concluded to say: We should note several points when choosing communication channel: The extent to which a receiver is involved in activities associated with the message, the size of the audience reached, the cost per person reached effectively …etc. Swanson (1984) added to say: visual means of communication include slide, films and television, plus the many variants of field demonstration, which are probably the

most effective methods of communications available to extension personal. To be effective, result demonstration require the use of both visual and spoken communication and can easily benefit from the use of written materials as well as combination of methods.

Receiver (R) is a person or group of persons who receive a message or interact with the source (S), this interaction either directly as the interaction between the an extension agent and the farmer (face-to-face interaction) or indirectly without face-to-face interaction as the use telo-communication to communicate with the farmer. The receiver may be determined be the farmers audience, or may be undetermined as the general audience.

To communicate successfully the audience to be communicated must be determined, the audience must be homophile or have similar social, cultural and economic characteristics.

Receivers communication skills, attitudes, knowledge and social background influence how they receive and interpret a message.((Van den Ban and Hawkins 1988), also receiver expectations and attitudes influence the way in which they will decode or interpret a message. If the farmer is viewed as a receiver then, his ability to interpret the content of the message he received, is effected by the constrains of the media, receiver's personality and the effect of receiver's social environments …etc.

Swanson (1984) reported that: feedback is another element of effective communication, in the absence of any reaction from the farmer's (feedback), it is virtually impossible to engage the appropriateness of the message contents or channel selection. This process two-way rather than one-way only. If the farmer is viewed as the receiver, then he or she must also be given the opportunity to function as sender, with the extension worker, in this case, as receiver. From communications point of view, it is clear that, both researchers, extension personal, and farmers are each, in tern senders and receivers of message.

Feedback was sought with two goals in mind:

- researcher and extension workers needed information any problems encountered by farmers in using the improved technology and
- extension workers needed information on the performance of relatively successful technologies to formulate educational campaigns for eventual wider diffusion of those technologies.

2:2:5 Extension Communication Methods:

There are several extension communication teaching methods, from which the extension workers may choose to set up learning situation and to maximize the transfer of information and skills to

young and adult learners or to help them form opinion and make decision.

According to Swanson (1984) each medium has inherent characteristics which define its strength, limitation and capabilities. Van den Ban and Hawkins (1988) considered an extension agent's choice of any of the many methods available will depend on his or her specific goals and on the circumstance in which he or she works.

Oakely& et al (1997) stated that :

Three different communication extension methods, that extension agents can employ in this work with farmers: a- the individual methods in which the agent deal with farmers in a one – to – one basis , b- the group methods in which the agent brings the farmer in one form or another in order to undertake his extension work, c- mass communication method which can expose large numbers of farmers to the same information at the same time.

2:2:5:1 individual Communication Methods:

These methods consist mainly of a dialogue between extension agent and farmer, an extension (agent) worker interacting on a one-to-one basic with the farmer and his family.

Van den Ban and Hawkins (1988) considered these methods, to be widely used and have been found to be highly effective as they are very useful way of supplying information required for solving a

unique problem such as a major investment decision. According to these methods it is possible to integrate information from thee farmer (example goal and means) with information from extension agent (e.g. causes of problems and research findings about possible solution).

The extension agent can increase the farmer's trust in him or her by showing interest in the farmer as a person, his or her situation and ideas.

Swanson (1984) suggested that: Through the use of this method that the extension worker's credibility and integrity can be nurtured. Also through working individually with clientele, the extension worker learns about people of the area, how they think: what their needs are, and how they carry on their work.

Swanson (1984) also added to say: individual techniques are widely used and have been found to be highly effective when dealing with illiterate farmers working small holdings who are not normally exposed to other educational techniques.

Oakely& et al () reported that: individual or face – to – face methods is probably the most universally used extension method in both developed and developing courtiers.

Despite the many advantages to these individual methods, naturally there are some disadvantages as these methods are time consuming, costs are high in terms of staff and time and travel.

Van den Ban and Hawkins stated that: these methods are based on a high level of trust between farmers and extension agent. The farmers will neither seek help nor disclose confidential information about them if this trust is lacking. An extension agent who works mainly through mutual discussion and farm visits usually reaches only a small proportion of the target group.

This individual contact between the extension agent and the farmer can take a number of forms, each of which will be considered below: home and farm visits, office calls, telephone calls, informal contact, the model farmers and group meetings ….. etc.

The main categories of individual communication teaching methods which can be discussed and have been in many ways, the corner stones of extension work are: the farm and home visits methods. Office calls, the model farmer, informal contact and group meetings …etc.

Office call methods:

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ZakariaHudu (2014) reported that, office call provide the extension worker with knowledge of the needs of the farming community. There are less expensive and time consuming than farm and home visits. However the farmer may feel less at home n the office and may be sensitive to attitude of the worker. He may be too shy to disclose the real purpose of his visit.

The farm and the home visit methods, involves meeting individually with the farmer or farm worker at the farm or home. It serves a number of purpose a it establish contact with men and women farmers and other within the farm household, to learn what practices and problems exist on the farm and in the farm household (Swanson 1984).

According to Oakely and et al (1997) farm visits can familiarize the extension agent with the farmer and his family. Also build up the agent's knowledge of the area, and of the kinds of problems which farmer face.

The farm and the house method is costly in terms of time spent and the number of clients contacted, which will necessary be few.

According to this method, the extension worker should visit many different farmers and homes, and care should be exercised to visit with both men and women farm managers as well as with other members of the farm family (Swanson 1984)

Van den Bann (1988) stated that: Extension agents must fulfill all of the requirements; they must be prepared to give help, and have time available to invest an adequate level of effort. This is unlikely to be possible where they have to serve several thousand farmers.

2:2:5:2 Group Communication Extension Methods:

Group methods frequently used, in extension work to communicate with group of individuals /9farmers, women, households) by utilizing face to face contacts methods.

The main categories of group communication methods includes group meetings, demonstration methods, fields trips, ….etc.

Swanson (1984), stated that: group methods are important when time and staff are limited; by utilizing group methods , an extension worker can reach more people than is possible by following individual methods alone.

Group methods are also effective in persuading extension clientele to try new idea.

Oakely and etal (1989) reported that: the group or communicating meeting is a useful educational forum where the agent and farmers can come together and ideas can openly discussed and analysed. Men, women and young people of the community are invited to attend to discuss issues of general community interest. The basic purpose of the meeting should be agreed and to determine this the agent should consult community or group leaders.

The demonstration is particularly powerful methods to use with farmers who do not read easily, as it gives them opportunity to observe at first hand, the differences between recommended new crop practices and traditional practices. The strength of

demonstration should lie in its simplicity and its ability to present the farmer with concerns results or practice. Group decision to try a new practice, for example, is likely to carry more weight in an area than a similar decision made by an individual.

Van den Ban & Hawkins (1988) added to say: there also is greater interaction between the farmers themselves. This interaction provides opportunity to exchange beneficial or useful experiences in order to integrate information from farmers and extension agents as well as to exert influences on group members behavior and norms. Therefore we use these methods only when we need feedback for extension agents.

Despite the ovious importance of group methods, the per capita cost of using group methods tends to be much higher than for use mass media, especially if working with small group. Therefore we use these methods only when need feedback for the extension agents or interaction between famers to achieve our objectives. (Van den Ban & Hawkins 1988). Group methods often reach one select part of target group because only those farmers who are interested in extension or those farmers who are members of a certain farmers organization come to the meeting.

2:2:5: 3 Mass Media Methods:

According to Oakely&Garforth (1997) : Mass media are those channels of communication which can expose large numbers of

people to the same information at the same time. They include media which convey information by sound (radio, audio cassettes) moving pictures (television, films video) and print (posters, newspapers, leaf lets).

(Swanson 1984), stated that: Mass media methods are particularly useful in making large numbers of people aware of new ideas and practices or alerting them to sudden emergencies, while the amount of detailed information that can be transmitted by mass media is limited. They serve an important and valuable function in stimulating farmers interest in new ideas. Van den ban & Hawkins (1988) Argued that: the mass media appear to have title direct influence when it is finally time to make a decision. Once farmers being stimulated or made aware through media, they will seek additional information from neighbors, , friends, extension workers or progressive farmers in the area. The attraction of mass media to extension services is the high speed & low cost with which information can be communicated to people over wide area.

When considering mass media, radio & television may come to mind first, but they are only one of several communication mass media available to convey extension news and information.

Swanson 1984, stated that: Radio & television are types of communication methods that rely on the audio or visual senses, either alone or in combination, help to overcome the barrier of

illiteracy and offer special advantages. Radio & TV are the least expensive media for sending messages to large number of people simultaneously, They can be used to publise extension activities, and enable one community or group to share its experiences Musa (2000), stated that: Radio reaches more than any other means of communications; it reaches many who read little or not at all, reaches others not able to attend extension meetings, reaches people at all economical levels reaches people that seldom reached by any other means of communication.Oakely (1997) stated that the limitation of the use of radio extension work that batteries are expensive and may be difficult to obtain in rural areas. Radio programmes might be centrally planned, designed and implemented thus, preventing a feedback from the people and the possibility that these programmes may not be relevant to specific local situation Van den ban &Hawkin(1988), considered that, Radio is the most important mass medium for farmers in less industrial countries. From radio programmes for agricultural development must be broadcasted at times when farmer, and their families can listen, usually early in the morning before to their fields or in evenings after work. Broadcasters have to win their listeners, confidence by basing their programmes on local problems and by using language that farmers can understand.

Interviews with successful small farmers usually are more effective than speech by agricultural scientists.

Printed media(posters, newspapers and leaflet …etc) is another type of communication media, they combine words pictures & diagram to convey clear & accurate information. Printed media seldom discuss problems which interest a less educated rural audience. Their greatest advantages is that they can be looked for along as the viewer wishes. According to Pearce(K.Jc2009), Mass communication is regularly associated with media influence or media effects. The main focus of mass communication reach is to learn how the content of mass communication effect the attitudes, opinions, emotions and ultimately behaviors of the people who receive the message. Several methods have been used in the study of mass communication, of which studying cause and effect relationships in communication which can only be done through experiments.

)2:3Diffusion and adoption of agricultural innovations:-

2:3:1Agricultural innovations:

An innovation according to Rogers (1995) is seen as (an idea, practice or object that is perceived as anew by an individual or other unit of adoption. Also van den ban & how kins (1999), reported that innovation is an idea, method or object regarded as

new by an individual but which is not always the result of recent research. A technological innovation usually has two components:
A hardware aspect (the tool product) and a software aspect (how to use the hardware).Poostichi1986, reported that:
The purpose of most innovations for rural households, rural people farmers and their families is to develop techniques that enable them to do their work more effectively. Innovation can be defined as anything new successful introduced into an economic or social process, in other words an innovation is not just trying something new but successfully integrating anew idea or product into a process that includes technical, economic and social components. This definition stresses an important thing that innovation is the creative use of different types of knowledge in response to the social or economic needs and opportunities.

2:3:2Concept of adoption:

Rogers earlier work of 1962, define adoption as (a mental process an individual passes from first hearing about an innovation to final utilisation(Mosher 1987) According to Feder. Et al (1985), adoption may be defined as the integration of an innovation into farmers, normal activities over an extended period of time.
Lion berger 1960, Rogers 1962, 1983 stated that: several stages are: Awareness, interested, Evaluation, Acceptance, trail and finally adoption.

According to lion berger 1960, these stages occur as a continuous sequence of events, actions and influence that intervene between initial knowledge about an idea, product or practice, and the actual adoption of it. In the latest edition of this book. Diffusion of innovation rogers (1983), proposed different stages in the innovation decision process, consists of five stages: knowledge that occurs when an individual (or other decision making unit) is exposed to innovations existence and gains some understanding of how it function. Persuasion that occurs when an individual(or other decision making unit) forms a favorable or unfavorable attitude towards the innovation .

2:4 Economic Importance of hibiscus or Karkadeh and production Technology:

2:4:1 Hibiscus production in the world and Sudan:

According to Herbal Gram-organization 2007:

Hibiscus is a flowering plant that is native to warm and tropical climates, native to part of North Africa and south East Asia. It is a shrubby tropical plant that produces light yellow flowerish with redish-purple centres; after the petals drops from the flower. Its remaining deep-red calyces (the cup like structures formed by the sepals) grown into seed containing pods that look like flower buds.

Most of the hibiscus economic value, particularly as ingredient in herbal teas comes from red calyces, although the leaves, seeds, and

flowers are also used, in local forms of traditional medicine. Hibiscus is now widely cultivated for its flowers, fruits and calyces in the tropical and sub-tropical regions of almost every continent.

According to consultative Meeting Report, October 21th, 2010, Sudanese chambers of industries Association, Khartoum, Sudan: the main importer of hibiscus are Germany (more than 80% of total export) followed by Mexico. Belgium, Egypt, Spain, France, UK, Hongkong, Italy, Japan, Lebanon, Netherland, Poland, Russia, Saudi Arabia and Syria.

Hibiscus (H. Sabdariffa L) locally known as Karkadeh. It is a minor cash crop in arid- areas of Sudan, although it is a cash crop, with great potential for small scale farmers in Sudan.

Ali, Idris and Griffith (2010) added:

Hibiscus is one of the main high potential exports of the rain-fed traditional agricultural sectors in Sudan, grown by poor marginalizing farmers, most of whom are women, into remote and challenging areas of Sudan. Hibiscus is an important cash crop for Sudan, with approximately 2240,000 farmers in the traditional rain-fed areas (N. Kordofan and N. Darfour states) “cultivate the crop.”

Market research indicated that international demand for hibiscus was shown to be favored by European buyers due to its product characteristics (such as acidity and colour). It was also generally

recognized that growing conditions in Sudan meant that virtually no chemicals needed to be used for pest or disease control.

This was considered to be strong selling point, especially when compared with up and coming competitors such as China and Thiland.

The total volume of production for Hibiscus in the year 2008 was estimated at 18 thousand tones (a good average compares to the past 10 years).

The total volume export is usually about half of the production, the rest is consumed in-country.

IgamiAbdelatif (2010), described hibiscus as one of the most important crop for the poor, due to its resistance to draughts and pests as well as its labour intensive nature. He saw the main challengs in creating and enabling environment for the farmers via training services empowering farmers to produce in larger scale, to increase productivity, opening marketing and trade opportunities as well as supporting export.

2:5:2 The Hibiscus plant medicinal, decorative and culinary uses:

Hibiscus is used in many medicinal herbal products, in the regions of almost every continent, in Egypt and Sudan the deep red tea from the calyces, called “Karkadeh”is popular as a “refrigerant” ie, a beverage that helps lower body temperature. In Egypt

preparations from the calyces have been used to treat cardiac and nerve diseases and also to stimulate dieresis (increased production of urine)' Elsewhere in North Africa, calyx preparations are used to treat cough, sore throat, and general problems, and the emollient leaf pulp is used for treating external wounds and abscesses (The journal of the American B.C. 2007).The traditional uses of hibiscus for its blood pressure (B.P)- lowering effect have been clinically researched. A standardized extract of hibiscus was shown effective in lowering blood pressure (BP), in hypertensive humans in a controlled Mexican trail. A clinical study in Iran also investigated the BP-lowering effects of sour tea (hibiscus tea) and found it superior to placebo in hypertensive patients.

Animal research suggested potential antioxidant and cholesterol-lowering effects of hibiscus teas (country programs, general 2007).

2:5:3 Improving Hibiscus Production in North Kordofan State:

N.K.S. is among the poorest states in Sudan, where people live predominantly in rural areas, and depend mainly on the natural resources to sustain livelihoods. In these areas crops farming and livestock rising are the main sources of income for the majority of population. The main cash crops in N.K.S are groundnuts, sesame, a and hibiscus.

Although, it was considered as one of the main producing areas, but the adopted traditional production systems have limited the

contribution of those crops to the improvement of community livelihoods.

According to consultative Meeting Report October 21th, 2010, farmers who are growing hibiscus were facing many problems, including: use of local varieties rather than certified seeds, resulting in law productivity in most of the cash crops, particularly hibiscus (It is estimated that the current productivity of hibiscus per area unit is only 19% of the optimum productivity). Traditional methods of agricultural practices and inefficient operations leading to high production cost. Also the methods of harvesting and post harvesting are negatively affecting the quality of to product. Farmers having little awareness of exporters needed the potential for adding value by improving harvesting methods or simple technologies for achieving this.

Practical Action considering hibiscus as a promising product, although the lack of government and non-government support to improve the product, (in different ways such as researchers, extension, financing marketing … etc).lack of appropriate and affordable services results in low productivity.

Farmers needed to produce more and higher quality hibiscus. Thus required better advance and inputs, linkages and relationship between market chains players such as farmers, local traders,

processers, whole salers and exporters needed to be strengthened so that they were more transparent and information flowed better.

