CHAPTER ONE

1. INTRODUCTION

1.1 Background

Nepal is generally described as a country of diverse casts and creeds, diverse climate and phsiography, diverse flora and fauna, and above all diverse mountain ecosystem and habitats. However, Nepal is largely homogenous in terms of its people being the farmer. Most people make their living through subsistence farming and over 65% of farming system is dependent upon monsoon. As such Nepal's environment is largely determined by the dynamics of men, mountains and the monsoon (Shrestha and Shrestha, 2004).

Being an agricultural country where 65 percent of the economically active populations depend on agriculture for their livelihood. It is estimated that about 22 percent (3.3 million ha) of the total area is cultivated to support a 27 million population. The agriculture sector accounts for nearly 32% in GDP and crop production alone contributes about 25% of AGDP of Nepal and therefore, the seed sector plays a significant role in sustainable development and welfare of the rural people (MOAC, 2008/09).

The agro-ecological and cultural diversity of Nepal provides the potential to produce a range of food and horticultural crops; many with a high value. In horticultural crops, vegetable crops occupy major area of commercial production as a cash crop. Due to the increasing awareness of fresh vegetable nutritive value and the income generating commodity, vegetable farming has been flourishing in the city vicinity, district headquarters and road corridors of Nepal. It is reported that the area under fresh vegetables increased from 82000 ha in 2031/32 to 225154 ha in 2065/66 and production of fresh vegetables also rose significantly from 135000 mt to 2754406 mt in (MOAC, 2008/09).

It is strongly believed that the area under fresh vegetables, the number of fresh vegetable growers and the impact on income generation from off-season fresh vegetable farming will certainly increase in future and this will undoubtedly be helpful in reducing poverty and rural employment (Budathoki & et al, 2001). As a result of the increased area under fresh vegetables, the production and consumption of vegetables seed has also been increasing. New production areas, particularly in accessible remote villages are being explored and expanded through Government and various private sectors. This occupation has been becoming one of the sources of income for farmers of remote areas farmers.

Budathoki and Regmi (1995) reported that 77 varieties of 31 vegetable crops used to be grown for small or large-scale production in the country. They further stated that out of those varieties, seeds for 39.3% were entirely produced in the country, for 21.5% were completely imported and for 39.3% were partially imported from various countries. Vegetable Development Directorate (VDD) has reported the total requirement of vegetable seed in Nepal is about 1900 mt in 2010 and organized internal production is about 45% and others fulfilled by import and informal production by the farmers.

Rukum is one of the major vegetable seed producing districts of Nepal. It has about 28 years of commercial vegetable seed producing history. In FY 2057/58 B.S. this district has produced about 170 mt vegetable seeds (DADO, 2008), which was about 13% of the total country production in the same year. The production trend shows decreasing after this year and it indicates that of conflict effect. In 2063 B.S, the total seed produced was about 64 mt and in monetary term which roughly gives about Rs.15 millions of worth for the district. So vegetable seed is directly related with the income opportunity then after support in rural poverty reduction for the farmers of Rukum. Since the commodity pursue the high value and low volume category as Agriculture Perspective Plan (1995) stated it as a high value commodity for remote districts.

For its long history of vegetable seed production, Rukum needs to be studied for its economic and social impact on livelihood of the farmers. This study has been designed to study the overall impact on poverty reduction through the vegetable seed business in Rukum district.

1.2 Objectives

The general objective of this study was to assess the role of commercial vegetable seed production in poverty reduction of the farmers in Rukum district. The specific objectives of this study were to:

- study the production status of traditional crop (wheat) and major vegetable seed crops radish and onion and find out the cost benefit ratio.
- recommend the farmers about the comparative advantage over traditional crops of other potential pockets and
- ➤ asses the role of vegetable seed crop over poverty reduction.

1.3 Statement of the Problem

Nepal has to achieve higher production of vegetables through increased productivity, as there is less possibility of bringing additional land under cultivation. The use of locally produced improved seeds of high-yielding varieties is expected to increase the production. The climatic condition of the country favors to produce all types of vegetable seeds from terai to inner Himalayan zones of the country.

It has been estimated that Nepal needs about 1900 mt (VDD, 2010) of vegetable seeds per year and the domestic production has met about 45 percent of this requirement. Despite the fact that Nepal is importing vegetable seeds from abroad, there is a significant quantity exported as well. These observed evidences show that Nepal produced vegetable seeds have good market.

Due to its topographical set-up, and availability of various agro-ecological zones and distinctly varied micro-climates within short distances, Nepal has immense potential in vegetable seed production. Since vegetable seed is one of the major high value commodity of rural part of the country like Rukum. The production policy has prioritized it as an income generating and high labor consuming activity. So that it has potentiality in commercialization agricultural activity and it ultimately provides job opportunity and support in poverty reduction in the remote rural part of the country.

Rukum is one of the major vegetable seed producing districts of the country. About 800 families are directly involved in this occupation (SVSPC, 2010). According to District Agriculture Office about 23 farmer groups are organized for seed production. Some group members are following contract seed production method with the Seed Companies like SEAN Seed Support Centre. Since the long seed production history of the district should have very strong seed production mechanism, but the situation of production, marketing as well as the organizational set up seems underdeveloped or primitive.

The production trend indicates declination of the growth from 170 mt in FY 2057/58 to 45 mt of FY 2064/65 production (DADO, 2008). The effect of conflict during this period is predictable but this is not only the solo reason for declination in production. The other reasons may have governed the major role in overall declining situation of this business. There is only one vegetable seed promotion cooperative in the district. Contract system of seed production is not functional. Some farmers are practicing contract system but the business is not faithful.

Despite all these situations the vegetable seed business in Rukum has been getting priority as a commercial agricultural business. Since the seed production program has almost three decades of history; more than 500 farmers are trained; seed traders have also gained experiences; on an average every year the earning from seed business is about 10 to 15 million rupees (DADO, 2008) and technical and other investment on this business should be in consideration to promote and support the agricultural business in Rukum. So this study has

been designed to analyze the role of vegetable seed business in terms of earning which ultimate has a role in poverty reduction or not.

Farmers are growing vegetable seed as a commercial commodity; the production process has already been crossed two decades of time but the real situation of the area in term of economic validity and its impact on poverty reduction process has not been assessed so this study has been designed to assess the problem behind vegetable seed production and its role on poverty.

1.4 Limitation of the study

The study could not cover all the vegetable seed producing pockets of Rukum. Due to time and economic resources it was not possible to cover all the area. There were other important vegetable seed crops like cauliflower, peas, rayo, cress but this study could cover only two radish and onion. Similarly there were other traditional crops like maize which also needs to be checked the comparative advantage with vegetable seed crops but it was limited in the study.

The study could not cover the traders or seed companies who are making contract or doing personal business with the seed producers. It would be more useful to assess the quality of seed farmers disposing to the traders and marketing problems prevailing in both sides. It was limited to familiar with the previous works of this nature so it was difficult to review the relevant literature of such specific studies.

1.5 Organization of the Study

The organization of the study has been arranged in six different chapters. The cover page, recommendation letter, approval letter, acknowledgements, table of contents, list of tables, figures, acronyms/ abbreviations and abstract has been given place before the chapter begins. The background, objectives, statement of problem, limitation and the organization of the study are included in chapter first as an introductory chapter. The literature review part has been covered in second chapter. The third chapter includes the introduction of the study area. The overall scenario of the district has been tried to cover in this chapter. Research methodology includes site selection, selection of farmers, collection of primary and secondary information and data analysis and report preparation has been addressed in chapter four. Chapter five covers all the aspects of result findings and discussion. Summery, conclusion and recommendation is in the sixth chapter of the thesis. In the last part as index, reference material list and annex I-III has been included.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Background

Seed is undeniably the most essential crucial and viable input in agriculture. With a built-in-genetic potential, good quality seed plays a catalytic role in boosting crop production and attaining sustained growth in agriculture production. Therefore, it is crucial to ensure greater use of good quality seeds of superior varieties in the country along with other essential inputs. Realizing this, Government of Nepal has been paying considerable attention to the development of the seed. Major components of the national seed program encompassing varietal development, seed production, quality control and marketing have been developed (Shrestha et.al. 2001).