2:5:4 Extension Activities to Increase adoption of Hibiscus Production technologies in the Study Area:

Based on analysis of the situation of Hibiscus production, farmers who are growing hibiscus need to produce more and higher quality hibiscus, and so required better advice and inputs. Thus, appropriate seeds in term of productivity and suitability to local condition were selected and recommended to farmers to grow.

Practical Action is supporting 40,000 marginalized, poor farmers to produce, process and market better quality product that will in turn, require a larger share of the market at a much higher and fairer prices.

According to Practical Action report 2003, farmers were organized in community based organizations (CBOs) and improved tools and selected seeds, were provided. Stores were built in five areas and supported by establishment of a revolving fund for the purchase of the hibiscus products at harvest time and to be sold later in the season when the prices improve.

Ali, Idres, Ibrahim & Griffith, Alison (2010) indicated that: other work to develop the supply of hibiscus included stimulating the provision of critical inputs and services needed by farmers. This

was addressed through the provision of extension services by local extensionists to build skills and knowledge of individual farmers.

Ali, Iders, &Alison (2010) added to say:

Developing suitable agricultural extension package and stimulating the supply of the simple low cost technology for cultivation and harvesting. The approach taken to extension was new in the state, and it's effectiveness in reaching marginalization farmers led to a demand to scale up of the activities outside the project area. An extension manual for hibiscus cultivation was produced for use by local extensionist and has been adopted by government extension department for use in the whole state on N.K.S. Replication of extension model used in the project area by agricultural scheme managed bilaterally by IFAD and N.K.S Ministry of agricultural which covered more than 150 villages.

Albadrabi, Khalid &Abdualatif, Rabie (2007) reported that:

During April 2007, almost 400kg, of seed capsules have been purchased from well-seed traders located in ElObied crop market, the seed have been distributed to potential farmers and other interested farmers by July 2007, initial instructions were disseminated to the seed farmers including the very basic principles to multiply seeds. Then together with farmers the project was enabled to identify about 10 Mukhamas (17.3 feddan) to be Kerkrade seed field. The project is used to provide seeds of the

desired Kerkrade quality, extending the technical assistance on multiplying the quality seeds, purchasing the produced seeds from the multipliers and re-distributed them to farmers fiscal year three. Encourage beneficiaries to sustain themselves to provide quality seeds.

Albadrabi and Rabie (2007), added to say

Based on analysis of the situation in 2006 Practical Action obtained a grant from Comic Relief for a few year programmes to develop the hibiscus market system with and for marginalized and vulnerable women producers in N.K.S. (52villages).

The base line study confirmed: The relation between inputs suppliers, producers, whole sellers, exporters and other key actors are poorly formed limiting investment in the existing and potential production area. Non-existence of related services such as extension services, insurance and innovation to improve quality and quantity of production. Low prices to small producers caused by poor coordination, high transaction costs and ineffective market relationships.

CHAPTER THREE

Research Design and Methodology

3:1 Study Area:

North Kordofan state (N.K.S) is situated in the North East of savannah belt bordering WesternKordofanState (W.K.S) to the west and west south, also, bordering south Kordofan state (S.K.S) to the south and south East, also bordering the white Nile state (W.N.S) to the East. .

North Kordofan state (NKS) lies between latitudes 16:45" N and 11 15" N and longitudes 27^{o} 50" E and 32^{o} 15 E. (N.K.S- Ministry of Agriculture & livestock).

North Kordofan state total area 190.840 km.it is composed of 8 localities which are Sheikan, UmRuwaba, Bara, Rahad, , Western Bara, Sodari, Jabara, & Um Dam. Only three of these localities will constitute the setting for this study, which are Sheikan, UmRuwaba&Rahad. They were representing the main areas for growing hibiscus or Karkadeh crop as known in Western Sudan.

North Kordofan state depends on traditional rain fed sub-sector through shifting cultivation for providing cash crops and food grains.

Roselle (Hibiscus Sabdariffa, L) or Karkadeh is an important cash crop and source of income for small scale farmers throughout

western Sudan, especially North Kordofan state CK. Osman, A. Suleiman 2007).

Improving Hibiscus status in N.K.S with the objectives of improving livelihood conditions of small scale farmers in N.K.S, is an initiative implemented by N.G.O which was practical Action in partnership with key community base organization, EidELNile, a national NGO that operate in N.K.S. The projects focus is on changing the practices of hibiscus cultivation and harvesting technique amongst the producers through introducing technology and knowledge sharing through the areas traditionally known as hibiscus production zones. In this study three localities (Sheikan, Rahad, UmRuwaba) were covered).

3:2 Population and sampling:

The targeted group in this study were direct or indirect beneficiaries small holder farmers in hibiscus growing area, of N.K.S either those for whom hibiscus is a vital source of income, or those who living in the area surrounding, where the project operate and who would benefit from replication of the process and technologies promoted by the project.

3:2:1 Village sampling:

Initially 13 villages out of the total 23 villages in the study area were covered to represent the three localities (Sheikan, Rahad, and UmRuwaba) as the main targeted area for growing hibiscus crop.

Multi-stage stratified random sample will be used in Selection of villages and farmers, The number of villages and the number of farmers to be selected to represent each locality was proportional to the total number of village and number of farmers in the locality.

Five villages from UmRuwaba, four villages from Sheikan and also four villages from Rahad Locality.

3:2:2 Respondents sampling:

The household was chosen as sample unit, since it represent a main unit of production in the project area. A sample of 78 direct beneficiaries or participant farmers compared to only 52 indirect beneficiaries (non-participant) were selected.

Table (1:3) show the sampled villages & household or respondents in each of the three localities.

Locality	Name of sampled villages	Respondents Sampled
Sheikan	1- Faris	10
	2-Kazgail	10
	3-Elhamri	10
	4-Elbrieka Musa	10
UmRuwaba	1- Abu Sabaa	10
	2-AlMyea	10
	3-UM-Ish	10

	4-ElDaba	10
	5-Samindia	10
Rahad	1-ElDagag	10
	2-Altibna	10
	3-Kendowa	10
	4-Altabledia	10
Total	13	130

3:3 Data collection:

Both primary and secondary sources were used as main tools to collect data needed. Primary sources were used to collect data through structured questionnaire (closed-ended) from respondents' farmers, in the study area. Also interviews and observations were from extension agents and local leaders.

Secondary sources (books and references) including relevant annual reports, documents collected from document Ministry of agriculture and livestock of N.K.S beside (P.A.) Practical Action – Sudan reports and also EidENile N.G.O. documents.

3:4 Data Analysis:

The data was organized, summarized, coded and fed in the computer and analyzed. Statistical Package for Social Science (SPSS) was used for data analysis.

Descriptive analytic and Chi-squire test technique were used to detect the associations between different variables (dependent or independent) for adoption and practicing of recommended hibiscus technical packages.

CHAPTER FOUR

Results and Discussions

This chapter presents the finding of the study. It is divided into the following parts:-

Part one: It deals, with description of variables used in the study: by using of the frequency distribution and percentages, of respondents, it was possible to determine the significance of observed differences between respondents in the study areas in relation to study variables by summarizing the general descriptive information from the survey.

Part two: It deals with analysis and interpretation of major findings of the study on the adoption of some hibiscus production technical packages in North Kordofan State (N.K.S). Description of the sample population and test of the existence of associations between the dependent and independent variables determine to what extent adoption and practicing of recommended hibiscus technical packages were dependent on some of the study variables. Identification of these relations alone is, however, not enough unless the relative influence of each variable is known by using further testing depending on statistical measures such as chi- squire test, to determine the influence of these variables on adoption ;of hibiscus technical packages.

Finally, testing the entire study hypothesis and generate causal model of adoption to some recommended technical packages among farmers in N.K.S. based on the interpretation of the model output, conclusions, suggestions and recommendations may be drawn to be used in modifying agricultural extension services in the study area.

4:1 General Descriptive Analysis of the Data used in the study:

The purpose of this part is to describe respondents according to some characteristics or variables.

4: 1: 1: Personal and demographic variables:

Table (4:1) Frequency distribution& percentages of respondents by gender in the study area.

Gender	Frequency	Percent
Male	91	70%
Female	39	30%
Total	130	100%

Source own survey data, 2011

As indicated in table (4:1): the result of sampled farmers who answer the questionnaire, were 130 respondents, from the total (130) respondent 91 (70%) were males and 39 (30%) were females. This shows that most of the respondents interviewed were males, the result reflects that there is a gender gap in the study area to the disadvantages of females.

There was statistical difference between males and females with respect to their respond to answer the questionnaire. This indicate that gender as demographic variable influencing extension contact in rural areas (study area) this may be because of cultural constraints that supposed female farmers have less exposure to outside world than male farmers or because female farmers were busy with household chores and caring of children, they had no time to attend meeting or to answer the questionnaire.

This agrees with priori expectation and confirms the study carried out by Ban den Van & Hawkins (1988), and the study by Awad, Amal (2008).

And Bashir, Mona (2011).

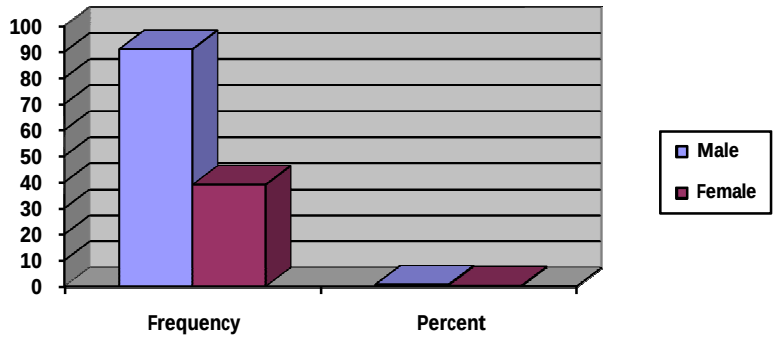

Figure 1: Distribution of respondents by Gender.

Age of the respondent or household head:

There is general agreement in the literature, that the age is an important factor in explaining farmers' adoption behavior. While many studies indicate that as farmer increases in his age his ability

to accept new technologies increases, other indicate a negative relationship between farmers' age and farmers' adoption behavior.

Table (4:2) Frequency distribution & percentages of Respondentsby Age group in the studyArea.

Age Group	Frequency	Percent
Less than 20 years	3	2.3%
21 – 30	23	17.7%
31 – 40	22	16.9%
41 – 50	36	27.7%
51 – 60	17	13.1%
More than 60 years	29	22.3%
Total	130	100

Source own survey data, 2011

Table(4:2) shows that 27.7% of the respondents fall in the age group ranging between(41-50) years, and 13.1% ranging between(51-60) years, more over there were about 23.3% of the respondents their age more than 60 years old .

Thus, the general conclusion revealed that more than 60% of the whole respondents have an age over 40 years, this may be the major constraint to the effort exerted to disseminate hibiscus production technical packages among the farmers of the study area.

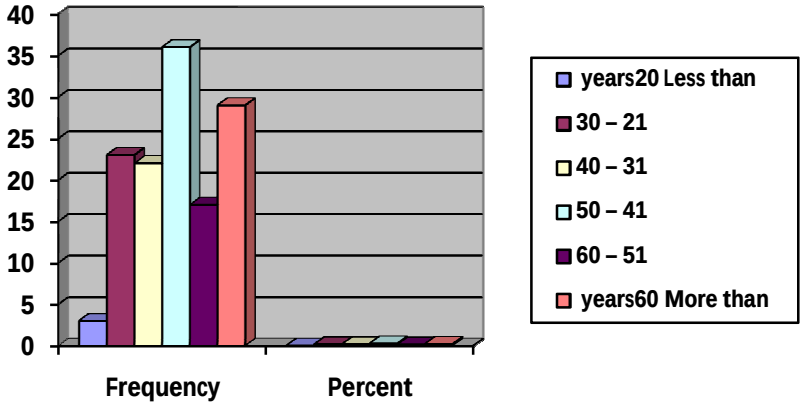

Figure 2: Distribution of respondents by age group.

Educational level of the respondents: -

Table (4:3)Frequency distribution& percentages of Respondents according to educationallevels in the study Area.

Level of Education	Frequency	Percent
Illiterate	32	24.6
Khaluwa	17	13.1
Pre-university	78	60
University	3	2.3
Total	130	100

Source own survey data, 2011

As presented in table (4:3), from the total sampled farmers, 24.6% were illiterate, 13.1% having Khaluwa level of education, and only 2.3% having university level of education

This indicate that, Although 60% of the respondents having pre-university level of education, butwith low average years of education (4.2) years. This may be a major constraint to effort exerted to disseminate hibiscus production technical

packages. As Feder& et al (1984), stated that education plays strong role in determining rates of adoption of new technologies in developing agriculture. Farmers with good education level possess good ability and adjust faster to environmental changes by adopting new technologies.

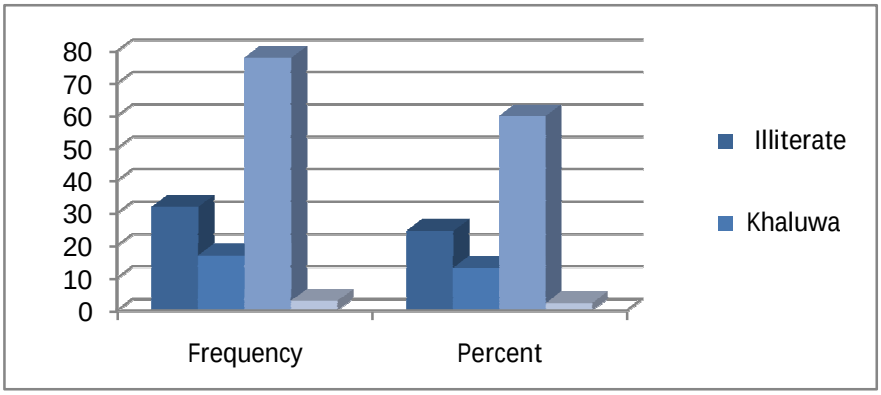

Figure 3: Distribution of respondents by education level.

Table (4:4) Frequency distribution& percentages of the respondents by the family size in the study area.

Family size	Frequency	Percent
1 – 6	55	42.3
7 – 12	66	50.8
More than 12	9	6.9
Total	130	100

Source own survey data, 2011

As presented in table (4:4), there was 42.3% of the respondent their household size ranged between (1-6) i.e. small family size , while 50.8% were medium family, ranged between (7-12) and the minority of the respondents (6.9%) were recorded as big family their household size more than 12.This means that the household in the study area can depend on family labour in agricultural production activities. As the average number of the family members for the interviewed respondents is above six persons

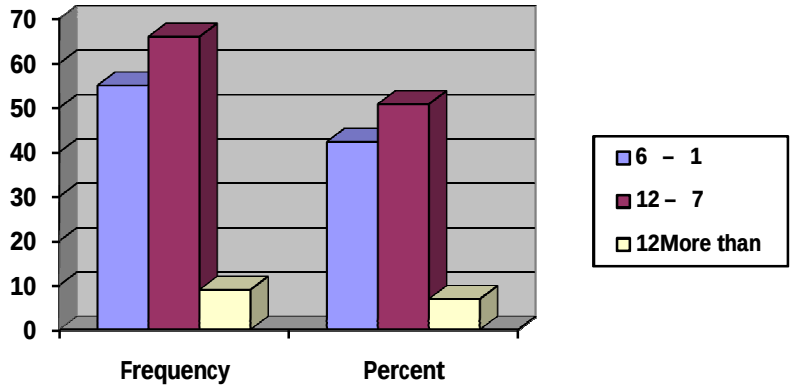

Figure 4: Distribution of respondents by the family size.

Farm experience of Respondent Farmers :

Table (4:5) Frequency distribution and percentages of respondents by farm experience.

Farm experience	Frequency	Percent
0 – 10 years	11	8.5
11 – 20	34	26.2
21 – 30	30	23.0
31 – 40	24	18.5
41 – 50	22	16.4
51 – 60	9	6.9
Total	130	100

Source own survey data. 2011.

It is concluded from table (4:5) above, that, about 34.7% of the respondents have less than 21 years of farm experience, where around 67.3% of them had 21 – 60 years of farm experience. On average, the sample respondents had about 30.5 years of farm experience. This result may reveal that, the farmers or respondents in the study area, expected to adopt the new technology effectively, thus, further statistical measures may be needed to determine the

significant of farm experience in adoption of using the hand-peeling tools & other recommended crop technical packages .

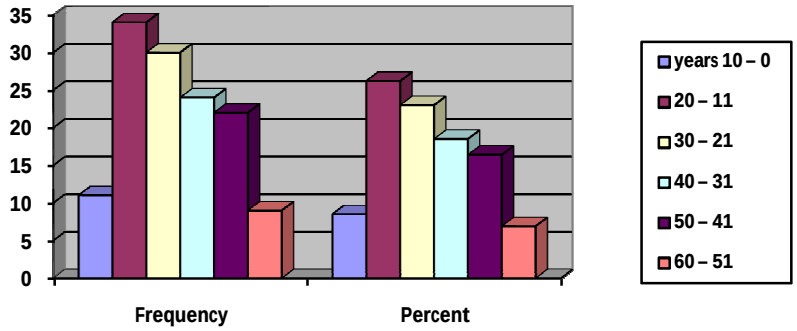

Figure 5: Distribution of respondents by farm experience.

4: 1: 2 Extension/ Communication Variables: -

Extension communication methods were supposed to have direct or indirect influence on the adoption behavior of the farmers in the study area, of these methods (extension meetings, extension contact visits, field visits training sessions, demonstration field and farmer- to – farmer contact …etc,) would be tested to detect whether they were influencing receiving agricultural information and hence adoption; of some hibiscus technical packages in N.K.S.

Table (4:6) Frequency distribution & percentages of respondents by attending extension meetings at village level.

Attending	Frequency of attending extension meetings					
	Always	often	Sometimes	Rarely	Neve	Total
Number	8	32	38	15	37	130
Percentage	6.2	24.6	29.2	11.5	28.5	100

Source own survey data 2011,

Table (4:6) summarizes the levels of attending extension meetings among the study sample, as of years 2010/2011. Respondents attending extension meetings at different levels 6.2% always, 24.6% often 29.5% sometimes 11.5% rarely and 28.5 never attending extension meetings. The general conclusion revealed that, only minority 6.2% of the respondents were those who receiving agricultural information from the meeting arranged by extension agents always. While 28.5% of them replied that, they never attended extension meetings, compared to 29.2% replied that they sometimes receive agricultural information from arranged extension meetings.

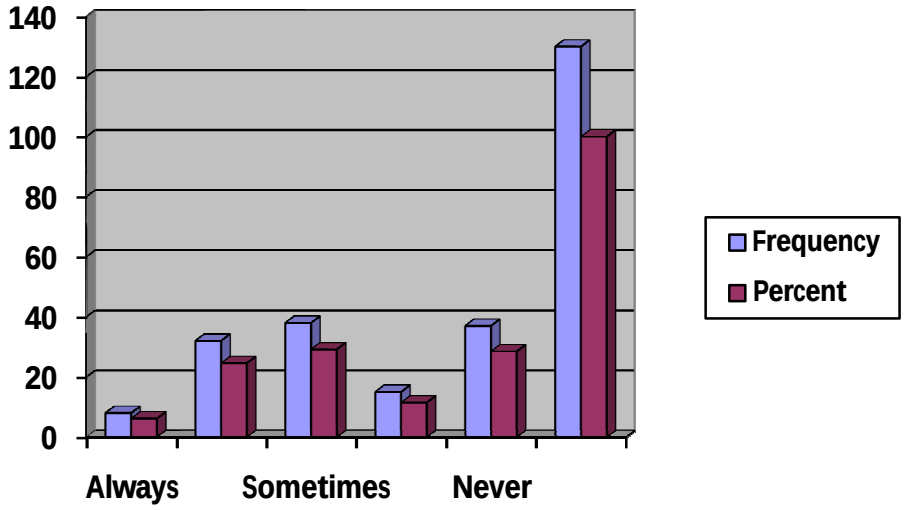

Figure 6: Distribution of respondents by attending extension meetings.

Table (4:7) Frequency distribution & percentages of respondents by attending training and receiving agricultural information's: -

Attending Training	Frequency	Percent
Always	5	3.8
More Frequent	14	10.8
Sometimes	12	9.2
Rarely	10	7.7
Never	89	68.5
Total	130	100

Source own survey data2011

As presented in table (4:7) out of the total sample respondents, 68.5% did not have chance of training. They did not attend in the training sessions, and they did not receive agricultural information. Only 3.8% out of the total sample respondents have always attended agricultural training. Concerning farmerspresence and attending training programs out of the total respondents' farmers, only 31.5% were found to have attended the training. This reveals a low ratio of training among the farmers in the study area.

Training is an important factor as it equips farmers with knowledge and skills, which help them to perform the new technology properly, if a farmer has no skill and know-how about certain technology, he may have less probability for adoption. thiscan be confirmed by further statistical measures.

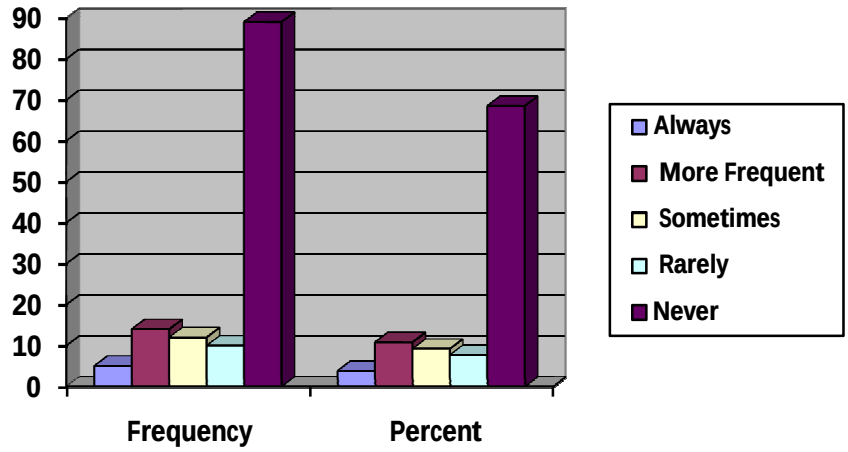

Figure 6: Distribution of respondents by attending training.

Table (4:8) Frequency distribution& percentages of the respondents by attending field visits & field days.

	Field visit		Field days	
Degree of attending	Frequency	Percent	Frequency	Percent
Always	1	0.8	5	3.3
More frequently	**7**	5.4	10	**7.7**
Sometimes	16	12.3	27	20.8
Rarely	26	20.0	88	67.7
Never	80	65.5	13	10
W3Total	130	100	130	100

Source own survey data 2011.

Table (4:8) shows that, field visit & field days were other means through which farmers are expected to get agricultural information by participation in these extension events. The results indicated that 65.5% of the total respondents in the study area never participated in field visit. Also 67.7% of them rarely participate in

field days. This indicate that he respondent have low awareness about the recommended hibiscus technical packages.

Only minority of the respondents were participated in these extension events, (field visit & field days) respectively, this may be due to lack of in frustrations that inhibit extension agents or institutions to arrange extension visits.

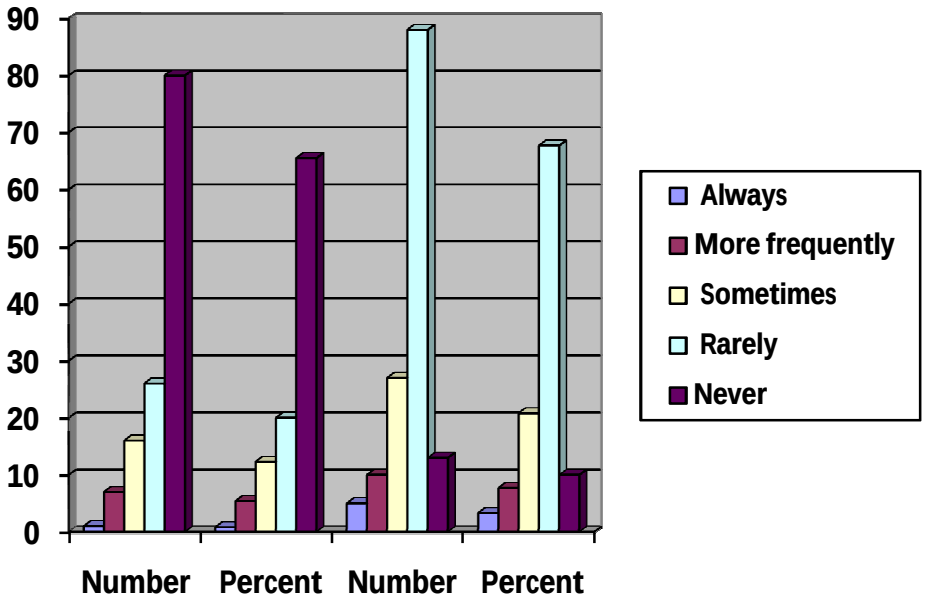

Figure :(7) distribution of respondents by attending field visit and field days

Table (4:9) Frequency distribution and percentages of respondents by attending field demonstrations &F.F.Ss :

	Field demonstration		F.F.Ss	
Degree of attending	Frequency	Percent	Frequency	Percent
Always	2	1.5	2	1.5
Often	7	5.4	3	2.3
Sometimes	19	14.6	4	3.1
Rarely	19	14.6	2	1.5
Never	83	63.8	119	91.5
Total	130	100	130	100

Source own survey data 2011

Table (4:9) indicated that, the majority of respondents 63.8% never participate or attended field demonstration, also 91.5% never participate in F.F.Ss. Thus, they had not yet seen demonstration field or hear about recommended hibiscus technical packages. This mean that there is a need to make more extension services.

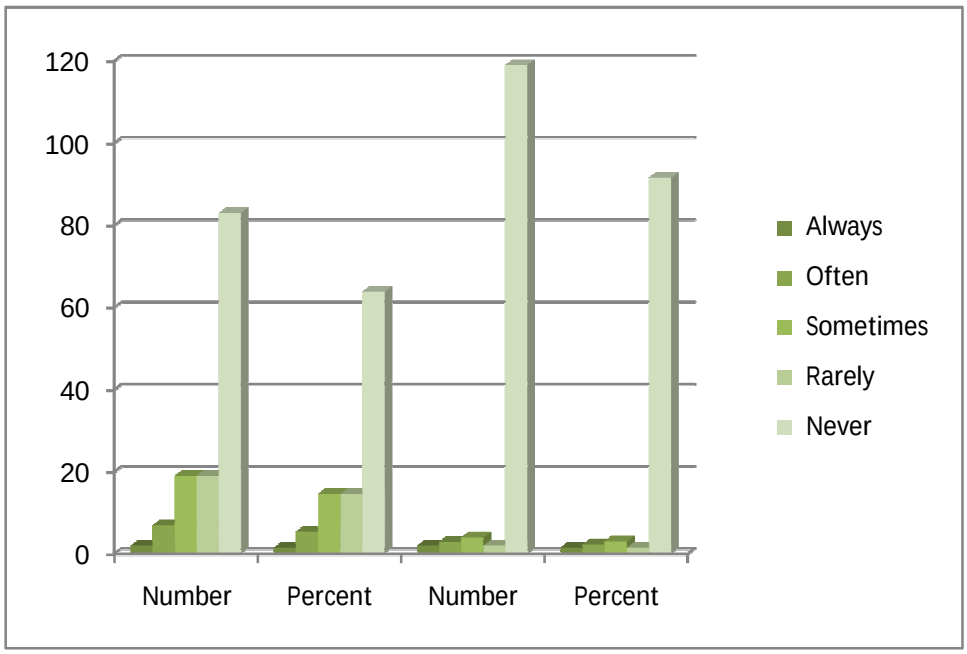

Figure 8: Distribution of respondents by attending field demonstration & F.F.Ss.

Table (4:10) Frequency distribution & percentages of respondents by other extension communication sources.

Degree of contact	Frequency	Percent
Sometimes	7	5.4
Rarely	39	30
Never	84	64.6
Total	130	100

Source own survey data 2011.

Table (4:10)show that Mass media such as (Radio, T.V & exhibits) are thought to be the alternative sources, however, when compared with other communication methods (field visits, field days, field demonstration…etc.) their effect on behavioral change is weak as

it is limited to awareness creation than skill development . Hence, 64.6% of the respondents replied that they never depend on these other sources as radio and T.v to receive agricultural information.

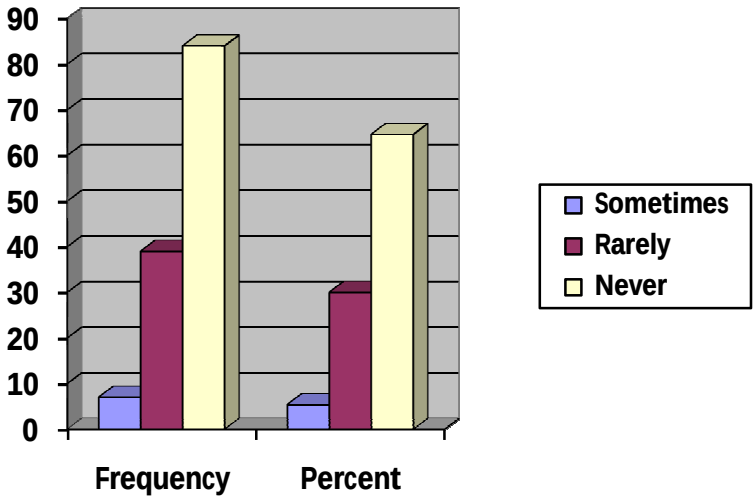

Figure 9: Distribution of respondents by other source for agricultural information.

4-1-2 Economic variables:

4-1-2-1 Active family labour force:

Family members were assumed to be the main source of labour required for most of the farm operations such as planting, weeding and harvesting in the different localities of the study area.

Table (4-11) Frequency distributions & percentages of respondents by the active labour force necessary for harvesting hibiscus crop:

Type of labour force	Frequency	Percentage
- only family labour	13	10%
-hired labour	04	3.2%
- Nafeer only	01	0.9%
Family labour and Nafeer	109	83.6%
- hired labour and Nafeer	03	2.4%
Total	130	100%

Source own survey data 2011

Table (4-11) shows that as respondents facing labour shortage during harvesting hibiscus crop they depend on family labour and Nafeer system to solve the problem of labour shortage. Thus, the mjority (83.6%) of the respondents depend on family labour and Nafeer in harvesting their crops Hence the information was generated on labouravailability of sample farmer; in order to examine the influence of labour availability on adoption of some hibiscus technical packages i.e. particularly the use of hand peeling tools.Hand peeling tools as a technology, its adoption might be encouraged by labour shortage, it could be attractive for those with limited labour force, as it reduces a labour demand and give good quality products.

4-2-1-2 Land holding and cultivated land:

Table (4-12) Frequency distribution & percentage of the respondents by scored farm size (land grown with hibiscus crop in season 2010 - 2011

Farm size	Year 2010		Year 2011	
	Frequency	percent	Frequency	Percent.
0----- 1.5	46	35.4%	54	41.5%
1.6--- 3.1	53	40.1%	59	45.4%
3.2---- 4.7	18	10%	10	7.7%
4.8---- 6.3	10	7.7%	05	3.8%
6.4---- 7.9	01	0.8%	-	-
8.0 --- 9.5	01	0.8%	1	0.8%
9.6 -- 11.1	-	-	1	0.8%
11.2 - 12.7	01	0.8%	-	-
Total	130	100%	130	100%

Source own survey data 2011

table (4:12) shows that most of the respondents in the study area have small farm size less than 3.1 Mukhamas, (Mukhamas =1.75 Feddan), as 41.5% of the respondents their farm size range between 0-1.5 and 45.4% ranging between 1.6-3.1 Mukhamas. These small farm sizes impede the adoption of using hand-peeling tools and other technical packages. Feder and et al (1987) Empirical studies have shown that, inadequate farm size impedes an efficient utilization and adoption of certain types of techniques.

4- 2 -2 Socio-psychological variables:

4 -2 -2-1 Characteristics and attributes of innovations:

4-2-2-1-1 farmers' evaluation of using hand-peeling tools:

Table (4:13) Frequency distribution and percentage of respondents by perception of importance of using hand-peeling;

perception of using hand –peeling	Frequency	Percentage
- very important	17	13.1%
- important	71	54.6%
Important to some extent	18	13.8%
Not important	18	13.8%
Never or not important at all	06	4.6%
Total	130	100%

Source own survey data 2011

As indicated in table (4:13) the majority (67.7%) of the respondents perceived the importance of using hand peeling tools (gargara) in harvesting hibiscus crop and only minority (18.4%) who are not perceiving the importance of using the hand peeling tool as they replied that it is not important (13.8%) or not important at all (4.6%) .

Although farmers in the study area perceived the importance of using hand peeling tool in harvesting hibiscus crop, they discontinue to use it due to unfavorable price being offered for the crop harvested by hand peeling tools as they replied and the price for the product of the two methods are the same. The relative superiority of the hand peeling tool in term of its product quality may enable farmers to have favorable perception about this technology which enhances decision in favor of adoption of using hand peeling tools.