Formal seed quality control activities i.e. seed testing, certification and seed legislation; can contribute to the stable and systematic development of a program with emphasis on quality. However, implementation of these measures is dependent on the phase of seed sector development within a country.

In Nepal, seed testing activities were initiated in the government sector in the early sixties. The first seed testing laboratory was set up in Singh Durbar under the Department of Agriculture (DoA) with the objective of distributing quality tested seed to farmers from the government farms/centers. It became accredited to the International Seed Testing Association (ISTA) in 1964.

Likewise, systematic seed production and certification started in the early seventies under DOA with the objective of assuring genetic purity along with physical attributes, using foundation seed of wheat procured from India. Since then, formal quality labelled foundation and certified seeds have been produced under the certification scheme in the country itself. Subsequently another category of seed was introduced, i.e. improved seed with information on minimum quality as regards purity and germination, with test date, provided on a yellow tag. This category was added to meet the demand for quality seed and has been mainly confined to cereals. The private sector has yet to enter into the formal quality control system though the existing act makes equal provision for the private sector.

Considering the entry of the private sector, especially into the vegetable seed business, seed legislation was conceptualized in the eighties to develop the seed industry, to make available high quality seed for increased production and to protect the seed user and seed

seller from fraudulent practices. The Seed Act came into existence in 1988 and the Regulations in 1997, almost ten years later. Subsequently, MOAC, with the advice of the National Seed Board (NSB), has formulated a National Seed Policy, 2056 (1999), in compliance with the Seed Act and Regulations and the ongoing seed program. The main goal is to develop public-private sector commercial seed industry that will create a regular delivery system to ensure easy access for farmers to quality seed of improved recommended varieties even in the more inaccessible remote villages (Shrestha et.al, 2001).

2.2 Review of Seed Sector Development by Plan Periods

A. The First Five-Year Plan (1956 to 1960)

Seed programs began in Nepal right in the First Plan Period in the Department of Agriculture (DOA) established under the Ministry of Agriculture. The main objective of the department was to introduce new improved varieties of cereal crops and to promote and assist farmers on improved seed production and dissemination. The important achievement during this period was the introduction of new improved seeds of rice, wheat and maize within the rural development program.

B. The Second Three Year Plan (1962-1965)

In this three years plan period, both seeds and chemical fertilizers were extensively tested in Nepal with the USAID funded Food Technology Project and the FAO funded Agricultural Project. The use of improved seeds and chemical fertilizers was adopted by farmers immediately as the impacts were easily visible and productivity increased by more than fifty percent. The government also implemented a massive "Land Reform Program" and the seed program was integrated into the land reform program. A total of about 542 cooperatives were reportedly organized during the plan period to distribute seeds to the farmers, whilst a cooperative bank was established in 1964 to finance cooperatives and farmers to produce seeds and other inputs for the farmers' productive use.

C. The Third Five Year Plan (1966 to 1970)

During this period, government introduced a large number of improved varieties of rice, wheat and maize through the Food Technology Project. The seeds of Mexican wheat varieties, IRRI rice varieties and Guatemalan Maize varieties were suitable for Nepalese conditions and farmers adopted them immediately. To meet the immediate demand of the farmers, government initiated a massive seed multiplication program on its farms and stations. Improved seeds of these new crop varieties were multiplied and distributed to farmers along

with chemical fertilizers through the Agricultural Inputs Corporation, but the interests of the private sector was not entertained.

D. The Fourth Five Year Plan (1971 to 1975)

In this plan period it was found that the demand for seed of Mexican wheat varieties and IRRI rice varieties was high and so the seed multiplication program was extended in all the newly established five development regions of Nepal with processing and storage facilities at Agriculture Input Corporation (AIC). Government also launched the Intensive Agricultural Development Program in 28 districts and gave priority to seed distribution. Therefore, cereal seed multiplication programs in farmers' fields were initiated. District Agriculture Development Offices were opened and seeds of these new varieties were demonstrated, but again the private sector received no encouragement.

E. The Fifth Five Year Plan (1976 to 1980)

The Integrated Cereals Project funded by USAID was launched for the massive expansion of new crop varieties and other technologies to suit the various cropping patterns all over Nepal. This helped both in increasing the cropping intensity as well as in the adaptation of new crop varieties and technologies. During 1976/77, contract seed production for Radish was started at Dadhikot, Bhaktapur. In 1979, the Vegetable Seed Production Project funded by FAO/SDC was initiated for a systematic vegetable seed production program. During the same period Hill Agriculture Development Project (HADP) also supported a seed production program in the hills and mountains. Further, government launched the Sajha Prgram (Cooperative Program), in which seed distribution through Sajha was prioritized and the seed multiplication program of AIC was strengthened and expanded.

F. The Sixth Five Year Plan (1981 to 1985)

In 1981, government launched a crop intensification program in 20 terai districts with an expanded seed multiplication program in farmers' field. A seed multiplication program was also initiated at private sector level. During the period, HMGN/AIC launched the Seed Production and Input Storage Project funded by USAID, which established 31 Mini Seed Houses in hill districts for seed production and processing. A small amount of Radish and wheat seeds were also exported to Bangladesh in 1981 through AIC. But AIC had no real interest in seed exports and so there was a need for the private sector to export seeds to India and Bangladesh.

G. The Seventh Five Year Plan (1986 to 1990)

During Seventh Five Year plan Period, a vegetable seed production program was initiated by private sector with the main objective of exporting radish, cauliflower and onion seeds to Bangladesh and India. A large number of vegetable seed producers were trained in quality seed production as well as in home-based seed grading. This program not only encouraged the private sector to export but also to supply the domestic markets. A large number of seed entrepreneurs became established and the Seed Entrepreneur's Association of Nepal (SEAN, 1989) was formed with a boost to vegetable seed production in the hills.

H. The Eight Five Year Plan (1992 to 1996)

In this period, the priority was given to the promotion of vegetable seed production to encourage seed entrepreneurs to initiate seed export to India and Bangladesh. However, the export markets were limited as no efforts were made for the exploitation of new markets. Government revitalized the Agricultural Inputs Production and Marketing program, where the private sector was allowed to play the major role in input delivery to farmers through importation. This the private sector to participate in input delivery, especially in respect of agro pesticides, chemical fertilizers and seeds, with the establishment of Agro-vets. However, this again did not encourage export promotion, but rather encouraged importation.

I. The Ninth Five Year Plan (1997 to 2001)

In this period, the priority was given to the marketing of high value crops such as vegetable seeds. By 1997, more than 200 private seed entrepreneurs/traders/dealers had been established. However, most Agro-vets are surviving with the dealership of agro-pesticides rather than with seeds

2.3 Government Seed Policy

The Government Seed Policy encompasses seven aspects of the seed industry and also biotechnology, all of which are outlined below:

A. Variety development and maintenance

Private sector will also have opportunities for the development of a variety; in this situation the private sector monopoly will be ended.

B. Seed multiplication

Nepal Seed Board will make a program and plan the supply of Nucleus Seed, Breeder Seeds, Foundation Seeds and Certified Seeds in cooperation with NARC, AIC and the private sector.

B. Quality Control

Quality control will be carried out through certification and truthful labeling (quality declared seed).

C. Increased Involvement of Private Sector

The developing of appropriate policies and regulations to facilitate private sector involvement in foundation certified and improved seed production and in the seed trade generally.

D. Seed Supply

There will be a buffer stock of seed at the national level, which may be utilized under conditions of natural calamity.

E. Continuity of Seed Supply

In remote areas, seed supply will be expanded in coordination with private producers and traders by giving some support.

F. Institutional Strengthening

This will be fulfilled by the strengthening of the National Seed Board Secretariat, and establishment of non-governmental laboratories, besides including institutional management in the seed contracting system whilst the semi-government agency involved in seed will be commercialized.

G. Bio-Technology

Advances in seed related technology have been made and are being utilized around the world. Therefore research and studies on biotechnology, genetic engineering, GMO, transgenic plants and tissue culture will proceed in Nepal also but bio-safety regulations will be prepared and implemented for the sake of general public.

2.4 Seed Legislation

A. Seed Act (1998)

The Seed Act, 1998 is the general Act on Seed Legislation and, with few exceptions, is not restrictive. It is brief document, which allows regulations to be made to deal with its enforcement (Shrestha et.al, 2001). The intention of the Act, as made clear in the preamble, is to make available high quality seed in a well organized manner for increased crop production and to undertake matters connected therewith, such as seed multiplication, processing and quality testing of seed.

Silent Features of the Present Seed Act:

In brief, they are as follows:

-) It shall come into force for specified areas from a specified date by notification in Nepal Rajpatra (Nepal Gazette).
-) It provides the definition of terms relevant to seed production and quality control.
-) It sanctions the formations of a National Seed Board (NSB) to create and implement policy and advice government, with the Secretary of MOAC as chairman and another twelve members, of which two are seed entrepreneurs nominated by HMG and the rest are mainly from public sector agricultural organizations. The composition of the Board may be changed by notification in the Nepal Rajpatra and the Board may invite experts to meetings as observers. The Board is authorized to form sub-committees as prescribed. The duties of the Board are:
 - o Advising HMG/N on formulating policy
 - o Co-coordinating public and private sector seed production and distribution
 - o Encouraging private sector investment in seed enterprises
 - Regulating quality in private and public sector production
 - o Approving the releasing and registering of new varieties
 - Verifying distinctness, uniformity and stability (DUS) of new varieties and granting ownership rights to breeders
 - Prescribing quality standards
 - o Promoting acceptance of quality standards, both National and International.
-) It establishes a Seed Certification Agency to set conditions for certification and to issue certificates.

-) It sanctions a central seed-testing laboratory to be established to test seed and to supervise other public laboratories. The government may also authorize non-government laboratories to carry out seed testing under prescribed terms and conditions.
- J It governs seed quality. It places restriction on seed of "notified" crops or varieties. This allows HMGN, in consultation with the Board, to prescribe minimum limits of germination and purity along with labeling of containers, and to ban the sale of seed that does not meet the specified standard. In addition, varieties may be notified for specific areas only and retail restrictions are placed in areas other than those notified. The restrictions also require permission for import or export seed of notified crops of varieties, with the exception of an organization established for that specific purpose. Restriction is placed on seed treated with toxic chemicals, which may not be sold other than for agricultural use. The Act empowers HMGN to appoint seed crop inspectors and seed analysts and also allows for recognition of foreign agencies for seed testing and certification.
-) It sets penalties in the form of fines and places the responsibility for prosecution for breaches of the Act with seeds inspectors. The Act empowers the designated officer handling the case to adjudicate in cases relating to the Act.

2.5 Review of Government Policy on Seed Sector Development

Before democracy in 1950, government were notable to recognize the value of quality seeds, even though there were many successful and efficiently operated and managed seed multiplication programs, and so there were no specific policies on seed sector development. With the government policies o nationalization, control mechanisms and limited participation of the private sector during the 1950's, 1960's, 1970's, and 1980's the government relied heavily on government owned corporations like AIC for seed sector development, which damaged both local initiatives as well as discouraged private sector investment in the seed sector.

After the restoration of democracy in 1990, the attitude of HMGN was forced to change for democratic reasons and it stated its willingness to promote the private sector's role in input procurement and delivery in accordance with its democratic values and principles. But government has not been able to come out of the AIC in the seed sector. Seed sector development on the basis of comparative advantage and export potentials has not happened as it is not defined and simplified by the Acts, Rules and Regulations of HMGN. The prominent

policy documents that affect seed sector development are Industry Policy of 1992; Foreign Investment and One Window Policy of 1992; The Industrial Enterprise Act of 1992; The Foreign Investment and Technology Transfer Act of 1992; The Privatization Act of 1994; The Export-Import Act of 1955 and The Black-Marketing Control Act 2032 BS.

2.6 Review of Farmers' Organizations and Institutions

Seed production in farmers' fields was initiated at local level by government farms and stations, dealing with individual farmers. Similarly AIC was dealing with contract seed producers on an individual basis. No organizational and institutional development aspects were considered at this time. In the USAID funded Rapti Development Project (RDP), No-Frills (under the VFC program) initiated the formation of commodity specific groups for vegetables seed production in order to make these groups capable of dealing with the seed entrepreneurs during the business negotiations for contract seed production. The seed marketing workshop in 1989 at Tulsipur was a good example of such business negotiation. By 1993, 29 seed entrepreneurs attended such a workshop together with group leaders from 12 seed production pockets.

In the DFID funded KOSIVEG and later SSSP, the focus has been on the formation of seed producers groups and their association- KOSEPAN. Here the business negotiations have been between SEAN and KOSEPAN, the district linkage between producers and traders was through their institutions. Thus, before the 1990's, farmer's organizations for seed multiplication and marketing were limited to groups, without any legal status. But now it is open for Farmer's Associations and Farmer's Cooperatives to gain legal status. However, the institutional development required for custom seed multiplication and contract seed producer farmers' organization is still very slow in coming and the rules and regulations are not clear for such development. There is no legal binding on the contract seed production system recently adopted.

2.7 Review of the Seed Program

A. Climatic Condition

In Nepal, it is well known to all policy makers, planners and bureaucrats that the topography and climate provide god opportunities for promoting vegetable and vegetable seed production as rural income generating activities. The climatic conditions do offer comparative advantages for vegetable seed production. It has to be exploring the potential of the temperate and sub-alpine ecological zones where there are many isolated pocket area for specific vegetable seed production. There are about 30 suitable production pockets identified for the

production for the production of selected sub-tropical, warm temperate, and cool temperate vegetable seeds in Nepal but the present level of seed production is very low and limited to local sales. No-Frills estimates that adopting suitable high value vegetable seed production could benefit the hill farmers who depend on agriculture for their livelihoods. However, very limited efforts have been made to explore the potential of the high hill area's isolated pocket areas for a temperate seed production program.

B. Government Farms and Stations

There are 31 government farms and stations but only 17 of these have relevant seed activities. Most of the farms have changed their mandate from improved seeds to producing breeders and foundation seeds without considering the quality improvement needed in their seed production systems. The credibility of many farms and stations are in question now, which needs to be addressed. The resource allocation for these farms is also very poor in terms of budget and manpower.

C. Seed Production Pocket Areas

There are many seed production pocket areas scattered all over the country in Temperate, Sub-tropical and Tropical zones. Nepal has specific advantages in producing temperate vegetable seeds for the export market, but little work has been done in these areas. In most of the pockets there are many trained farmers but they are not utilized. The local seed production program for export markets is limited to only a few crop varieties. Major attention should be given by the authority to explore the potential of these production pocket areas. However, in general the scale of production in each pocket area is small as compared to the required economic scale of production. This has been a major constraint on the development of export markets. The quality aspect of seed in terms of pre harvest and post harvest should be in major consideration for export materials.