Farmers when asked to respond how they perceive using hand peeling tool over traditional method the majority of them prefer hand peeling methods over traditional one for its product quality and it reduces labour cost sometimes.

4:2:2:1:2 Suitability of using hand peeling tool according to efforts necessary to operate it:

Regarding to adoption farmers sometimes discover problems in putting recommendations into practice. The extent of adoption, adjustment or rejection depends on farmers' behavior. (Valera et al 1987)Respondents were asked to respond how they perceive the effort necessary to operate hand peeling tool compared to traditional one.

Table (4-14) Frequency distribution and percentage of respondents by perception of the effort necessary to operate hand peeling tool, (gargara).

Effort to operate h. p. tool	Frequency	Percentage
Less effort	17	13.1%
Same effort	18	13.8%
More effort	63	48.5%
Never used hand peeling	32	24.6%
Total	130	100%

Source own survey data 2011

As indicated in table (4-14) respondents have perceived the efforts needed to operate hand peeling tools in relation to hand peeling that hand-peeling tools need more effort (48.5) while (24.6%) of the respondents never used hand peeling tool, (13.8%) of the respondents replied that it need the same effort as traditional methods.Thus the respondents in the study area reported that the main obstacles facing them are the effort needed to operate the hand peeling tools . these results reveal that farmers in the study area may have no skill and know-how about the new technology hence they may have less probability of adoption. This means that more training is needed to develop the skills and experience of the farmers on the using of hand-peeling tools.

4:2:2:2 Participation in hibiscus Production Association (H. P. A.)

Participation in hibiscus production association or other community -based behavior organization is expected to have indirect influence on the adoption of the farmer i.e. it exposes the farmer to a variety of ideas hence makes him positively practices or adopting the use of hand peeling tools.

Farmers' participation was calculated in the basis of his membership status, this could be different levels: not a member, a member only, committee member and leader or responsible of hibiscus production association. This is to see whether farmers level of social association influence his adoption to some hibiscus technological packages in the study area

Table (4:15) Frequency Distribution and percentage of farmers' relationship with hibiscus production association:-

Level of participation	Frequency	Percentage
Not a member	46	35.4%
A member only	64	49.3%
Committee member	14	10.8%
Leader	06	4.6%
Total	130	100%

Source own survey data 2011

Table (4:15) indicates that 35.4%were not members in the hibiscus production association while, 49.3%of respondents were only members compared to 10.8% and 4.6% were committee members and leaders respectively

Farmers' participation and exposure to new idea was hypothesized to affect adoption of hibiscus production technologies, and assumed to influence access to information on improved farming practicing when compared to other farmers group.

4:3 Tests of significance:

This part of the findings focuses on testing the factors affecting adoption of some hibiscus recommended technological packages among the farmers in N.K state by detecting the association between the independents variables and the dependent variables by using Chi-square tests, at a level of significance of 0.05 used for accepting or rejecting hypotheses. This may revealed the impact of some used communication extension methods on adoption process. The independent variables that may be considered in the study area include; Socio-economic factors, socio-psychological factors and communication extension factors, on the other hand the dependent variables include: adoption of using hand peeling tools, and adoption of improved hibiscus varieties:

4:2:1 Personal and demographic variables that affect adoption of using hand peeling tools and using of improved hibiscus varieties

Table (4-16) Chi-square test for testing association between gender and using hand peeling tools.

Gender	Using of hand-peeling tools									
	Always		Sometimes		Rarely		Never		Total	
Male	14	15.4%	35	38.5%	8	8.8.%	34	37.3%	91	70
Female	6	15.4%	19	48.7%	5	12.8%	9	23.1%	39	30
Total	20	15.4%	54	41.5%	13	10%	43	33.1%	130	100

Chi - squarevalue = 2.826, df=3 Sign= 0.420 .

As presented in table (4:16) that there was no significance statistical differences between groups with differences in the gender of the studied sample and the adoption of using hand peeling tools. The findings show that 15.4% of the male population always using the hand peeling tools while 38.5% of the male population sometimes using it. On the other hand while 15.4% of the female population always using hand peeling tools and 48.7% of the female sometimes using hand peeling tools.

There is no significance differences for chi-square value = 2.82 at a level of 0.420 which show no existence of gender impact on the farmer using hand peeling tools. That means the adoption was not dependent on gender

Table (4:17) Chi- square test for test of association between farmers' Gender and adoption of using improved variety (Abu shankel):

Gender	Rate of adoption of using improve variety Abushankel									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Male	37	40.7%	13	14.3%	2	2.7%	39	42.6	91	7%
Female	16	41%	8	20.5%	5	12.8%	10	15.6	39	30%
Total	53	40.8%	21	16.2%	7	5.4%	49	37.7	130	100%

F = frequency p = percent Chi square value = 8. 520, sign = 0.036 df = 3

Table (4: 17) shows that, 41% of the female population compared to 40.7% of the male population always adopted the using of the improved variety Abu shankel, also 20.5% of the female population compared to 14.3% of the male population sometimes adopted the use of this improved variety (Abu shankel). Thus Chi-square test for the relationship between gender and adoption of using the improved variety Abushankel revealed that, there were significant statistical differences for Chi- square value 8.52 at level of significant of 0.036 which show existence of gender impact on the farmer using of the improved variety Abushankel for the advantage of the female farmers.

Table (4:18) Chi- square test for of association between farmers' gender and adoption of using improve variety Betra:

Gender	Rate of adoption of using improve variety Betra									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Male	1	1.1%	13	14.3%	2	2.2	75	82.5	91	70%
Female	-	-	8	12.8%	6	15.4	28	71.8	39	30%
Total	1	0.8%	18	13.8%	8	6.2	103	79.2	130	100%

F = frequency p = percent chi –square value = 8. 574, sign = 0.036 df=3

Table [4:18] revealed that 82.5% of the male population compared to 71.8% of the female Population never used the improved variety (Betera) and also 2.2% of the male population compared to 15.4% of thefemale population rarely adopted the use of this improved variety Betra. Thus, this finding reflect that there was significant difference for Chi-square value = 8.574 at level of significant of 0.036 which show existence of gender impact on the farmers non-adoption for this improved variety (Betra) for the advantage of male farmers.

Table (4:19) Chi-square test for association between gender and adoption of using hibiscus improved variety (Abu Nagama):

Gender	Rate of adoption of using improved variety Abu Najma									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Male	41	45.5	2	2.2%	7	7.7	41	45.5	91	70%
Female	11	28.2	5	12.8%	2	5.1	21	53.8	39	30%
Total	52	40%	7	5.4	9	6.9	62	47.7	130	100%

F = frequency p = percent df = 3 chi –square value = 8. 360, sign = 0.039

Some own data survey 2011

Table (4:19) shows that, 45.5% of the males population compared with 28.2% of the females population always adopted this improved variety (Abu Najama), and also 53.8% of the female population compared 45.5% of the male population never adopted the use of this improved variety (Abu Najama), thus, the results indicated that, there were significant differences for Chi-square value of 8.360 at a level of significant of 0.039, which show existence of gender impact on the farmers adoption for this improved variety (Abu Najama) for the advantage of male farmers.

Table (4:20) Chi-square test for the association between gender and adoption of the hibiscus recommended technical package (plant spaces):

Gender	Rate of adoption of recommended plant spaces							
	Yes		No		To some extent		Total	
	F	P	F	P	F	P	F	P
Male	39	42.8	14	15.4	38	41.8	91	70%
Female	17	43.6	6	15.4	16	41	39	30%
Total	56	43.1	20	15.4	54	41.5	130	100%

F = frequency p = percent Chi –square value = 0. 007, sign = 0.997

Table (4: 20) revealed that 42.8% of the male population compared to 43.6% of the female population adopted the recommended plant spaces exactly ( ) as they replied (yes) on the other hand 41.8% of the male population compared to 41% of the female population adopted the recommended plant spaces but to some extent. Hence, Chi-square test indicate that farmers gender had insignificant association with adoption of hibiscus recommended plant spaces for at level of insignificant of 0.997 which show no existence of gender impact on farmer adoption of recommended hibiscus plant spaces.

Table (4:21) Chi-square test for test of the association between the farmer's gender and adoption of some recommended hibiscus seed rate:

Gender	Rate of adoption recommended seed rate							
	Yes		No		To some extent		Total	
	F	P	F	P	F	P	F	P
Male	53	58.24	5	5.49	33	36.27	91	70%
Female	24	61.54	1	2.56	14	35.89	39	30%
Total	77	59.23	6	4.61	47	36.15	130	100%

F = frequency p = percent Chi –square value = 0. 559, df= 2 sign = 0.756.

Source own data survey 2011.

Table (4:21) shows that, as 61.54% of the female population compared to 58.24% of males population adopted the recommended hibiscus plant seed rate (3 seed / hole) and they replied yes, there also 5.49% of the males population compared to 2.56% of the females population not adopted the recommended plant seed rate as they replied No, this, results revealed that there were no significant difference for Chi-square value 0.559 at a level of insignificant of 0.756, which show no existence of gender impact on the farmers no – adoption for recommended hibiscus plant seed rate.

Table (4:22) Chi-square test for the test of association between the farmer gender and adoption of the recommended hibiscus technical package (cultivation)

Gender	Rate of adoption recommended cultivation							
	Yes		No		To some extent		Total	
	F	P	F	P	F	P	F	P
Male	82	90.11	2	2.19	7	7.69	91	70%
Female	35	89.74	-	-	4	10.26	39	30%
Total	117	90%	2	1.54	18	13.85	130	100

F = frequency p = percent Chi –square value = 1. 070, sign = 0.586 df =2

Table (4:22) shows that, 90.11 of the male population compared to 89.74% of female population were adopted the recommended cultivation date as they replied yes, on the other hand 10.26% of the female population compared to 7.69 of the female population were adopted the recommended plant cultivation date to some extent as they replied.

Thus Chi-square test for the relationship between gender and farmers adoption for the recommended cultivation date, shows no existence of gender impact on the adoptionfor the Chi-square value 1.070 at level of insignificant of 0.586 which shows no existence of gender impact on the farmers adoption for the recommended cultivation date.

Table (4:23) Chi-square test for the test of the association between farmers gender and adoption for the recommended sowing date.

Gender	Rate of adoption recommended sowing date							
	Yes		No		To some extent		Total	
	F	P	F	P	F	P	F	P
Male	70	76.92	5	5.49	16	17.96	91	70%
Female	30	76.92	1	2.56	8	20.5	39	30%
Total	100	4.61	6	4.61	24	18.46	130	100%

Chi- square value = 0. 635 Sign = 0. 728 df = 2

Table (4: 24) Chi – square test for the test of the association between the gender and the farmers. Adoption for the recommended.

Harvesting date:

Gender	Rate of adoption Recommended harvesting date							
	Yes		No		To some extent		Total	
	F	P	F	P	F	P	F	P
Male	48	52.57	9	9.89	34	37.36	91	70%
Female	20	51.28	4	10.56	15	38.46	39	30%
Total	68	52.30	13	10.00	49	37.69	130	100%

F= frequency p = percent Chi- square value = 0.024 sign = 0.988 df = 2

Table (4:24) shows that there were insignificant differences for the Chi- square value = 0.024 at a level of insignificant of 0.988 which

show no existence of gender impact on the farmers adoption for the recommended harvesting date.

Finally as indicated in table (4:21), (4:22), (4:23) ,(4:24) and table (4:25), that the Chi-square tests for the test of associations between farmers' gender and their adoption rate for some recommended hibiscus technical packages (plant spaces, seed rate, cultivation, sowing date and harvesting date) revealed that there were insignificant association at level of (0.997, 0.756, 0586, and 0.728. respectively.

This may be due to the fact that gender (both male and female) had less exposure to the outside world or extension contact.

Table (4: 25) Chi-square test for association between gender and adoption for the labour force necessary for crop harvesting:

Gender	**Source of labour force necessary for crop hravesting**							
	Family labour		Rent labour		Nafear only		Family and nafear	
	F	P	F	P	F	P	F	P
Male	10	11%	4	4.4%	1	1.1%	76	83.5%
Female	2	5.1%	1	2.6%	1	2. 6%	33	89.7
Total	12	9.2%	5	3.8%	2	1.2%	109	85.3%

F = frequency Chi-square value = 1.759 p = percent sign = 0.624 df = 2

The result in table (4:25) indicate that both male and female respondents depend on (family + Nafear) as a source for labour force to harvest their crops as 11% of the male respondents compared 5.1% of the female respondents depend on family labour in harvesting their crops, there also 89.7% of the female respondents compared to 83.5% of the respondent depend on (family + Navear) as a source of labour to harvest their crops thus, Chi- square tests revealed that there were no significance differences for Chi-square value 1.751 and at a level of non-significance of 0.624

Table (4:26) Chi-square test for the association between the respondents' category of age and adoption of using hand peeling tools:

Category of age	Rate of adoption of using hand peeling tools by the farmer's age									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Less than 20 years	-	-	-	-	-	-	3	6.97	3	2 .31
21- 30 years	2	10%	11	20.4	4	30.8	6	14	23	17.69%
31-40	1	5%	12	22.2	1	7.8	8	18.6	22	16.92%
41-50	8	40%	17	31.5	3	23.1	8	18.6	36	27.69%
51-60	2	10%	6	11.1	2	15.4	7	16.8	17	13.08%
More than 60 years	7	35%	8	14.8	3	23.1	11	25.58	29	22.31%
Total	20	15.4	54	41.5	13	10%	43	33.1	33.1	100%

F = frequency P = percent Chi-square value= 18.321 df= 15 significance level= 0.246

Table (4:26) indicated that about 41.5% of the total respondents sometimes adopted the use of hand peeling tools compared to only 15.4% of the total respondents always adopted the use of hand peeling tools.

On the other hand as 40% of those who always adopted the use of hand peeling tools their ages range between 41-50 years of old, there were only 31.5% of those who sometimes adopted the use of hand peeling their ages range between 41-50 years of old.

There is another results which show that 30.8% of those who rarely adopted the use of hand peeling tools their age range between 21-30 years compared to only 10% of those who always adopted the use of hand peeling their age range between 21-30 years of old.

Thus, the Chi-square tests revealed that there were no significant association for the Chi- square value of 18.32 at level of non- significant of 0.246, which show that no existence of influence or impact for the farmer's age on adoption of farmers for the using of hand peeling tools.

The table (4:27) Chi-square test for the relationship between farmers' category of age and adoption of using improved variety (Abu shankel):

Category of age	Rate of using improved variety Abu shankel									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Less than 20 years	1	1.89	-	-	-	-	2	4.08	3	**2.**
21- 30 years	9	16.98	5	23.81	3	42.88	6	12.29	23	
31-40	10	18.87	3	14.29	1	14.29	8	16.33	22	
41-50	18	33.96	4	19.05	2	28.57	12	24.49	36	
51-60	5	9.43	3	14.29	-	-	9	18.37	17	
More than 60 years	10	18.87	6	28.57	1	14.29	12	24.49	29	
Total	53	15.4	21	16.15	7	5.38	49	37.69	130	

Chi-square value = 10.371 sign = 0.798 df= 15

The table (4:28) Chi-square test for the relationship between farmers' category of age and adoption of using improved variety (Betera):

Category of age	Rate of using improved variety (Betra)									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Less than 20 years	-	-	1	5.56	-	-	2	1.94	3	2.31%
21- 30 years	-	-	3	16.64	3	37.5	17	16.50	23	17.69%
31-40	-	-	1	5.56	2	25	19	18.45	22	16.92%
41– 50	-	-	8	44.4	2	25	26	25.24	36	27.69%
51-60	-	-	1	5.56	1	12.5	15	14.56	17	13.08%
More than 60	1	100	4	22.2	-	-	24	23.3	29	22.31%
Total	1	0.77	18	13.85	8	6.15	103	79.23	130	100%

F= frequency P = percentChi-square value = 13.094sign = 0.595

df

Table (4:29) Chi- square test for the relationship between the respondents' category of age and the adoption of using improved variety Abu Nagama:

Category of age	Rate of adoption of improve variety by the farmer' age									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Less than 20 years	2	3.85%	-	-	-	-	3	1	1.61	5
21- 30	7	13.46%	2	28.57	1	11.1	6	13	20.97	23
31- 40	8	15.38%	2	28.57	3	33.3	8	9	14.52	22
41- 50	13	25%	1	14.29	1	11.1	8	21	33.87	36
51- 60	8	15.38%	2	28.57	2	22.2	7	5	8.09	17
More than 60 years	14	26.92%	-	-	2	22.2	11	13	20.97	29
- Total	52	40%	7	5.38	9	6.92	43	62	47.69	130

F= frequency p = percent Chi square value = 12.612 sign = 0.632 df= 15

From the table (4:27) , (4:28) , (4:29) Chi- square tests for the adoption of the three varieties which are (Abu shankel, Betra and Abu Nagama) show that there were no significant association for Chi-square value of = 10.371 at a level of insignificant of 0.798 for adoption of the variety Abu shankel also there were non-significant association for Chi-square value of 13.094 at level of non- significant of 0.595 for the adoption of Betra and there were insignificant association for Chi-square value of 12.612 at a level of non- significant of 0.623 for the adoption of the variety Abu Nagama, these results reflect that the adoption of improved hibiscus varieties were not influenced by the farmers' category of age.