D. Women in Seed Production and Marketing

Women are directly involved in the production of seeds in Nepal. In fact, in most of the trouble areas of Rukum and Rolpa, women are handling the total seed production program. However, the availability of foundation seeds to women farmers was reported very low as only a limited number of women farmers were directly involved in contract production. More women need to be trained in contract seed production with an upgrading of their skills in business negotiations before asking them to become involved in contract seed production

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E. Private Seed Enterprise

An estimated 100 private seed enterprises are presently active in seed trading. However, only about a dozen are engaged in contract seed production and only a limited number of farmers in about 30 production pockets have been trained in contract vegetable seeds production and market. Most private seed enterprises are depending on imported rather than locally produced seeds except for a few crop varieties. The situation is changing as the demand for hybrid seed is increasing in both commercial production pocket areas as well as in the new NGO program areas, as it is safer for non-technical staff to distribute hybrids seeds.

F. Demand for Vegetable Seeds in Nepal

Demand is estimated to be around 1900 mt annually, of which around 900 mt (45%) is imported from India and other foreign countries, an estimated 33 percent (650 mt) is locally produced, and the rest handled by the informal sector. The demand for hybrid seeds of Cabbage, Cauliflower, Tomato, Cucumber, etc is increasing rapidly especially in the summer off-season commercial vegetable growing areas. The main sources of hybrid seeds are Takii, Toyoka and Sakata Seed Companies of Japan. Mahyco, Century, Indo-American, etc of India and Royal Sluis of Holland. There are also some imports from Denmark and other countries. To date, hybrids seed of Tomato has been introduced in Nepal.

G. Demand for New Technologies

The demand for new technologies and the high demand for hybrid seeds have compelled the private sector to take a new look at the demands for seeds. National research and development has not been able to meet the demands of the private sector, which is now also looking for potential joint ventures and technological linkages with foreign seed companies.

2.8 Government Quality Control Services

There is basically no difference between seed quality control mechanisms in countries of the developed world and in developing countries. The only differences are in the degree of implementation and in attitude towards quality. The objective of seed quality control is to ensure that the seed being sold is of the highest standard with respect to genetic and physical attributes.

For the implementation of quality control mechanisms in Nepal, NSB and its three sub-committees; SDQCSS and RSTL are involved. The Nepal Seed Act 1988 has prescribed two systems i.e. certification and truthful labeling with minimum standards as seed quality control measures. Certification is carried out on a voluntary basis as per request of the seed producer where as truthful labeling is compulsory where seed traders must affix a label describing quality. Seed Certification is a regulated process designed to secure, maintain and make available a prescribed level of genetic purity, physical purity, physiological quality and health in seeds including vegetatively propagated materials of superior crops and plant varieties. Certification schemes cover the various phases of seed production, processing, storage and handling so as to meet the requirements of the scheme.

Seed testing after the harvest of a seed crop, the seed lot is tested in seed testing laboratory to determine its quality. These testes have been provided free of cost by the five authorized RSTL. Besides these authorized laboratories there are other laboratories under AIC, NARC and the private sector but these laboratories can test only for internal quality control. For the certification program testing can only be carried out by authorized laboratories. Testing procedures are followed according to ISTA rules. All the Regional laboratories under DOA have the capacity to test around 2000-3000 samples per annum. All regional level laboratories have their own lab building and are equipped with different seed testing equipments.

2.9 The Key Stakeholders of Seed Business

A. Seed Producer Groups/Association/Cooperatives

The first main group of beneficiaries of the private seed sector development is the Seed Producer Group/Associations/Cooperatives with legal status for contract seed production and its institutional development. A large number of seed producer groups have been formed, but they have no legal status. A few groups have been registered as local associations or as cooperatives to gain their legal status. Examples of such groups are: Local Associations; to buy, process, and sell seeds; Producers-Marketers Groups/ association: to buy, process and sell vegetable seeds.

B. Private Seed Traders (SEAN Members)

The second main group of beneficiaries of the pprivate seed sector development is the Private Seed Entrepreneurs/ Traders/Dealers with their legal status for private-to-private linkages for both joint ventures with foreign seed companies and with domestic seed producers groups and local dealers. A large number of private seed entrepreneurs have been established and most of them have become members of SEAN, a commodity association of private seed entrepreneurs with more than 100 members for the betterment of the vegetable seed entrepreneurs. SEAN members buy, processes and sale vegetable seed.

C. Seed Consumers

These are the third main group of beneficiaries of the private seeds. The improved seeds are distributed among the seed consumers.

D. Central Level Institutions in the Public Sector

a. Ministry of Agriculture and Cooperatives (MOAC):

The Ministry provides the Secretary of Agriculture as the chairperson of National Seed Board.

b. The National Seed Board (NSB)

This is a policy umbrella body under MOAC, having three technical committees and includes the private sector but as a minority. NSB is an apex body incorporating public and private sectors and has the Seed Development and Quality Control Division for the development. NSB provides quality assurance and advisory services for commercial seed production in the public and private sectors.

c. Department of Agriculture (DoA)

DoA includes the Seed Quality Testing and Control Labs in five regions of country. All the district agriculture offices are responsible for seed multiplication program in the district. They make arrangements for source seed and field inspection activities.

d. Seed Quality Control Agency

This includes the Central Seed Testing Laboratory (CSTL) and technically operates under NSB as an executive institution for both public and private sectors.

e. National Agricultural Research Council (NARC)

This includes all the research stations in all regions of the country. NARC has mandate of breeder and foundation seed production programs. All the source seed needs for the district and private sector is produced by NARC.

f. Agricultural Inputs Corporation (AIC)

AIC buys, processes and sells seeds through its own sales depots as well as through its dealers. AIC now divided into two functional bodies of Nepal Seed Company and Agricultural Inputs Company. Seed Company has their own seed production program. They get foundation seeds from NARC. Agricultural Input Company basically deals with chemical fertilizer (Kayastha, 2001).

2.10 Emergence of Private Seed Sector

The SEAN Seed Service Centre Ltd. (SSSC) - a public limited company has been incorporated with HMGN under the Company Act 2053 B.S. The establishment of SSSC was promoted by the Seed Entrepreneurs' Association of Nepal (SEAN) and various members and indicates the emergence of an accountable private seed sector. The centre has received support from SSSP. The objective of SSSC includes:

-) Organizing production and marketing of source/foundation seeds
-) Providing a seed crop supervision service
-) Providing transit storage of seeds
-) Providing seed testing services
- *J* Providing seed packaging
-) Organizing seed production planning and marketing and
-) Providing grow-out tests in association with SEAN and SSSP.

The centre has already provided the following services:

-) Supply of source/foundation seeds; since FY 2055/56 the centre has been producing different vegetable crop seeds like Radish, Peas, Beans, Rayo and others with the technical help of GRESSCO Consultants.
-) Provision of seed crop supervision
-) Organizing Seed Planning and Marketing Workshops for the various stakeholders in different seed production areas to assist in the making of contractual arrangements between seed producers and seed buying companies.
-) Initiation of the development of production techniques for Hybrid Seed Production in collaboration with a multinational seed company, SSSC has commenced seed production trials on hybrid varieties of cabbage and Chinese cabbage.

2.11 Present Status of the Private Seed Sector Development

Seed Grower's Association or Seed Producer's and Marketer's Groups/ Associations or Agricultural Marketing Cooperatives have been established in major seed production pocket areas. Seed grower groups have been established in the district level by the help of district agriculture development offices and vegetable seed production centers. A large number of commercial vegetable seed producers have now been developed and have been made capable of directly contracting with the business agencies (No-Frills, 1996). SEAN has made contract seed business in different part of the country.

Vegetable seed production pockets have been established in more than 17 pocket areas in Nepal with comparative production advantages. There are different seed production pockets in Nepal like Rukum, Salyan, Parbat, Therathum, Dadeldhura, etc. are the major seed producing area. Different types of vegetable seeds are produced in different niches of the country. Dolpa and Mustang are feasible for carrot and temperate radish seed production. Rukum is major pocket area for Onion vegetable seed production. Tropical vegetable seeds are produced in different foot hills pockets and Terai area.

The total amount of vegetable seed production in Nepal is very small 441 mt in 2000; Vegetable Development Directorate has estimated this amount as formal seed production by the seed growers. In the same year No-Frills has estimated about 550 mt vegetable seed has been produced and marketed in Nepal. The major crops focused are Cole crops, Radish, Onion, Broad Leaf Mustard, etc. Other different valuable vegetable crops have to be explored for commercialization. SEAN (Seed Entrepreneurs Association of Nepal) formed in 1988, was registered in 1992 with more than 100 active seed entrepreneurs, seed dealers, seed traders and seed companies scattered all over Nepal.

Nepali seed companies are exporting vegetable seeds to India and Bangladesh. The total amount of seed exported to Bangladesh and India is very small and limited to a few commodities, mainly radish. However, the scope for Cole crop seed exports to India and Bangladesh is very high. Private sector participation in commercial vegetable seeds production and marketing has increased and now accounts for more than 90 percent of the total commercial vegetable seed market. However, the private sector participation in cereals, pulse, and oilseed production and marketing has not increased because of policy constraints.

Policy makers have recognized the importance of private sector involvement and investment in commercial vegetables seed production and marketing but have not visualized their potential for investment in cereals, pulses, and oilseed crops. The cereal seed production

programs have been introduced as a food security concern programs all over the country. Specially, in the irrigated areas the seed production programs of rice and wheat has been kept as district seed sufficiency program. Maize seed production program, to increase the Seed Replication Rate (SRR), has been running in different part of the mid hills where about fifty percentage of total food is contributed by this crop. According to DADO, Rukum, about fifty one percentage of total consumable food is supported by maize and the district has been running maize seed production programs in different pockets.

Thousands of local entrepreneurs, collectors, traders, transporters, and agents have been established in the 17 major seed production pocket areas of Nepal. Different NGOs and Community Based organizations are working in different districts in seed production programs. Seed has been taken as a major technology among our farmers. Seed quality deterioration is the major cause to decline the productivity and disease infestation so the replacement of local seed by quality seed is the major challenge of food security programs. The rural population depends on local production so their cultivation practices will get nourish when they will have good quality seed for sowing.

2.12 Government Strategy for Private Seed Sector Development

Presently, government policy for seed production is in major priority of Ministry of Agriculture and Cooperatives. The following strategies can be put in following headings:

- a. Government Farms and Stations are made responsible for the production and supply of foundation seeds. NARC is responsible for Breeder and Foundation seed production and government farms are responsible for foundation seeds.
- b. Vegetable seeds will be produced by farmers who will be supplied with foundation seeds by farms and stations on the recommendation of the Vegetable Development Directorate. In case of vegetable seeds the improved seeds are produced directly from foundation seeds. These improved seeds go for the fresh vegetable production.
- c. Seed production field inspection will be done by the seed certification units. Seed certification is done by regional seed lab and the seed inspectors in district level. Field information, source seed record, and all other field information will be taken by district agriculture office. Seed testing process like germination test, moisture test and purity analysis will be done by regional seed lab.

- d. Technicians will be provided for the supervision of the seed multiplication in pocket areas during the harvesting and seed threshing period. Private sector should inform the district or regional offices before seed sowing and field should be inspected by seed inspectors.
- e. Potential markets, including the export markets will be explored. The role of government in marketing sector will be work as a coordinator of facilitation and mediator for contract seed farming. Government will make the seed exporting facilities including post harvest activities.

2.13 Private Sector on Seed Exports and Imports

In the changing world of market development with advances in agricultural technologies, Nepal needs to re-address itself on policies and programs concerning the development of the private sector's involvement in the export and import of vegetable seeds. To make both import and export of vegetable seeds more conducive to the Nepal agricultural sector whilst not harming domestic seed production and consumption, we need to develop a clear cut policy that takes into account developments in the world markets, which affect the seed business in Nepal. We need to build and improve our level of technology in line with international standards. This requires re-organizing of some of the activities and policies in both the private public sectors, thereby opening up new avenues and prospects.

There are two points that should be kept in mind when addressing the involvement of the private sector in vegetables seed exports and imports. Firstly, no public enterprise has ever really been involved in the exporting or importing of vegetable seeds, and so this aspect of the seed trade in Nepal is totally under the private sector. Secondly, there is an immediate need to reorganize and re-systemize the Nepali seed industry, specially imports and exports, in line with the World Trade Organization's rules and policies so as to provide means for checking quality standards, etc, of imported and exported seeds.

In present situation, considering the Nepali vegetable seed export and import, we have made but little progress since private seed entrepreneurs started importing and exporting vegetable seeds. Initially only one item, i.e., Radish Mino Early was exported from Nepal to Bangladesh, and looking at the current situation the same item is exported to Bangladesh today, although in a larger quantity. There has been no diversification in terms of the type of vegetable seeds exported from Nepal or the place of export. Every year, for the last ten years, Radish seed has been the major exportable vegetable seed from Nepal and the major buyers happen to be seed traders in Bangladesh. There have been attempts at exploring other potential markets in the Middle-East for Radish as well as other vegetable seeds but this has not borne any fruit in as far as no large quantities are being exported. Even the Indian market, which appeared promising, though here again for Radish seed only, has not been so favorable mainly due to prices or rates of the item irrespective of quality. Table 1 provides a glimpse at the exports of vegetable seeds, including Radish, from Nepal:

Fiscal Year	Quantity (in Kg)	Destination
2004/05	7259	Bangladesh
2005/06	2856	Bangladesh
2006/07	1130	Bangladesh
2007/08	5040	Bangladesh
2008/09	11095	Bangladesh

 Table 1: Export of Nepali Vegetable Seeds.

Source: MOAC, 2008/09.

Imports on the other hand have shown a tremendous amount of growth from the time when seed entrepreneurs first started importing improved and hybrid seed varieties from countries like Japan, Korea, Holland, etc. Initially the imports were limited to certain hybrid cabbage and cauliflower varieties; but now, however, there are many different types of vegetable seeds being imported into Nepal encompassing different varieties of the same crop also. The quantity imported has increased manifold since that time, thereby indicating more preference for hybrid seeds at the farmers' level which private seed entrepreneurs are more than happy to fulfill because of quality and guaranteed supply of these imported seeds.

2. 14 Future Requirements

In rearranging the export and import strategy of seed as an agro input commodity in Nepal, two important issues need to be kept in mind when improving and re-modeling the plans and policies regarding foreign seed trade, which must be in line with international standards.

a. In the days ahead there is no role for the public sector to be involved in the production and marketing of vegetables seeds of all varieties, as in the case of AIC. The public sector entities dealing with seeds should concern themselves more with distributing and disbursing seeds to areas that face scarcity and have food shortages, and leave the business aspect of importing and exporting to private seed entrepreneurs. Though the concern of feeding as extra mouth with food is the responsibility of the Government in most under-developed countries. In developed economies, this concern has been taken over by the private entrepreneurs, and has created a situation leading to the improvement and hoarding of germplasm, which has all gone to multinational companies. Nepal needs to address this issue clearly so as to define what role both the public and private enterprise will play.