Table (4:30) Chi-square test for the relationship between the framers' age and adoption of using recommendedplant spaces:

Group age	Rate Adoption of recommendedplant spaces							
	yes		No		Some extent		Total	
	F	P	F	P	F	P	F	P
Less than 20 years	1	1.8%	0	0%	2	3.7%	3	2.3%
21- 30	12	21.4%	5	25%	6	11.1%	23	17.7%
31- 40	7	12.5%	2	10%	13	24.1%	22	16.9%
41- 50	16	28.8%	8	40%	12	22.2%	36	27.7%
51- 60	10	17.9%	2	10%	5	9.3%	17	13.1%
More than 60 years	10	17.9%	3	15%	16	29.6%	29	22.3%
Total	56	43.1	20	15.4	54	41.5%	130	100%

F = frequeency P = percentage Chi-square value = 11.890 df = 10

sign = 0.293

Table (4:31) Chi- square test for relationship between the farmers' age and adoption of using recommended seed rate:

Group age	Rate of adoption of seed rate							
	yes		No		Some extent		Total	
	F	P	F	P	F	P	F	P
Less than 20 years	1	1.3%	1	16.7%	1	2.1%	3	2.3
21- 30	13	16.9%	0	0%	10	21.3%	23	17.7
31- 40	12	15.6%	0	0%	10	21.3%	22	16.9%
41- 50	20	26%	3	50%	13	27.7%	36	27.7
51- 60	12	15.6%	1	16.7%	4	8.5%	17	13.1%
More than 60	19	24.7%	1	16.7%	9	19.1%	29	22.3%
Total	77	59.2%	6	4.6%	47	36.2%	130	100%

F = frequency P = percentage Chi-square value = 11.590 df = 10

sign = 0.313

Table (4:32) Chi-square test for the relationship between the farmers' group of age and adoption of using recommended hibiscus (sowing date):

Group age	Rate of adoption of sowing date							
	yes		No		Some extent		Total	
	F	P	F	P	F	P	F	P
Less than 20 years	1	1.0%	1	16.7	1	4.2%	3	2.3%
21- 30	16	16.4%	1	16.7	6	25 %	23	17.7%
31- 40	19	19%	0	% 0	3	12.5%	22	16.9%
41- 50	30	30%	0	% 0	6	25%	36	27.7%
51- 60	13	13%	2	33.2%	2	8.3%	17	13.1%
More than 60 years	21	21%	2	33.3%	6	25%	29	22.3%
Total	100	76.9%	6	4.6%	24	18.5%	130	100%

F = frequency P = percentage Chi- square value = 13.593 df = 10 sign = 0.192.

Table (4:33) Chi- square test for the relationship between the farmers' group of age and adoption of using recommended hibiscus technical package (cultivation):

Group age	Rate adoption of sowing date							
	Yes		No		Some extent		Total	
	F	P	F	P	F	P	F	P
Less than 20 years	1	1.7%	-	-	1	9.1%	3	2.3%
21- 30	21	17.9%	-	-	2	18.2	23	17.7%
31- 40	19	16.2%	1	50%	2	18.2	22	16.9%
41- 50	32	17.4%	-	-	4	36.4	36	27.7%
51- 60	16	13.7%	1	50%	-	-	17	13.1%
More than 60 years	27	23.1%	-	-	2	18.2	29	22.3%
Total	117	90%	2	1.5%	11	8.5%	130	100%

F = frequency P = percentage Chi- square value = 9.090 df = 10 sin = 0.524

Table (4:34) summary of Chi- square test for the relationship between the farmers' group of age and the adoption of using some recommended hibiscus technical packages:

Technical package	Sign	Df	Chi-square value	Indicative
1. using hand peeling tools	0.246	15	18.321	non-significant
2.using improved variety Abu shankel	0.798	15	10.371	non- sign
3.using improved variety Betra	0.595	1	13.094	non-sign
4.using improved variety Abu Nagama	0.632	15	12.612	non-sign
5.adoption recommended plant seed rate	0.293	10	11.890	non-sign
6. recommended sowing date	0.192	10	13.593	non-sign

As shown in table (4:35) summary of Chi-square tests, revealed that, there were no significant differences between farmers' group of age and their adoption to most of the hibiscus production technical packages such as (plant spaces, seed rate, sowing date, using of improved varieties and using hand peeling tools) at a level of sign of 0.05, while there were highly significant association between the farmers age and adoption for other hibiscus technical packages as harvesting the crop at recommended harvesting date. The result of this study revealed that age as a variable has no influence on the adoption process, and this is against our hypothesis in this study

Table (4:35) Chi-square test for the association between the farmers educational level and adoption of using hand peeling tools:

Level of educational	Rate of adoption of improve variety by the farmer' age									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Illiterate	7	35%	5	9.26%	3	23.1	17	39.5	32	24.6
Khalwa	5	25%	8	14.81	-i	-	4	9.3	17	13.1
Pre-university	8	40%	39	72.2	10	76.9	21	48.8	78	60
University	-	-	2	3.70	-	-	1	2.3	3	2.3
Total	20	15.38%	54	41.54	13	10%	43	33.3	130	100

F = frequency P = percentage Chi- square value = 19.827 sin = 0.019 df = 9

As presented in table (4:36) out of those who always adopted the using of hand peeling tools 40% having pre-university level of education and 72.2% of those who sometimes using hand peeling tools were also having pre-university level of education. Thus, Chi-square test shows that there were significant association for chi-square value 19.827 at a level of significant of 0.019. this means that adoption of using of hand peeling tool were dependent on respondents educational level, if farmerswere well educated they may not need outside support, later, they themselves can properly implement recommendation. Hence, the result of this study is in an agreement with feeder and et al (1984) and AmelAwad (2008).

Table (4:36) Chi- square test for the association between the farmers level of education and adoption of using improved variety (Abu shankel):

Level of educational	Rate of adoption of improve variety Abu shankel									
	Always		Sometimes		Rarley		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Illiterate	10	18.9	7	33.33	1	14.29	14	28.57	32	24.6
Khalwa	10	18.9	3	14.29	-	-	4	8.17	17	13.1
Pre-university	32	6.38	10	47.6	5	71.43	31	63.26	78	60
University	1	1.89	1	4.77	1	14.29	-	-	3	2.3
Total	53	40.77	21	16.15	7	5.38	49	37.69	130	100

F = frequency P = percentage Chi- square value = 12.026 sin = 0.212 df = 9

Table (4:37) Chi-square test for the association between the respondents' educational level and the adoption of improved variety Betera:

Level of educational	Rate of adoption of improve variety (Betera)									
	Always		Sometimes		Rarley		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Illiterate	1	100	2	11.11	1	12.5	28	27.18	32	24.61
Khalwa	-	-	5	27.78	1	12.5	11	10.68	17	13.08
Pre-university	-	-	11	11.11	5	62.5	62	60.19	78	60
University	-	-	-	-	1	12.5	2	1.94	3	2.31
Total	1	0.77	18	13.83	8	6.15	103	37.69	130	100

F = frequency P = percentage Chi- square value = 12.688 sin = 0.178 df = 9

Table [38] Chi-square test for the association between the farmers' education level and adoption of improve variety Abu Nagama:

Level of educational	Rate of adoption of improve variety Abu Nagama									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Illiterate	15	28.85	3	42.85	3	33.3	11	17.74	32	24.61
Khalwa	4	7.69	-	-	1	11.1	12	19.35	17	13.08
Pre-university	33	63.46	4	57.14	5	55.5	36	58.16	78	60
University	-	-	-	-	-	-	3	4.84	3	2.31
Total	52	40%	7	5.38	9	6.92	62	46.69	130	100

F = frequency P = percentage Chi- square value = 10.228 sin = 0.332 df = 9

Table [38] show that 46.69% of the total respondents never adopted the improved variety Abu Nagama compared to only 40% of the total repondent always adopted these variety, on the other hand 63.46% of those who always adopted the improve variety Abu Nagma were pre-Univesity level there were also 57.14% of those who sometimes adopted the variety Abu Nagma were pre-University level, also the results indicated that about 58.16% of those who never adopted the improve variety Abu Nagma were pre- University level. Thus chi-square tests for the adoption of the improved varieties of hibiscus (Abu shankel, Abu Nagama and Betera) by the education level of the respondents were insignificant at levels of (0.12, 0.178 and 0.332) respectively. Generally, the results

indicated that there were no relationship between the farmers' educational level and their adoption rate for these improved variety at level of 0.05, but there could be other characteristics of the respondents that may impact their adoption.

Table (4:39) chi-square test for the association between the farmers' education level and adoption of recommended plant spaces:

Ed. Level	Rate of adoption of recommended plant spaces							
	Yes		No		To some extent		Total	
	F	P	F	P	F	P	F	P
Illiterate	15	14.28%	7	35%	17	31.48%	32	24.61
Khalwa	7	12.50	1	5%	9	16.67%	17	13.08
Pre-university	40	71.43	12	60.%	26	48.15%	78	60
University	1	1.79	-	-	2	3.70%	3	2.31
Total	56	40.08	20	15.38	54	41.54	130	100

F = frequency P = percentage Chi- square value = 9.349 sign = 0.155 df = 6

Table [4:40] chi-square test for the association between farmers' education level and adoption of the recommended plant spaces, shows that, 41.54% of the total respondents adopted the recommended plant spaces to some extent, while 40.08% of them adopted the recommended plant spaces exactly as they replied (yes).

Thus, the chi-square tests revealed that there were no significant association between the farmers' education level and adoption of the recommended plant spaces for the chi-

square value of 9.349 and level of insignificant of 0.155 which show no existence of relationship between the farmers' education level and their adoption for the recommended plant spaces.

Table [40] summary for chi-square tests for the association between the farmers' education levels and adoption for some hibiscus production technical packages:

Technical package	Significant	df	Chi-square value	Indicative
Using of hand peeling tools	0.019	9	19.827	Significant
Adoption of recommended plant spaces	0.155	6	9.349	Non significant
Adoption of recommended seed rate	0.763	6	3.357	Non significant
Adoption of recommended sowing date	0.312	6	7.095	Non significant
Adoption of cultivation	0.016	6	15.691	Significant
Adoption for recommended harvesting date	0.287	6	7.378	Non significant

Sign = significant non- sign = non significant

Table [40] show summary of chi-square tests for the association between the farmers' level of education and their adoption to some recommended hibiscus production technical packages (using hand peeling tools, plant spaces, seed rate, sowing date, cultivation and

harvesting time) as they are provided as complete packages necessary for improving the crop production in the study area.

The results indicated that there were significant relationship at level of 0.05, between the farmers' education level and their adoption for some recommended technical packages as (using hand peeling tools and cultivation) at level of significant of 0.019 and 0.016 respectively while there were non- significant relationship at level of 0.05 between thefarmers' education level and adoption for other recommended technical packages as (plant spaces, seed rate, sowing date and harvesting date) at levels of insignificant of 0.155, 0.763, 0.312 and 0.287 respectively.

Table [41] chi-square test for the association between the respondents' family size and their adoption for using hand peeling tools:

Family size	**Rate of adoption of using hand peeling by the family size**									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Small 1-6	6	30%	22	40.74%	2	15.38	25	51.13	55	42.31
Mid 2-12	12	60%	27	50%	10	76.92	17	39.53	66	50.77
Mor than 12 big	2	10%	5	9.26%	1	7.69	1	2.33	9	6.92
Total	20	15.38	54	41.54%	13	10	43	33.08	130	100

F = frequency P = percentage Chi- square value = 10.708 sign = 0.096 df = 6

Table [4:41] chi-square tests for the relationship between the respondents family size and their adoption for using hand peeling tools shows that about 41.54% of the total

respondents sometimes adopted the use of hand peeling tools, while only 33.08% of the total respondents never adopted the use of hand peeling tools. The results of chi-square test indicated that there were no significantrelationship at level of 0.05 between respondents adoption of using hand peeling tools and the family size of the respondents, at the chi-square value of 10.708 and a level of insignificant of 0.098.

Table [4:42] chi- square tests for the association between respondents family size and adoption of some hibiscus production technical package:

Technical package	Sign	Df	Chi-square	Indicative
Plant spaces	0.088	4	8.098	nonSignificant
Sowing date	0.840	4	1.426	non significant
seed rate	0.715	4	2.41	non significant
harvesting date	0.987	4	0.241	non significant
Cultivation	0.987	4	0.339	non significant
using improve variety:				
- Abu shankel	0.267	6	7.620	non sign
- Betera	0.004	6	19.045	Sing
- Abu Nagama	0.137	6	9.729	non sign

Sign = significance non- sign significanct

Data on table [4:42] shows a summary for chi-square tests for adoption of some hibiscus production technical packages by respondents family size.

The results of chi-square test for the adoption for some hibiscus production technical packages as (plant spaces, sowing date, seed rate, har

vesting time and cultivation) as independents variables by respondents family size as dependent variable, revealed that, there were no significant relationship at levels of insignificant of 0.088, 0.840, 0.715, 0.987 and 0.987 respectively between respondents family size and adoption for these technical packages as they listed respectively.

While chi-square tests for adoption of improved hibiscus varieties by respondents family size were insignificant at level of (0.267 and 0.137) for the two varieties Abu shankel and Abu Nagama respectively. It were significant at level of 0.004 for the variety Betera this means that theadoption of technical packages were not dependent on respondents family size and it may be dependent on other socio-economic factor.

Table [4:43] Chi-square test for the relationship between the respondents' family size and the adoption for the farm labour force:

Family size	Rate of adoption of farm labour by family size							
	Family labour		Rent labour		Nafear		Nafear +family	
	F	P	F	P	F	P	F	P
Small 1-6	5	41.67	2	40%	1	50%	25	36.15
Mid 2-12	7	58.33	3	60%	1	50%	17	49.55
Mor than 12 big	-	-	-	-	-	-	1	16.36
Total	20	9.23	5	3.85%	2	1.54%	111	85.36

F = frequency P = percentage Chi- square value = 1.828 sign = 0.935 df = 6

Table [4:43] chi- square test for the relationship between the farmers' family size and the harvesting labour force necessary for harvesting the crop, revealed that, there is no significant association for chi-square value of = 1.828 at level of insignificant of 0.935 which show no existence of impact for family size on adoption of farm labour force necessary for harvesting the crop generally, about 85.38% of the total respondents depends on Nafeer and family labour for harvesting their crop, and about 49.55% of those who depend on Nafear and family labour were of medium family size.

Table [4:44] chi-square test for the association between farmers' attending for extension meetings and their adoption for using hand peeling tool:

Attending for extension meeting	**Rate of adoption of using hand peeling tools by attending exttension meeting**								
	Always		Sometimes		Rarley		Never		Total
	F	P	F	P	F	P	F	P	F
Always	5	25%	3	5.56%	-	-	-	-	8
More frequent	7	35%	21	38.89%	1	7.69%	3	6.98	32
sometimes	4	20%	15	27.78%	7	53.85	12	27.90	38
Rarely	1	5%	6	11.11%	1	7.69	7	16.28	15
Never	3	15%	9	16.67	4	30.77	21	48.84	37
Total	20	15.38	54	41.54	13	10%	43	33.08	130

F = frequency P = percentage Chi- square value = 42.620 sign = 0.000 df = 12

Table [4:44] shows that chi-square test for adoption of using hand peeling tools by attending extension meeting at the village level were highly significant at chi-square value of 42-620 and level of significant of 0.000, which means that adoption of using hand peeling tools were dependent on the farmers' attending for extension meetings as they influencing adoption positively and they act as most sources for information necessary to make farmers alert about the importance of this new technology.