- b. Unless the seed industry of Nepal re-organize and re-systemizes itself within next four to five years i.e. before Nepal's accession to the WTO norm in 2007, the present system of production and levels of productivity in Nepal's agricultural sector will dramatically decline if not collapse. The reasons behind this are:
 - Eighty to ninety percent of commercial vegetable seeds and international germplasm are coming into Nepal from third countries directly or via India.
 Nepali farmers will have to compete with this situation.
 -) In case of rice, The Peoples Republic of China has developed a very high quality of rice (hybrid) and a few companies in India are also producing hybrid rice. This will have an impact on the rice cultivation program in Nepal. Rice cultivation is not very commercialized in Nepal so the role of the government in this area is negligible. Thus the government should make way for the private seed entrepreneurs to take up and commercialize the rice cultivation practices in Nepal, thereby generating more income for the farmers.
 -) Wheat is the only crop the Government of Nepal has an interest in, mainly due to the high volume nature of the product, which will be difficult for the private sector to take up. Once the business transactions conducted along the East-West highway become smooth, there will be an inflow of wheat seeds from neighboring West Uttar Pradesh, Haryana, and Punjab of India where a massive amount of wheat is grown; then the private seed entrepreneurs will see an opportunity and jump into this area also. The Government needs to address this issue immediately.

There are other requirements that need to be addressed to provide a favorable environment for the import and export of seeds. Some are listed below that are needed to be improved.

2.14.1 Demand Assessment

The first and foremost important task in exporting seeds is to determine the demand, and accordingly undertake a production program conducive to the food habits of the importing country. For example, in the export of Radish seeds, both India and Bangladesh prefer pungent varieties whereas China and Tibet prefer the sweet varieties. Therefore, proper demand assessment of the importing country should be made, and based on this demand; appropriate production programs should be undertaken in Nepal so that there is a viable market for Nepali seeds that can compete in the international market especially in terms of prices and quality.

To ensure smooth export of seeds on time, the demand scheduled should be collected six to nine months in advance. In the Nepali seed market, it is difficult to collect demand information for over one year. The demand data, in such a situation, is influenced by many factors, and these factors change from time to time thereby completely altering the original demand data collected for such a period. Financial capacity, change to hybrid varieties, awareness, preferences, export potentials, global market situations, etc, are some of the factors that influence demand forecasts for a year.

The long term demand forecast helps management in decision making. The medium term demand forecast facilitates variety identification, promotion, and sales transactions. The short term demand forecast assures the accuracy of production programs, procurement plans, sales and distribution plans all according to demand priorities. As mentioned earlier, the demand assessment for the import of seeds (both open and hybrids) into Nepal is mostly carried out by the private seed entrepreneurs, and as such these entrepreneurs have full knowledge about the crops, their varieties, and when the seeds are required in Nepal.

2.14.2 Foundation Seeds and Quality Control

Another important requirement for the export of seeds from Nepal is the availability of quality foundation seeds to produce quality commercial seeds. Radish Mino Early, being the only seed exported from Nepal, is being produced from foundation seeds nearly ten years ago. This has restricted the quality of the Radish seeds being exported due to carelessness of the seed entrepreneurs. The immediate need is for the government to provide better foundation seeds from its farms through out Nepal. The government should provide the environment for private seed entrepreneurs to take up foundation seed production and/or aid the private entrepreneurs in acquiring stock seeds from abroad for their production program. Quality control such as supervision and monitoring, grow out checks, etc. should be conducted by both the government and private seed entrepreneurs together so that only quality seeds are exported.

2.14.3 Marketing Organization

Under economically viable conditions, seed exporting should entail a combination of efficient seed production, quick movement of raw seed from production areas to processing line, application of appropriate processing and packaging techniques and safe storage of seeds at different locations before export. The management of quality seed and exports should encompass the following minimum requirements in this system.

-) Coordinated seed production program as per market demand.
-) Supply of seeds on time for export purposes.
-) Proper processing and packaging facilities.
-) Effective quarantine checks to ensure quality and disease free seeds are exported.
- Financial structures that provide for pre-shipment payments.
-) Flexibility to adjust to changing conditions.
-) Efficient sales reporting.

The sales function (whether for imports or exports) is a valid component for any seed business organization. Sales reflect the development efforts of both the private and public sectors involved in the seed business. It is also directly related with the seed production program undertaken. The success of seed marketing depends not only on the confidence of all those involved in the marketing channel, but also on after sales monitoring of the effectiveness of the product sold.

2.14.4 Seed Pricing

For any export of seeds from Nepal, the following factors should be taken into consideration before price fixation.

- Basic seed procurement rate, which should be in line with market rates as determined by the demand and supply.
-) Seed processing and storage costs.
-) Wastage during processing.
-) Quality control and production supervision costs.

-) Seed promotion and marketing costs.
-) Out-going transportation costs.
-) Insurance costs of stocks and infrastructures.
-) Carried over inventory and revalidation costs.
-) Management overhead costs.
-) Financial rate of return on investment for the entrepreneurs.
- Surcharge for further business expansion and reasonable profit.

2.14.5 Quarantine Facilities

All imports and exports of seed, whether to or from third countries or from India, should come under the umbrella of the Plant Quarantine Section of the government. Proper quarantine checks should be made available at all border points and all imports should be done only after acquiring an Import Permit from the Quarantine Section. This will not only control the inflow of inferior quality seeds but will also provide and information database for the type of seeds being imported and exported from Nepal.

Besides that given above, a lot of information is available on the seed export market and its potential benefit for Nepal. But none of the literature provides any deep rooted information on the problems inherent for seed exporting. Some of these inherent problems and issues are listed below; these need to taken into consideration before developing a sound import and export policy for seeds in Nepal.

- Concerned authorities (technical) and related agencies are not aware of quality requirements for suitable crops and the food habits of the importing country.
-) There is an unavailability of quality foundation seeds required to produce commercial seeds for export purposes.
-) There is a lack of efficient quality control mechanisms both in the private and public sectors.
-) There is a lack of quarantine infrastructure throughout Nepal to check the informal inflow of seeds into Nepal.
-) There are no seeds cargo priorities from customs; airlines, transport companies, especially land transport, for exported seeds.

-) The banking of facilities, regarding export of seeds, do not allow for pre-export loans and infrastructure development loans for the seed export market.
-) There is no national policy regarding seed as a special commodity for export.
-) There is no proper coordination between the liaison cell in the Ministry of Agriculture and Ministries of Finance, Commerce, Supply or Foreign Affairs, the Planning Commission, the Trade Promotion Center, NARC and AEC. This is a hindrance to seed export.
-) There is no bilateral trade agreement between neighboring countries spelling out in detail the priorities given for export of seed commodities from Nepal. Seed production for export purposes requires the special grooming of farmers and seed producers. (Gyawali, 2001).

2.15 Role of Various Institutions in Nepalese Seed Sector Promotion

A. Vegetable Development Directorate

Vegetable Development Directorate (VDD) is one of the major directorates of Department of Agriculture. Vegetable seed improvement and promotion program in Nepal was started by HMG during the 1960's through this directorate which was known as Vegetable Development Division in past. An institutional set-up was developed by HMGN to up-grade the quality of seed through the production network of government farms/centers, which were responsible for the breeders/foundation seed production and supply to commercial/private entrepreneurs and the Agricultural Input Corporation (AIC). VDD and the Swiss funded FAO Fresh Vegetables and Vegetable Seed Production Projects (1981-1996) made a significant contribution towards seed production and distribution in Nepal.

B. Lumle and Pakhribas Agriculture Centre

Overseas Development Administration (ODA/UK) financed Lumle and Pakhribas Agriculture Centre in seed development programs. These two agriculture centers have made an important contribution to the promotion of seed production and marketing in Nepal. Lumle Agriculture Centre started its vegetable seed production program in the potential districts of Western Development Region where as Pakhribas started commercial vegetable seed production programs in Eastern Development region.

C. Agriculture Input Corporation (AIC)

Agriculture Input Corporation was the leading institution in vegetable seed distribution in organized sector. After the separation of AIC into Seed Company and Agriculture Input Company, the role of AIC has been diluted as before. With the growing role of the private sector, the Seed Company share of vegetable seed sales has become almost negligible in the national scenario. However, it is still a major cereal seller in the country.