Table [4:45] chi-square test for the association between attending extension meeting and adoption of using improved hibiscus variety (Abshankel):

Attending for extention meeting	**Rate of adoption of using improve variety (Abu shankel)**								
	Always		Sometimes		Rarley		Never		Total
	F	P	F	P	F	P	F	P	F
Always	8	15.09	-	-	-	-	-	-	8
More frequent	24	45.28	6	28.57	2	28.57	-	-	32
sometimes	13	24.52	4	19.05	2	28.57	19	38.78	38
Rarely	2	3.77	1	4.76	2	28.57	10	20.41	15
Never	6	11.32	10	47.62	1	14.29	20	40.82	37
Total	53	40.77	21	16.16	7	5.38	49	37.69	130

F = frequency P = percentage Chi- square value = 55.741 sign = 0.000 df = 12

Table [4:46] chi-square test for the association between attending extension meeting and adoption of using improve hibiscus variety (Betra):

Attending for extention meeting	**Rate of adoption of using the improve variety Betera**									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Always	-	-	4	22.2%	-	-	4	3.88	8	6.15
More frequent	-	-	11	61.1%	3	37.5%	18	17.48	32	24.61
sometimes	1	100	2	11.1%	1	12.5%	34	33.01	38	29.23
Rarely	-	-	1	5.56	1	12.5%	13	12.62	15	11.54
Never	-	-	-	-	3	37.5	34	33.01	37	28.46
Total	1	0.79	18	13.85%	8	6.15	103	79.23	130	100

F = frequency P = percent Chi- square value = 33.802 sign = 0.001 df = 12

Table [4:47] chi-square test for the association between attending extension meetings and adoption of using the improve variety Abu nagama:

Attending for extension meeting	Rate of adoption of using the improve variety Abu Nagama									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Always	-	-	-	-	-	-	8	12.90	8	6.15
More frequent	1	1.92	3	42.86	3	33.33	25	40.32	32	24.61
sometimes	20	38.46	1	14.29	3	33.33	14	23.58	38	29.23
Rarely	9	13.31	2	28.57	-	-	4	6.45	15	11.54
Never	22	42.31	s1	14.29	3	33.33	11	17.74	37	28.46
Total	52	40%	7	5.38	9	6.92	62	47.69	130	100

Tables [4:47] , [4:4:7], [4:48] show that chi-square tests for the adoption of using the improve varieties (Abu shankel, Betera and Abu Nagama) by respondents' attending for extension meetings were highly significant for the chi-square values of (55.741, 33.801 and 42.395) and at level of highly significant of (0.000, 0.000, and 0.001) for the three varieties. Extension agent contact with farmers is hypothesized to accelerate the effective dissemination of adequate agricultural information necessary to farmers' decision to adopt new crop varieties which are (Abu shankel, Betera and Abu Nagma) as common experimented varieties of hibiscus in the study area.

Table [4:48] chi-square tests for the association between the farmers' attending of extension meeting and the adoption of some hibiscus production practices (plant spaces, seed rate sowing date and harvesting date.

Adoption of hibiscus production practice	Sign	df	Chi-square value	Indicative
Using of hand peeling tools	0.306	8	9.445	Nonsignificant
plant spaces	0.565	8	6.741	Non significant
seed rate	0.810	8	4.493	Non significant
sowing date	0.634	8	6.120	Non significant
Harvesting date	0.570	8	6.696	Non significant
Using hand peeling	0.000	12	42.620	significant

Table [4:48] chi- square test for the association between the farmers' attending extension meeting and the adoption of different hibiscus production practice such as (plant spaces, seed rate, sowing date, harvesting date and cultivation) were insignificant for the chi-square values of (9.445, 6.741, 4.493, 6.120 and 6.696) and at level of significant of (0.306, 0.565, 0.810, 0.634 and 0.570) for the mentioned hibiscus production practices respectively. This means that the adoption of different hibiscus production practices were not dependent on respondents' attending for extension meetings. But it can serve as a mean influencing the adoption for other practices as using improve varieties and using of hand peeling tool.

Table [4:49] chi-square tests for the association between farmers' attending training sessions and their adoption for using hand peeling tools:

Frequency of attending training	**Rate of adoption of using the improve variety Betera**									
	Always		Sometimes		Rarley		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Always	4	20%	1	1.85%	-	-	-	-	5	3.85
More frequent	3	15%	8	14.81	2	15.38%	1	2.33	14	10.77
sometimes	2	10%	9	16.67	1	7.69%	-	-	12	9.23
Rarely	3	15%	4	7.41%	2	15.38	1	2.33	10	7.69
Never	8	40%	32	59.26%	8	61.54	14	95.35	89	68.46
Total	20	15.38%	54	41.54	13	10%	43	33.08	130	100

F = frequency P = percent Chi- square value = 39.459 sign = 0.000 df = 12

Chi- square [4:49] shows that chi- square test for the adoption of using hand peeling tool for harvesting hibiscus crop by the respondents attending training sessions were highly significant for the chi-square value of 39.459 and a level of highly significant of 0.000 which show that the adoption of the use of hand peeling tool technology were dependents on farmers' attending training session, as presented in the above table [4:50] , 68.45% of the respondent never attending training session, as the result they never use this technology – they have not seen the demonstration they worried of this new technology and believe only on the manual hand peeling –

thus, the training is important to bring more confidence about the hand peeling tool.

Table [4:50] chi-square test for the association between famers' attending training session and their adoption to some hibiscus technological package (using improve varieties, adoption of recommended plant spaces seed rate sowing date, cultivation and harvesting at recommended harvesting date).

hibiscus production practices	Sign	df	Chi-square value	Indicative
-Adoption of improved variety Abu shankel	0.001	8	6.741	Significant
-Adoption of improved variety Betera	0.002	8		significant
-Adoption of variety Abu Nagama	0.000	8	4.493	significant
-Adoption of seed rate	0.539	8	9.996	Non significant
-Adoption of sowing date	0.265	8	5.762	Non significant
- Adoption of plant spaces	0.674	8	6.120	Non significant
- Adoption of cultivation	0.812	8	6.696	Non significant
- Adoption of harvesting date	0.117	12	42.620	Non significant

Table [4:50] chi-square tests for the adoption of three recommeded hibiscus varieties (Abu shankel, Betera and Abu Nagama) by the respondents' attending training session were seem to be of highlsignificant for chi-square values (34.239, 30.622 and 27.324) and at high levels of significant which are (0.001, 0.002 and 0.007) for the adoption of three varieties respectively. This means that, the

adoption of the new hibiscus varieties were really dependent on the farmers attending training session, training may lead to farmers' awareness about the importance of these new improved varieties and may enhance their adoption to be grown in the study area on the other hand, table [4:51] chi- square tests for the adoption of the others hibiscus production technical packages (plant spaces, seed rate, sowing date, cultivation and harvesting date) by therespondents' attending training session were found to be non significant for the chi-square values of (6.976, 9.996, 5.762, 4.477 and 12.844) and at levels of insignificant of (0.539, 0.262, 0.674, 0.812 and 0.117) respectively which revealed that the adoption of these technical package (plant spces seed rate, sowing date, cultivation and harvesting date) were no dependent on the respondents' attending session it were observed from the results above that large majority of the respondents never attended training session in agricultural activities, and they were not aware of the importance of these technical package.

4:1:2:2 Contact with Extention Agent:

Extention agent contact with farmers is supposed to have direct influence on adoption behavior of the farmers, particularly in possibility of adoption of agricultural innovations. The degree of contact with extension agent is established at different levels (always, often, sometimes, rarely and never).

Table [4:51] chi-square test for the association between farmers' contact with extension agent and their adoption for using hand peeling tool.

Contact with Extension Agent	**Rate of adoption of using hand peeling tools by Extension contact**									
	Always		Sometimes		Rarley		Never		Total	
	F	P	F	P	F	P	F	P	F	P
More frequent	4	30%	14	25.93%	1	7.69	2	4.65	23	17.69
sometimes	6	30%	14	29.63	4	30.77	7	16.28	33	25.38
Rarely	4	20%	16	29.63	5	38.46	12	27.91	37	28.46
Never	4	8%	8	14.81	3	2308	22	51.16	37	24.46
Total	20	15.38%	54	41.54	13	10%	43	33.08	130	100

F = frequency P = percent Chi- square value = 23.699 sign = 0.005 df = 9

Table [4:51] chi- square tests for the relationship between farmer' contact with extension agent and adoption of using hand peeling tools, indicated that there, is significant association at level of 0.005 between farmers' extension agent contact and their adoption for using hand peeling there may be attention to that technology and awareness on the importance of that technology.

Table [4:53] chi- square tests for the association between farmers' contact with extension agent and their adoption for some hibiscus production technical packageshow that, the adoption of these practices (plant spaces, sowing date, cultivation and harvesting date) were not dependent on farmers' contact with extension agents and these may be to other factors on the other hand the adoption of the seed rate as recommended practice were found to be significantly associated with farmers' extension contact, at level of significant of 0.049 which shows existence of relationship

between the adoption of seed rate and farmers' extension contact.

4:1:2:3 Participation in some extension events:

Farmers' participation in different extension activities or events, may be considered as another means through which farmers expected to get information about improved hibiscus production technological packagesfarmers' attendance in demonstration and in field visits may be expected to influence the adoption process.

Table [4:52] chi- square tests for the association between farmers' attendence of a farm demenstration and adoption of using hand peeling tools in harvesting the crops:

Attending of field demonstration	**Rate of adoption of using hand peeling tools by Extension contact**									
	Always		Sometimes		Rarley		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Always	-	-	2	3.70%	-	-	-	-	2	1.54%
More frequent	4	20%	3	5.56	-	-	-	-	7	5.38%
sometimes	5	25%	11	20.37	1	7.69%	2	4.65%	19	14.61%
Rarely	2	10%	12	22.22	2	15.38	3	6.98%	19	14.61%
Never	9	45%	26	48.15	10	76.92	38	88.37	83	63.85
Total	20	15.38	54	41.54	13	10%	43	33.08	130	100%

F = frequency P = percent Chi- square value = 31.562 sign =0.002 df = 12

As presented in table [4: 52] that chi- square test shows that adoption of using hand peeling tool were dependent on farmers' attending of field demonstration. Demonstration farm can show farmers the effect of a change in their technology, thus encourage the adoption for this

technology. Thus the results show that there is significant association between farmers' attending demonstration and their adoption.

Table [4:53] chi-square tests for the association between extension agent contact with farmers and their adoption for some production technical package (plant spaces) :

Extension contact	**Rate of adoption plant spaces by Extension contact**							
	Yes		No		To some extent		Total	
	F	P	F	P	F	P	F	P
More frequent	12	21.43%	3	15%	8	14.81%	23	17.69
sometimes	15	26.79%	5	25%	13	24.07	23	25.38
Rarely	14	25%	5	25%	18	33.33	37	28.46
Never	15	26.79%	7	35%	15	27.78	37	28.46
Total	56	43.08%	20	15.38%	54	41.54%	130	100%

F = frequency P = percent Chi- square value = 1.992 sign =0.920 df = 6

Table [4:53] chi-square test for the association between the farmers' adoption of the recommended plant spaces and the frequent of extension agent contact with the farmers revealed that there no significant relationship at chi-square value of 1.992 and level of insignificant of 0.920, which show that, the adoption of this practice (plant spces) were not dependent on farmers contact with extension agent.

Table square [4:54] chi-square tests for the associations between extenstion agent contact with farmers and their adoption for some recommended hibiscus production practices:

Adoption of technical package	Sign	df	Chi-square value	Indicative
-seed rate	0.049	8	12.628	Significant
-sowing rate	0.462	8	5.972	Non significant
-cultivation	0.171	8	9.050	Non significant
-harvesting	0.666	8	4.079	Non significant

Table [4:54] chi-square tests for the relationship between extension agents contact with farmers and the adoption for some hibiscus production practices were found to be significant at chi-square value of 12.628 and level of significant of 0.049 for the adoption of recommended plant seed rate, while they were insignificant at chi-square values of 5.972, 9.050 and 4.079 for the practices of sowing date cultivation and harvesting date respectively at levels of non significant of 0.462, 0.171 and 0.666 respectively. The above results may agrees with the finding reported for the association between farmers' attending of extension meeting and their adoption for those technological packages by the respondents in the study area.

Participation in some Extension Event:

Farmers' participation in different extension activieis or events may be considered as an other means through which

farmers expected to get information about improved hibiscus production technical packages. In this study.Attendence of farmers field aschools (F.F.SS) and in field visits may be expected to influence the adoption process.

Table [4:55] chi-square tests for the association between famers' attending of demonstration farm and adoption of using peeling tools:

Attending of field demonstration	**Rate of adoption of using hand peeling tools by demonstration**									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Always	-	-	2	3.70%	-	-	-	-	2	1.54%
More frequent	4	20%	3	5.56	-	-	-	-	7	5.38%
sometimes	5	25%	11	20.37	1	7.69%	2	4.65%	19	14.61%
Rarely	2	10%	12	22.22	2	15.38	3	6.98%	19	14.61%
Never	9	45%	26	48.15	10	76.92	38	88.37	83	63.85
Total	20	15.38	54	41.54	13	10%	43	33.08	130	100%

F = frequency P = percent df = 12 Chi- square value = 31.562 sign =0.002

As presented in table [4:55] that chi-square test for the adoption of using hand peeling tool by attending demonstration farm were significant for chi-square value 31.562 at a level of significant of 0.002, which show that adoption of this practice (hand peeling tools) were dependent on farmers' attending of farm demonstration.

Table [4:56] chi-square test for the association between farmers' attending field demonstration and their adoption to the improve variety (Abu shankel):

Attending of field demonstration	**Rate of adoption of the improved variety Abu shankel by attending field demonstration**									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	
Always	2		-		-		-		2	
More frequent	7		-		-		-		7	
sometimes	14		3		-		2		19	
Rarely	9		3		3		4		19	
Never	12		15		4		43		83	
Total	53		21		7		49		130	

F = frequency P = percent df = 12 Chi- square value = 37.786 sign =0.000

Table [4:56] revealed that chi-square test for the relationship between farmers' attending of field demonstration and their adoption for the improved variety Abu shankel were significant for the chi-square value of 37.786 and level of highly significant 0.000, which shows that adoption of these variety (Abu shankel) were dependent on the farmers' attending for field demonstration.

Table [4:57] chi-square tests the association between farmers' attending field demonstration and adoption for the improved varieties (Abushankel, Abu Nagama and Betera):

Adoption of improve variety	Sign	df	Chi-square value	Indicative
-adoption of Abu shankel	0.000	12	12.628	Sign***
-adoption of Beter	0.002	12	5.972	Sign**
Adoption of Abu Nagma	0.009	12	9.050	Sign

Table [4:57] chi-square tests revealed the adoption of the different hibiscus varieties (Abu shankel, Betera and Abu Nagama by the respondents' attending of field demonstration were significant for chi-square values of 37,786, 31, 015 and 26.492 and level of significant of 0.000, 0.002 and 0.009 for the three varieties Abu shankel, Betera and Abu nagama respectively which Shows that adoption of these hibiscus varieties were dependent on the farmers attending on the farmers' attending field demonstration.

Table [4:58] chi-square tests for the association between the farmers' attending for field demonstration and their adoption for some production practice:

Adoption of production practice	Sign	df	Chi-square value	Indicative
Recommended plant rate spaces	0.576	8	6.635	Non Sign
Recommended seed rate	0.083	8	13.950	Non Sign
Sowing date	0.134	8	12.400	Non sign
Cultivation	0.960	8	2.542	Non sign
Harvesting date	0.008	8	26.669	Sign

Table [4:58] chi- square tests for the association between farmers' attending of field demonstration and adoption of some hibiscus technological package were found to be non significant for chi-square values of 6.635, 13,950, 12,400 and 2.542 and level of insignificant of 0.576, 0.083, 0.134 and 0.960 for the four practice which are plant spaces seed rate, sowing date and cultivation

respectively. While it was found significant for harvesting date at chi-square value 26. 669 at level of significant of 0.008 which show that the adoption of some hibiscus production practices as plant spaces, seed rate, sowing date, cultivation was not dependent on farmers' attending of field demonstration, while it were dependent on farmers' attending to filed demonstration for practice of harvesting date.

Table [4:59] chi- square tests for the association between farmers' attending field days and their adoption for some hibiscus production practices:

Adoption of production practice	Sign	df	Chi-square value	Indicative
-using hand peeling tool	0.01	9	21.712	Sign
-recommended plant spaces	0.265	6	7.650	Non Sign
- recommended seed rate	0.650	6	4.194	Sign
-recommended sowing rate	0.740	6	3.528	Non sign
-recommended cultivation	0.840	6	2.678	Non sign
Harvesting date	0.035	6	13.574	Non sign
Adoption of improved varieties	-	-	-	-
1.Abu shankel	0.000	9	34.568	Sign***
2.Betera	0.161	9	13.031	Non sign
3. Abu Nagama	0.010	9	21.806	Sign**

Table [4:59] chi- square test for the association between farmers' attending of field days and their adoption for some recommended hibiscus production practices revealed that there were significant association between farmers attending of field days and their adoption for some technical packages such as using hand peeling

tools for harvesting at recommended date, these could be at chi-square values of 21.712 and 13.574 and at level of significant of 0.01 and 0.035 respectively. Which show that these practices were dependent of farmers' attending field days also adoption of the two important varieties Abu shankel and Abu Nagama were significant at chi- square values of 34.68 and 21.806.At the levels of significantof 0.010 respectively.At the levels of significant of 0.000 and 0.010 respectively, which show that the adoption of these improved varieties were dependent on farmers' attending of field days on the other hand table [4:64] chi- square tests for the association between farmers' attending field days and the adoption and the other practice such as plant spaces, seed rate.Sowing date and cultivation were insignificant for the chi-square values 7.650, 4.194, 2.678 and 3.528 respectively and at level of insignificants of 0.285, 0.650, 0.740, and 0.650 respectively, which show that the adoption of these production technical packages were not dependent on farmers' attending of field days.