D. NGOs/INGOs in Seed Production and Distribution

The activities of several projects and INGOs/NGOs have been instrumental in furthering a significant increase in the demand, for and the production and supply of, vegetables and vegetable seeds in the country. The major projects were Koshi Hill Seed and Vegetable Project (KOSEVEG) in four hill districts of Koshi Zone and four hill districts of Gandaki-Dhaulagiri zones; Vegetable, Fruits and Cash Crops Development Projects (VFC/USAID) in Rapti-Bheri Zone; Market Access for Rural Development (MARD/USAID) in Rapti, Bheri, Lumbini and Gandaki Zone; Seed Sector Support Project (SSSP,DFID) started in twelve districts of Koshi, Gandaki, Dhaulagiri and Far-Western Development Region; CBED/CECI in Jumla, Dadeldhura, Baitadi; CEAPRED, DANIDA in Baitadi, Surkhet, Kavre, Banke, Dolkha districts; Li-Bird in Chitwan, Nawalparasi and Gulmi. The major activities conducted by these organizations are summarized as follows:

2.16 Major Problems and Issues in the Seed Sector

2.16.1 Poor Implementation of Seed Contracts

The regional meetings/workshops where producers and traders met together used to be an appropriate occasion at which to sign contracts for production as in the earlier days under KOSEVEG. However, the recent workshop (2001) has shown that such formal workshops may no longer be so necessary as good and strong linkages develop between growers and traders with both parties sometimes now preferring to make own arrangements.

For both traders and farmers the real indicator of success of the seed contract is the actual quantity delivered. The gap between the contracted quantity and the quantity produced (delivered) is believed to be significant in many seed programs. For example, an SSSP report shows that in 1998/99 the total volume contracted was 75 mt while the actual volume deliverd was a mere 36 mt, which was only 48% of the contract. SSSP reports show that farmers from both SSSP (east) and SSSP (west) diverted much production away from KOSEPAN and WESEPAC (a seed growers cooperatives in the west) leading to contracts not being fulfilled.

However, other factors such as errors in the actual area planted and shortage of stockseed have also contributed to shortfalls and are currently being evaluated by SSSP.

Traders complain that farmers were found to be selling seeds to retailers in certain areas at much lower prices than those of the wholesalers (in the same area) who had entered into contracts with the farmers. So, several wholesalers were found unwilling to enter into contract system. It has been reported that they preferred to wait rather than conclude a contract with farmers. Such practices have eroded the effectiveness and popularity of contract production. Similarly, farmers with contracts have often felt many traders do not make full payment in time even after receiving the seeds. Lack of sufficient working capital on the part of the farmers and delay in payment by traders have created a shortage of working capital, even for and institution like KOSPAN where it has led to difficulties in meeting the cash need of its members/farmers after seed has been delivered to traders.

2.16.2 Weak Market Information System

There is an increasing shift away from open-pollinated varieties to imported hybrids, probably because of their high yield, better quality and reliability of supply compared to open pollinated varieties seeds produced in Nepal. Likewise, in the Nepalese seed market, there are many varieties of seed widely used but not released by NARC. These seeds are being imported through different channels. There is often a lack of Nepalese seed for off-season vegetables production at many markets due to lack of information on the demand for and supply of different seeds in the country. Such information could be used by seed dealers, seed producers and even NARC or other institutions engaged in research and production of foundation seeds. Regular surveys or studies are lacking in this regard. Similarly, updated information on production costs and marketing costs from different production pockets to major markets are also lacking.

2.16.3 Non-commercial Seed Production Program

The major problem related to the seed sector is informal or none institutionalize seed production. It appears that several institutions involved in promoting seed production in remote areas pay little attention to making it a viable commercial activity. Such programs may not properly address quality issues and may not be competitive and sustainable due to an insecure market and to a relatively high production cost per unit.

Similarly several programs are being conducted in Nepal where the projects procure all or a significant portion of the production from farmers, thus relieving the farmers from the marketing activities. It may not be a significant burden to the project or producer when the volume is low but this kind of practice may make growers totally dependent on the project or producer for marketing the produce. Once the volume of production increases substantially it might not be practical for the producer or project to continue handling the marketing effectively. It sometimes makes serious when the supporter or project terminates without making the farmers competent enough to market their produce independently. One example was when Lumle Agriculture Research Center pulled out from vegetable seed marketing in 1995-96, many of the seed growers of center area could not market seed to traders directly as they did not have the linkage with seed traders since this had been by the center. So overcome to this problem of informal production should be addressed by the project or supporters to make the group or cooperative institutionalize first.

2.16.4 Poor Coordination between NGOs and INGOs

Several INGOs/NGOs are found to be providing agricultural inputs including seeds at free or at heavily subsidized rates to their target groups directly bringing these inputs themselves from different sources. Such activities can distort the local input prices, may undermine the activities of local commercial seed farmers and vegetable growers. The local production may be unutilized due to the inputs used from different sources out side the local area.

Heavy subsidies provided by one institution can adversely affect the activities of another institution working in the same area but with fewer subsidies or without a subsidy program. Coordination is often lacking between INGO/NGO working in the same area in this regard.

2.16.5 Poor Post Harvest Activities

Post harvest activities to address seed cleaning, grading, packaging plays major role in seed business in terms of quality. Most seeds sold in Nepal are hand cleaned, sun dried and packed in sacks by seed producers and are passed on to dealers for selling in such condition. Seventy five percentages of seed is sold either loose or in small plastic packets without adequate drying, grading and labeling. Generally, presentation of Nepali seed is very poor; and less attractive as compared to Indian and other imported seeds. Attractive packaging to international standards is practiced by handful of seed companies. There are some companies like GM seed company, GRESSCO, Dahal Trading, etc. Poor presentation of the Nepali seed is the reason why the market for seeds of established crops like radish and rayo is being invaded by comparatively low grade Indian and Bhutanese products at higher prices. In other

side promotional activities by Nepalese companies to advertise domestic seeds are almost lacking in Nepal.

Very often proper inspection, certification and other quality control measures are lacking. Farmers often complain that traders do not wait for formal papers in relation to quality control or seed certification when there is a high demand for that seed in market. Currently Government/semi government farms and the private sector are undertaking the production of foundation seeds. Frequently the question is raised regarding the quality and quantity of foundation seeds. It is difficult to conduct the entire field inspection program because of limited manpower resources in all contracted areas so combine effort of government and private sectors may make it effective. This will be even more the case as the volume, area and number of varieties of seed all increase significantly.

For quality control of seed, testing facilities are also not adequate and available at convenient points for farmers and traders. Also there is no active institution responsible for supervising or checking the quality of the seed entering the domestic and foreign markets. Moreover in Nepal, even up to the present, seed processing has remained synonymous with seed grading only.

2.17 Poverty

Poverty is the state of one who lacks a certain amount of material possessions or money. Absolute poverty or destitution refers to being unable to afford basic human needs, which commonly includes clean and fresh water, nutrition, health care, education, clothing and shelter. About 1.7 billion people are estimated to live in absolute poverty today. Relative poverty refers to lacking a usual or socially acceptable level of resources or income as compared with others within a society or country (Website wikipedia, 2011). Poverty is pronounced deprivation in well-being, and comprises many dimensions. It includes low incomes and the inability to acquire the basic goods and services necessary for survival with dignity. Poverty also encompasses low levels of health and education, poor access to clean water and sanitation, inadequate physical security, lack of voice, and insufficient capacity and opportunity to better one's life (Website world bank, 2011).

Poverty is an unacceptable human condition, mainly related to economic backwardness of the people. It is neither immutable nor heritable but the developmental activities can alleviate poverty. Various organizations such as ADB and UNDP have defined poverty in different ways. A person is poor, when his living standard is below a specified level (poverty line). National Living Standard Survey (NLSS, 1996) conducted by Nepal Rastra Bank estimated 42% population in Nepal below the poverty line; of this, 24.9% is the poor and 17.1%, ultra-poor. To alleviate the poverty, GoN has made policies, programs, and activities in several periodic plans in the past and the poverty incidence by geographical areas have been changed (Table 2).