Table [4:60] chi- square tests for the association between farmers' attending F.F. Ss and their adoption for some hibiscus production technical packages:

Adoption of technical package	Sign	df	Chi-square value	Indicative
-using of hand peeling tool	0.359	12	21.712	Non Sign
-Adoption of improved varieties:				Non Sign
(i)Abu shankel	0.330	12	13.419	Non Sign
(ii)	0.010	12	26.227	Sign
(iii)	0.635	8	9.789	Non sign
-Plant spaces	0.311	8	9.379	Non sign
-Seed rate	0.333	8	9.117	Non sign
-cultivation	0.995	8	1.335	Non Sign
-Sowing date	0.147	8	12.094	Non sign
-Harvesting date	0.743	8	5.134	Non Sign

Table [4:60] chi-square tests for the association between farmers' attending F.F.Ss and their adoption for some hibiscus production technical packages shows that, the adoption for using improved variety (Bertra) were significant for chi-square value 26.227 and at level of significant of 0.010, which show that, the adoption of using this variety (Betera were dependent on farmers' attending F.F. Ss, while the adoption for the other two varieties which are Abu shankel and Abu Nagama were found to be insignificant for chi-square values 13.419 and 9.789 and at level of significant of 0.333 and 0.935 respectiviley. Which show that the adoption of these two varieties were independent on farmers' attending of F.F. Ss.

Table (4:61) Chi square test for the test of association between the farmers' contact with village development committee (V.D.C) and their adoption for using hand peeling tools.

Frequency of contact with V.D.C	Rate of adoption of using hand peeling tools by the farmers contact with (V.D.C)									
	Always		Sometimes		Rarely		Never		Total	
	F	P	F	P	F	P	F	P	F	P
Always	4	20%	9	16.67%	-	-	-	-	13	10%
More frequent	5	25%	16	29.63%	3	23.08%	6	13.95%	30	23.08%
Sometimes	8	40%	17	31.48%	7	53.85%	15	34.38%	47	36.15%
Rarely	2	10%	12	22.22%	2	15.38%	12	27.91%	28	12.54%
Never	1	5%	-	-	1	7.69%	10	23.66%	12	8.23%
Total	20	15.38%	54	41.54%	13	10%	43	33.08%	130	100%

F = frequency p = percent df = 12

Chi – square value = 30.995 sign = 0.002

Table (4:61) shows that chi – square test for the association between farmers contact with V.D.C and their adoption for using hand peeling tools, was significant for the chi – square value of 30.995 and at level of significant of 0.002 which revealed that, the adoption of using hand peeling tools was dependent on farmers contact with V.D.C.

Table (4:62) Chi – square tests for the test of association between farmers' contact with village development committee (V.D.C) and their adoption for some hibiscus technical packages: (improve varieties, plant space, seed rate ... etc.

Adoption of technical package	**Chi – square**	**df**	**Sign**	**Indicative**
1. improved variety Abushankal	39.730	12	0.000	Sign✡✡✡
2. Improved variety Betera	16.363	12	0.175	Non sign
3. Improved variety Abu Najma	31.983	12	0.001	Sign
Recommended plant space	6.373	8	0.606	Non sign
Recommended seed rate	10.930	8	0.206	Non sign
Recommended sowing date	12.125	8	0.146	Non sign
Recommended cultivation date	30.215	8	0.000	Sign✡✡✡
Recommended harvesting date	4.772	8	0.782	Non sign

Table (4:62) show that chi – square tests for the associations between farmers' contact with village development committee (V.D.C) and their adoption to some hibiscus production technical packages were significant such as adoption of using the improve varieties Abu Shankal& and Abu Najma for the chi – square values of 39.730 & 31.983 and at level of significant 0.000 and 0.001 respectively while the adoption of some other technical packages such as improve variety Abu Najma, plant spaces, seed rate, wowing date, harvesting date were found to be insignificant for the chi – square values of 16.363, 6.373, 10.930, 12.125 and 4.772 at level of insignificant of 0.175, 0.606, 0.206, 0.146 and 0.782 respectively, which revealed that the adoption of the some recommended technical packages such as improved varieties (Abu Shankal& Abu Najma, and adoption of recommended cultivation date were dependent on farmers' contact with development committee while it was not dependent for other technical packages such (adoption of improved variety Betera, adoption of plant space sowing date, seed rate ... etc.

Table (4:63) Chi – square test for the test of association between farmers' contact with other farmers and their adoption for some recommended hibiscus production technical packages:

Adoption of technical package	Chi – square	df	Sign	Indicative
Using of hand peeling tools	38.272	12	0.000	Sign✲✲✲
- Improved variety Abu Shankal	41.171	12	0.000	Sign✲✲✲
- Betera	18.456	12	0.103	non Sign
- Abu Najma	35.802	12	0.000	Sign✲✲✲
Adoption recommended technical packages:				
- Pant space	9.479	8	0.304	Non sign
- Sowing date	14.978	8	0.080	Non sign
- Cultivation date	61.256	8	0.000	Sign✲✲✲
- Harvesting date	15.767	8	0.046	Sign

Table (4:63) shows that chi – square tests for the associations between farmers' contact with the other farmers and their adoption for some hibiscus production practices that it was found to be highly significant for the adoption of some practices such as (using hand peeling, using improved varieties Abu Shankal& Abu Najma and adoption of recommended cultivation date for chi – square value of 38.272, 41.171. 35.802 & 61.265 respectively. While it was insignificant for the adoption of other practices such as adoption of some recommended practices such as plant spaces, seed rate, soil date at level of a significant of the 0.178, 0.304 and 0.080 respectively. Thus, the results indicated that adoption of

some practices such as using hand peeling tools, adoption of improved variety Abu Shankal& Abu Najma& adoption of the recommended activation date was dependents on farmers' contact with other farmers. While they were independent for other practices such as adoption of the variety Betera& adoption of plant spaces, seed rate & sowing date.

Chapter five

Summary, Conclusion and Recommendations

This chapter summarizes the study, gives summary of the objectives of the research, and summarizes the analytical methods used and comparison of these methods. Gives a summary of level of adoption and discussion of factors affecting hibiscus production technology adoption. Give recommendation for future research.

5:1 Summary of findings:

1) 130 farmers' house hold were randomly selected to represent the study sample, responses were obtained from 91 (70%) males, and 39 (30%) females, females show less exposure to answer the questionnaire, according to their responses.
2) The majority of the respondents who interviewed fall in age group over 40 years of old. there were about 27.7% fall in the age group between 41-50 years and 22.3% having an age more than 60 years of old.
3) 60% of the respondents, were pre-university level with low average years of education (4.2 years), this may be due to religious education system (Khalwa) and years of formal education before university. Only 2.3% having university level.

4) 50.8% of the respondents house hold were medium family size ranged between 7-12 members, 42.3% of the respondents households were small family size, 1-6 members. Thus, the households in the study area can depend on family labour in agricultural activities.
5) 67.3 of the respondents had 21-60 years of farm experiences, with 30.5 average years of farm experience. Thus, the respondents expected to adopt the new technology effectively.
6) The respondents in the study area attending extension activities at different levels (always, sometimes, rarely and never). Only minority 6.2% were those who always attending extension meetings 28.5% of them never attending, this may constraints the farmers to receive necessary agricultural information from arranged extension meetings.
7) There is a low ratio for training among the respondents in the study area as only 3.8% out of the total samples respondents have always attend training sessions. Thus the respondents may have a less probability for equipping with recommended agricultural technologies.

8) The majority of the respondents in the study area have low participation in many of the agricultural extension activities conducted in the study area:
   - 67.7% of them never participated in field days
   - 65.5% never participated in field visits
   - 63.8% never attended in field demonstration
   - 95.5% never attending F. F. Ss.
9) Mass media such as (radio & TV) when compared with other extension methods they have low effect on behavioural change of the respondents as 64.6% of the respondents in the study area replied that they never received any agricultural information from this media.
10) Respondents in the study area facing labour shortage during harvesting hibiscus crop, the "Nafeer system" represent as mean to solve the problem of labour shortage and the majority of respondents 83.6% depend on family labour and "Nafeer" in harvesting their hibiscus crop.
11) Most of the respondents in the study area have small farm size less than 3.1 Makhamas under hibiscus crop and 90.6% of the total respondents their farm size less than 3.1 Makhamas. The small farm sizes impede the adoption of using hand peeling tools and better hibiscus technical package.

12) 24.6% of the respondents never used hand peeling tools in harvesting hibiscus crop, also 48.5% of them believed that using of hand peeling tools need more effort compared with traditional methods. Thus, more effort were needed to increase knowledge, developing skills experiences and raising awareness of the farmers on using hand peeling tools.
13) 13.35% of the respondents, never participated in the hibiscus production association (H.P.A) this may assumed to influence farmers access to information on improved farming practices.
14) Farmers' gender as a variable was significantly associated with adoption of some hibiscus production practices such as adoption of improved varieties (Abu – Shankal, Betera& Abu Najma) at level of significance of 0.036, 0.036 & 0.039 respectively. While it was insignificantly associated with adoption of other practices such as plant spaces, seed rates, sowing date, cultivation at level of insignificant of (0.997, 0.756, 0.728 and 0.586 respectively.
15) Age as a variable associated significantly with adoption of other practices such as adoption of improved varieties Abu Shankal, Betera, Abu Najma at level of

insignificance of 0.798, 0.595 and 0.623 respectively and adoption of using hand peeling tools. At level of insignificant of 0.242.

16) There was significant association between the farmers education level and their adoption for 5ome hibiscus production technical package such as :- -using hand peeling tools at level of significant of 0.019.- -adoption of recommended cultivation date at level of significant of 0.016 .

17) There was significant association between farmers' attending extension meetings and their adoption for some production practicessuch as : - : -adoption of improved varieties Abu shankel , betera , Abu Najma at levels of significance of 0.000 , 0.000 and 0,001 respectively .

- Using hand peeling at alevel of highly significant of 0,000

18) There wassignificant association betweenfarmers' attending training sessions and their adoption of some hibiscus technological packages:-

- adoption of using hand peeling tools at high level of significant 0.000.

- adoption of the improved varieties Abu Shankel, Betera ,and Abu Najma at levels of significance of 0.001 , 0,002 and respectively .

19)farmers attending of some extension activities such as (field demonstrations ,field days ,field visits and F.F.Ss had significantly influence the adoption of some hibiscus production practicessuch as;-

-attending fielddemonstration significantly influence the adoption of improved varieties Abu Shankel , Betera and Abu Najma at levels of significant of 0.000 , 0.002 , 0,009 .respectively . and using of hand peeling tools at level of significant of 0.000.

- attending of field days significantly influence the adoption of using hand peeling tools , adoption of improved varieties Abu Shankel , Abu Najma and recommended seed rate , at level of significance of 0.010 , 0 .000 , 0.010 and 0.035 respectively.

20)Farmers' contact with (V.D.C) significantly influence the adoption of some hibiscus recommended technical packages as : - adoption of using hand peeling tools at level of significant of 0.002 , using improved varieties Abu Shankel , at level of 0.000 , Abu Najma at level of 0.001 and cultivation date at level of 0.000.

21) Farmer- to-farmer contact significantly influence the adoption of some recommended technical packages at highly significant 0.000 which were using hand peeling tools , cultivation date , adoption of the improved varieties Abu Shankel and Abu Najma .

5:2 Conclusion:

North Kordofan State (N.K.S) depend on traditional rain fed sub-sector through shifting cultivation for producing cash crops and food grains like (millet, sorghum, sesame and ground nuts &karkadeh, …etc) which are characterized by low productivity. Farmers were faced with many problems, associated with lack of adoptive technologies, lack of improve varieties, …etc.

Roselle (Hibiscus sabdariffa) or karkadeh is one of the promising cash crops particularly for dry areas, resistant to drought.

Farmers in N.K.S in three localities Um Ruwaba, Rashad&Sheikan have an opportunity and access to effective initiatives implemented by Non-governmental organization which was practical Action (P.A) in partnership with Key community based organization EidelNiel NGO, operates in N.K.S with the objectives of improving farmer livelihood, focusing in changing the practices of hibiscus cultivation and harvesting.

Despite the efforts made P.A and other NGOs as a diffusion agency to accelerate the adoption of some recommended technological packages in project area, some of these packages were not widely adopted, consequently farmers initiative to use them in the following years was low, the author suggest that low

rate adoption might be attributed to the lack of effective training on skills necessary to adopt the recommended hibiscus production technologies, lack of willingness to promote the suggested innovations among the farmers in the project area. Also the method of harvesting is negatively affecting the quality of the products.

Farmers needs to produce more & higher quality of hibiscus products, and so required better extension services, useful linkages and relationship between market chain players such as farmers, local leaders …etc and whole sellers.

The present study was designed to assess the impact of some used extension methods used in the project areas, that being directed to link up the knowledge about hibiscus improved varieties , and the adoptive harvesting techniques to improve the crop production and it's quality . Socio –economic factors as farmer's age , education level ,farm size , family size and farmer's farm experiences ,beside other extension communication variables (field visits , farm demonstrations and field days) were emerged as principal factors affecting of these hibiscus technical packages .

Variables found to be significant factors affecting adoption of improved varieties (Abu Shankel , Betera and Abu Najma)and using of and peeling tools includes: education level , family size , farm size ,farm experience , but not only these factors ,

rather how extension services would be expected . Thus, results of this study indicated that extension communication factors found to be important as they make farmers access to information from research and training in hibiscus production technologies .another important factor was farmer's participations in extension activities , adoption was enhanced more through farmer having hand –on experiences than would be their own indigenous knowledge .

5:3 Recommendations:

1- Farmers must attend & participate in extension activities; field demonstration, F.F.Ss field visits to get necessary information concerning hibiscus production technologies.
2- Provision of extension services by local extensionist to build skills & knowledge of individual farmer.
3- Encourage farmers to sustain themselves to provide quality seeds by extending technical assistance on multiplying the quality seeds and redistribute the produced seeds to other farmers.
4- Community training centres need to be constructed, supported with audio-visual system to train villagers on crop production improved technologies at village level.

5- Farmers organizations and producers co-operatives or village developing committees must be strengthened to provide a wide range of activities and support.

6- There in a need to involve NGOs, as well as ministry of agriculture, at the state level in developing packages of demonstration, training that result in better technology adoption.

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إستمارة إسبيان رقم (1)

أثربعضوسائلالاتصالفىتبنىالمزارعينلبعضالحزمالخاصةبانتاجمحصولالكركدى - بولايةشمالكردفان

❖ **عيمغنمء** (Locality):..... **عيفءفظمء** (District):.....**عيفلمء** (Village): .....

❖ **نقظمء** (Name): ..... **كنمء** (Sex):.....

❖ **فنكمء** (Age)-:

1) عشرون سنه و ☐ 2) 21 – 30س ☐

3) 31 – 40سنة ☐ 4) 41- 50س ☐

5) 51- 60سنه ☐ 6) أكثرمن 60 سنه ☐

❖ **ينيمكءمءينءقنمء** (Educational Level):-

1) أمي (illiterate) ☐ 2) خلوة (Khaluwa) ☐

ب) سنوات الدراسة النظامية قبل الجامعة..... سنة

جامعى ☐ فوق الجامعى ☐

❖ **كف عف نم م ين نقم عم غ فم ء** (Annual in come):.....جنيه سوداني

❖ **ي ك ف ف نم عم نك م ع ق ف عذ ني ل ك ف عف نم م ع ي م نك م ع ف ء غ م ء**

(ع عن نقم عء):.....سنه

❖ **ع ف ق ظم ء ف ع ف ل ظ ف ف ك** (Family Size) :-

1) 1 – 6 ☐ 2) 7 ☐ فرد 3) أكثر ☐ ذلك

❖ مشاركة أفراد الأسرة في العمل الزراعي.....

❖ **ي ك ف ف نم عم نك م م ن ن ل ف ل ع نم ع ف ق ظم ء ف ع ف ل ظ ف ف ك**

:.....

أفـــراد الأسرة	العـــدد	طبيعة المشاركـــة في العمل الزراعي
الزوجات		
الابناء		
البنات		
الأخوان		
الأخوات		
آخرون		

❖ **ع ك ع ف ف م ع ع ن ي ل ق ف ع ذ ي ي ع م ع ق ف ظ م ع ع ك ف ع ف نم ع ع ل ع م ك** :

1) مالك 2) مستأجر 3) مشاركة
4) غيرذلك ....

❖ عيعمنمعيفمفممعيغعننفعغعظعكفعفنمعلعمك؟

غيرعضوعضو
عضوتنفيذى مسئول مكتب

❖ نمعنينفننمعمعمغعلمعغنمعميقعغنمعععنعكعففعذليعمعيممعغعقنمعففغ

ينفننيقع (2010/2011ذ)؟

المساحةالمزروعةعام 2010م ....مخمس

المساحةالمزروعةعام 2011م .... مخمس

❖ نينفننمعمغيفمفممعمنقغنعنعكعففعذليعمعغعقنمعففغ:

نقننمء	(بالمخمس)
الموسم 2010م	
الموسم 2011م	

❖ علاقة المزارع باتحاد منتجي الكركدي بالولاية:

غير ع عضو
عضو مسئول

❖ إذا كنـ ر عضو باتحاد الكركدي بالولاية حدد ؟

....

....

....

- ❖ نيذقنمعمعمغيفمفممعننممنقغنعيغعغنظكقنعذ2011/2010ذ

1) متوسطالإنتاجية ....قنطار / مخمسللعام 2010م

2) متوسط .... قنطار / مخمسللعام 2011م

- ❖ كعفقننيمكعمقغيفمعفظعكممنيلعننعنيفمفممعمنقغنع؟

1) مجزي جداً 2) مجزي 3) مجزي لحدماغيرمجزي

- ❖ هلي لديك معرفة بالأصناف المحسنة لمحصول الكركدي والتي تم إدخالها لمنطقتكم

نعـــم لا

- ❖ هل تحصلت على أي من هذه الأصناف المحسنة لمحصول الكركدي

إذا كانت الاجابة نعم ، لأي مدى كانت إستفادتك من زراعة الأصناف المحسنة لمحصول الكركدي؟

أ- فائدة كبيرة جداً ب- فائدة كبيرة

ج- فائدة متوسطة د- فائدة ضعيفة

هـــ- لا فائدة تذكر

إذا كانت الاجابة (لا) هل لديك الرغبة في الحصول على هذه الأصناف المحسنة

نعـــم لا

- **يعغعليفكممفمن بحوفمفممعمنقغنمنقغنمععنيكمعنكعغنمكنمفلنععمن**

عنفء :

1) متوفرجداً ☐ 2) متوفرة ☐
3)متوفرلحدما ☐ 4) غيرمتوفر ☐

- **منقغنمعكعففعقعغمعنقغنمعينعلعمعيمكمنقغممفقننعذ :**

1) وزارةالزراعة ☐ 2) السوقالمحلي ☐

3)المزارعيناالآخرين ☐ 4) منالمنظماتالطوعية ☐

5) لا أحصل عليها ☐

ـ إذا كنت لم تتحصل على الأصناف المحسنة لمحصول الكركدي فان ذلك يعني:

1. ليست لديك معرفة بالأصناف المحسنة. ☐
2. الأصناف المحسنة لا تحقق فائدة تذكر. ☐
3. أسباب أخرى أذكرها:

....
....
....
....

ـ مدى الاتصال بمصدر المعلومات الزراعية التالية، ومدى الاستفادة منها في العمل الزراعي

المصدر	درجة الاتصال					مدى الاستفادة			
	دائماً	كثيراً	احياناً	نادراً	لا اطلاقاً	كبيرة جداً	كبيرة	متوسطة	ضعيفه
الاجتماعات الارشادية									
الدورات التدريبية									
المرشد الزراعي									
عضو لجنة التنمية									
العمدة او شيخ القرية									
المزارعين الاخرين									
الحقول الايضاحية									
الزيارات الحقلية									
أيام الحقل									
مدارس المزارعين الحقلية									
اخرى اذكرها									

*** الزيارات التي يُحظى بها المزارع خلال الموسم الزراعي منقبل المرشد الزراعي:ـ**

1- أكثر من مرة في الاسبوع ☐ 2- أسبوعياً ☐

3- كل أسبوعين ☐ 4- مرة كل شهر ☐

5- مرة خلال الموسم ☐ 6- لم يزرني قط ☐

❖ **عنليعكعءكفعفنمعذعفعمظيفذنمنقغنمعغعءنظعءقعغ؟**

أي بذور العيناتالمحسنةالخاصةتستخدمها في زراعة محصول الكركدي:

	لها			
أبوشنكل				
البيترا				
عينةأخريأذكرها				

فيفغمعلعنقظمعقكعفعءعغظعءقعغمعيملغمعءفعذعمعقكعيلمفعةظنظكفعفنمله

فيع

نعملحد ما ☐ لا ☐

❖ **فيعفعغعمعنفنمغنبلمعفعقظممفعفكعقظبمكعنظمن**

نعملحد ما ☐ لا ☐

مدى التزام المزارع ببعض الممارسات الموصى بها لانتاج محصول الكركدى

نوع الممارسة	نعم	لا	لحد ما
مسافاتالزراعة			
عددالبذوربالحفرة			
العزيقومراته			
مواعيدالزراعة			
مواعيد الحصاد			

* متى قمت بحصاد محصولك **نييقعنمعنينقننمعيليفمفممعمنقغنمءكعفكلعننذ**

2011/2010**ذ**:.....

.....

❖ ما **يفمفممعمنقغنفعقغيلعنءعنكعقظيعمعمعنكمعكنذ؟**

1) الأسرةالإيجارب النفير ☐

أخري (أذكرها).....

* هل تذكر الفترة بالتحديد التي أدخلت فيها آلة الحصاد اليدوي (القرقارة) إلى قريتكم؟

متى ....وبواسطة من

....

* تقييمك لآلـــة الحصاد اليدوي (القرقارة) عند إستخدامها لتقشير المحصول من حيث توفير الوقت والجهد.

ة جداً ☐ ☐ مهمة ل ☐ غير ☐

❖ **كفعفنمعنفغعقيمن** آلة الحصاد اليدوي (**عفعلفلمع**)

فيفمفمعمنقغنفعقغيل

1) ☐ 2) أ☐ دراً ☐

لاأستخدمهاإطل☐

❖ **عمطنفغعقعمعنمعفظ**الحصاد اليدوي (القرقارة) في **ينكيعفنلممنقغنفعقغ** :

1. الآلةبطيئةوغيرمناسبةلعمليةالحصاد ☐
2. الآلةغيرمتوفرةبالنسبةلك ☐
3. الآلةمتوفرةولكننيلاأجيدإستعمالها ☐
4. الآلةمتوفرةولاأحبذإستعمالها ☐
5. أسباب أخري ☐

أذكرها..

❖ نفغعقعنمعفظآلة الحصاد اليدوي (القرقارة) في حصاد محصولك فهذا يعني:

1. الآلةسريعةومناسبةلعمليةالحصاد ☐
2. الآلةمتوفرةوسهلةالإستخدام ☐
3. الآلةتضمنمحصولجيدبالمواصفاتالمطلوبة ☐
4. الحصول على القرقارة سهل وهى متاحه ☐

5. أسبابأخرى (يذكره)

:.....

مدى الجهد الذى تبذله في الحصاد عند إستخدام (القرقارة) مقارنة بالطريقة اليدوية التقليدية:

أقل بكثير ☐ جهد أقل ☐ نفس ☐

جهد أكبر ☐ لاينطبق السؤال ☐

الارباح التنى حققتها من زراعة العينات المحسنه مقا رنه بالعينات التقليدية :ـ

كبيرة جداً ☐ كبيرة ☐ متوسطة ☐

نفس الدخل ☐ ضعيفة ☐ لا ينطبق ☐

اذا كنت لاتلتزم بزراعه العينات المحسنة لمحصول الكركدى فهذا يعني:

السبب	اوافق جداً	اوافق	اوافق لحد ما	لا اوافق	لا اوافق اطلاقاً
عدم توفر التقاوى المحسنه					
غير مقتنع باهمية التقاوى المحسنة					
ارتفاع اسعار التقاوى المحسنة					
التقاوى لاتحقق فائدة					
اسباب اخرى تذكر					

أين تقوم بتسويق انتاجك من محصول الكركدى ؟

سوق القرية ☐ الاسواق المجاورة ☐

السوق بالمحلية ☐ السوق المركزى بالولاية ☐

عبر اتحاد منتجى الكركدى ☐ اسواق اخرى ☐

*** مدى مساهمة المنظمات الطوعية (براكتكل أكشن أو منظمة إيد النيل) في تحسين إنتاجية محصول الكركدي بمنطقتكم فيما يتعلق بالآتي:ـ**

نوع المساهمة	مدى ما تقدمه من مساهمة أو مساعدة				
	كبيرة جداً	كبيرة	متوسطة	لحد ما	ضعيفة
- توفير التقاوى المحسنة					
- توفير آلة الحصاد (القرقارة)					
- التسويق وتركيز الأسعار					
- أخرى أذكرها					

- هل لديك مقترحات لتطوير إنتاج محصول الكركدي بمنطقتكم ؟ أذكرها

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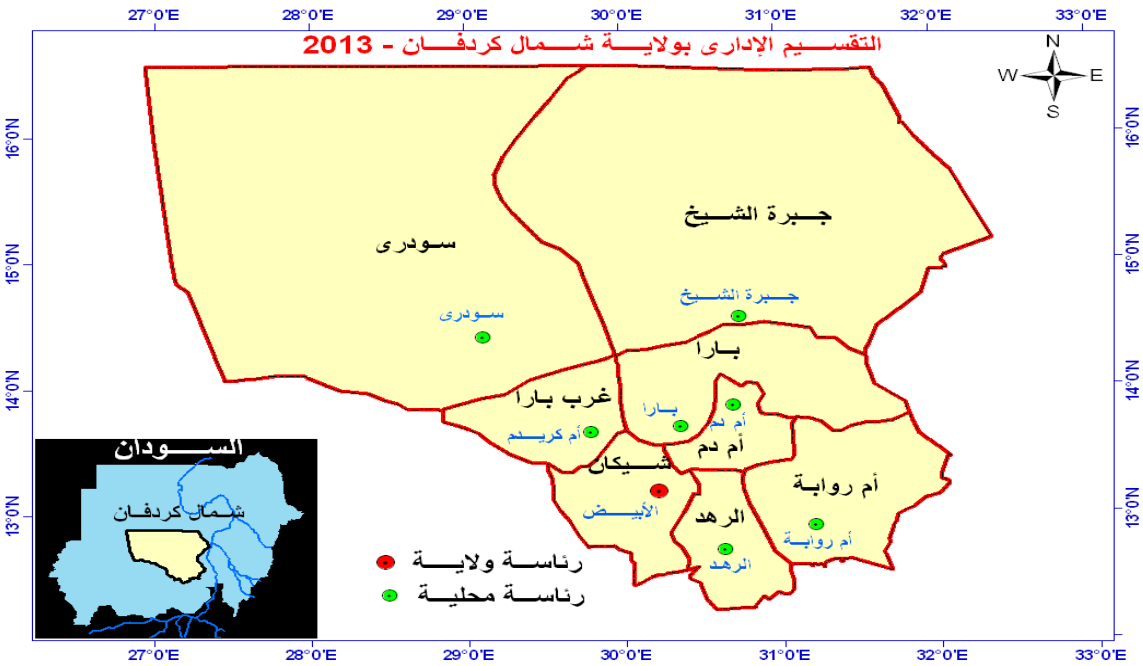
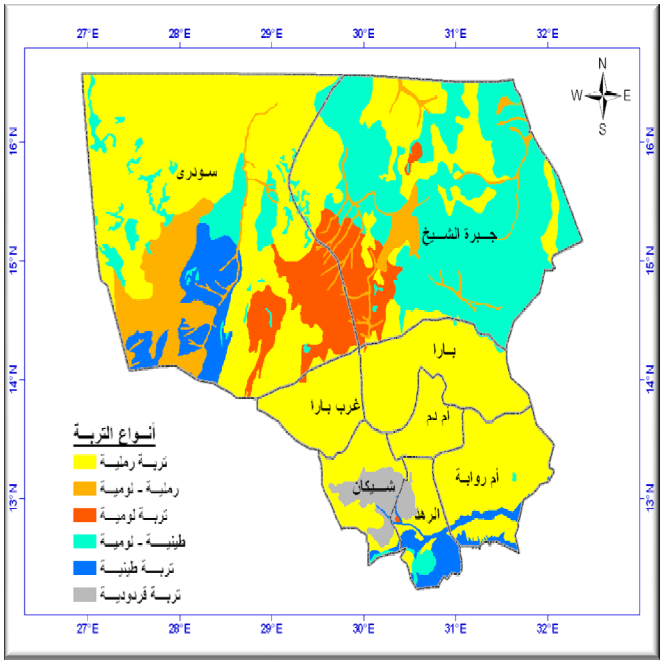
خريطة ولاية شمال كردفان بمحلياتها



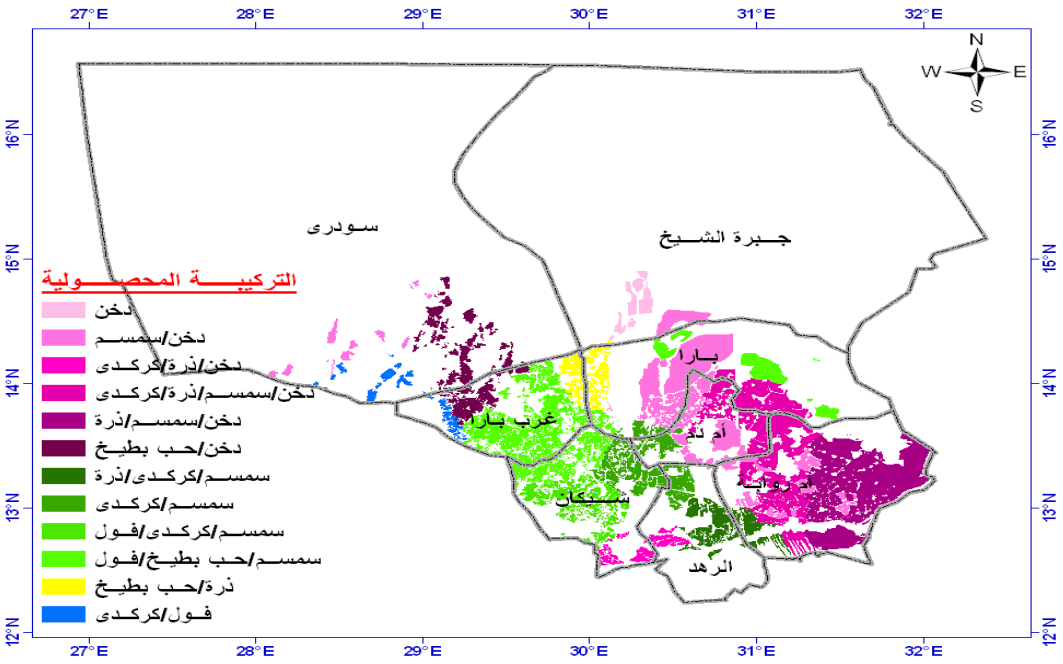
التربة

يمكن تقسيم تربة الولاية الى مجموعتين:

1. مجموعة ترب ذات قوام خشن (ترب رملية وترب القيزان) حيث تغطى الجزء الاكبر من الولاية، ما يعادل87,5%.
2. مجموعة ترب ذات قوام ناعم وهى أراضي القردود وبعض الجيوب الطينية المبعثرة بما يعادل 12,5% من مساحة الولاية، تربة القردود تعتبر البديل الاستراتيجى للاراضى الرملية.



ولاية شمال كردفان – التركيبة المحصولية



الموقع الجغرافي و المساحة و السكان

تقع ولاية شمال كردفان فى وسط السودان وتحدها ولايات الشمالية والخرطوم شمالاً، والنيل الأبيض شرقاً وجنوب ، وغرب كردفان جنوباً، وولايات دارفور غرباً.

تبلغ مساحة الولاية حوالى 195,280 كيلومتراً مربعاً (48 مليون فدان) وتقدر الأراضي الصالحة للزراعة والرعى بحوالى (42 مليون فدان)

يبلغ عدد سكان الولاية حوالى 1,98 مليون نسمة حسب تقديرات الإحصاء السكانى القومي للعام 2008م حيث يمثل سكان الريف (68,1 %) من جملة السكان