Geographical Regions	Poverty Head Count Rate (%)			
Sector	1995/96	2003/04	Change in Percent	
Nepal	41.8	30.8	-26	
Urban	21.6	9.6	-56	
Development Regions				
Central	32.5	27.1	-17	
Mid-western	59.9	44.8	-25	
Ecological Belt				
Hill	40.7	34.5	-15	

Table 2. Poverty Incidence by Geographical Areas, Nepal, 1995/96 and 2003/04.

Source: UNDP (2009). Nepal Human Development Report. 2009, p. 45.

Poverty alleviation has been one of the major objectives of development efforts since Seventh Plan in Nepal. For this, economic growth must be accelerated along with the generation and expansion of employment opportunities. The government introduced economic reforms in early nineties to accelerate economic growth both in non-agricultural and agricultural sectors. Compared to non-agricultural sectors (trade, transport, industries, etc.) the growth in the agricultural sector was insignificant and impact on rural poverty was minimal. Succeeding periodic plans have also focused poverty reduction in rural communities as their main objectives emphasizing promotion of agriculture and agro-enterprises (Shrestha and Shrestha, 2004).

Agriculture Perspective Plan (APP) has long-term vision of promoting horticultural activities in suitable locations in the mountains of Nepal. Vegetable seed has been kept as one of the major high value commodity in hills and mountains region (NPC, 1995). Different horticultural activities have created high thrusts in many organizations including INGOs, NGOs, CBOs and Private sectors. That such activity would improve economic status of rural people and help to alleviate urban poverty as well. Development of fruit nursery, vegetable

seeds and off-season vegetable enterprises, organic farming and marketing promotion are some examples of income generating priority activities in horticulture.

2.18 Poverty Status in Nepal

Vast majority of world's poor lives in Asia, particularly in rural areas. Nepal has also the same trend of poverty in rural part of the country. Most of the Asian countries have over 20% of their population below poverty line (Table 3). Rural poverty remains the most important development challenge in these countries, several aspects related to characteristics, causes, and remedies of poverty need a great deal of research of efforts. The available data on percent of population below the poverty line shows that Indonesia and Pakistan have poor people less than 12%. This indicates that they are better than China, India, Nepal, and Philippines. The percent of poverty may differ with the poverty indicators being used for evaluation.

Country	Year	Poverty %
China	1998	6
India	2006	28.5_
Indonesia	1998	24
Nepal	2010	25.4*
Bangladesh	2010	31.5 @
Pakistan	2008	17.2 +

Table 3. Poverty Incidence in Some Asian Countries.

Source: ADB (1998, 1999); NPC*; Bangladesh Economic News Website @; Planning Commission of India_ and UNDP, 2009 +.

National Planning Commission carried out a study of income distribution, employment and consumption pattern in 1976 and it was estimated that 33% of the total population lived below poverty line. Nepal Rastra Bank (NRB) conducted a household budget survey in 1984 and reported 42% of the population living below the poverty line. Another survey of NRB, made in 1991 covering only the rural areas, indicated a wide spread of poverty those severely affected landless and small farmers. Nepal Living Standard Survey (NLSS-I) also indicated 42% of the people below poverty line.

The table 4 indicates that those people below poverty line live in both the urban and rural areas. About 41 percent of the total are ultra-poor, also known as the hardcore poor. It is

necessary to develop programs for addressing poverty alleviation of both the poor and ultrapoor living in rural as well as urban areas.

Area	Poor	Ultra-poor	Total
Urban	13.2	09.8	23
Rural	26.4	17.6	44
Nepal	24.9	17.1	42

 Table 4. Percent of the Population under Poverty Line in Nepal.

Source: NPC, 2003. The Tenth Plan: Poverty Reduction Strategy Paper, 2002-2007.

In spite of development efforts run in the past plan periods the proportion of the country's population below the poverty line has been increasing and it is more concentrated in rural areas. So the poverty alleviation is the biggest challenge to the government. Poverty is also the root cause of many of Nepal's current problems- population growth, environmental degradation, social ill events, etc. Therefore, as in the 9th plan, poverty alleviation is one of the main objectives of the 10th plan. Various policies, programs, and activities are addressed to promote agriculture and non agriculture sectors, which reduce poverty in Nepal. The major thrust in the agriculture sector would be directed at ensuring the successful implementation of APP (1995). Of the many components of agriculture, horticulture is one important sector to promote economic growth of rural as well as urban poor. Because, horticultural crops stimulate capital flow which starts from subsistence level to commercial level, to agro enterprises development, then to industrial level.

2.19 Role of Horticulture in Income Generation

One of the important outputs of APP's defined achievement is an increased, yet substantial production of high value horticultural crops in the country. Prioritized horticultural commodity programs emphasized in the APP are citrus throughout the mid hills, apple in the high hills, off-season vegetables in the hills and terai, and vegetable seeds in the hills and mountains. In addition, APP also stresses on the promotion of agribusiness and marketing with an appropriate integration of horticultural crop commodities and enterprises. Therefore, horticulture can play a key role on income generation of rural as well as urban poor. Some activities that hold adequate opportunities to generate incomes are briefly mentioned.

2.19.1 Fresh Vegetable and Seed in Income Generation

Among the horticultural entrepreneurships, fresh vegetable production is practiced by many small farmers and is a good provocation for income generation. Depending on the nature of vegetables and the growing season, monetary returns vary. The farmers of Thimi have experiences that the net income from broad leaf mustard ranged from Rs. 5000 to Rs. 20000 per ropani in a season while it was a lot higher in carrots (Rs. 8000 to Rs 40000 per ropani) (Shrestha and Shrestha,2004). The report of Business Promotion and Research Center indicates there is quite a variation in net profit of vegetable spices grown in this country, shown in the Table 5.

Vegetable	Expenses (E)	Gross income	Net return (NR)	E/NR, %
Cabbage	78.2	159.4	81.2	104
Pea	101.1	254.0	153.0	151
Cucumber	68.4	260.8	152.4	281
Bitter gourd	77.6	274.0	196.4	253
Cauliflower	80.3	126.8	46.6	58
Chilli	54.6	212.5	157.9	289
Raddish	79.8	280.7	200.8	252
Tomato	93.9	197.6	103.7	110

Table 5. Income from Vegetable Production (Rs*1000 per hectare)

Source: BPRC, 2003.

The commercialization of agriculture especially vegetable production helped a rapid expansion of vegetable, as the case is true in Rapti Zone. For example, export of vegetable seed from Rapti has increased from 86 tons in 1994 (worth of Rs. 5 millions) to 125 tons in 1995 (worth of Rs. 8 millions). The remunerative value of vegetable seed production is also reflected in Table 6. However, the return over expenditure varies and depends also on vegetable species.

Vegetable	Expenses (E)	Gross income	Net return (NR)	E/NR, %
Tomato (Sarlahi)	31.4	80.1	48.7	155
Cauliflower (Kath. Local at Dhankuta)	31.9	49.8	17.9	56
Cauliflower (Snowball-16 at Rautahat)	33.4	129.2	95.8	287
Bean (Nuwakot)	42.5	67.2	24.7	58

Table 6. Income from Vegetable Seed Production ('000 Rs. per hectare)

Source: EASD (2054 BS).

Production of vegetables out of their normal season has been recent practice of many vegetable farmers to fetch high price. Objectively defined activity of most NGO/CBOs is transfer of off-season vegetable production technologies to small, rural poor farmers through hands-on field practices. Although critical, yet timely intensive care and management practices are required, the vegetables that are produced in off-season pay a lot more to raise a rural poor economically better (Table 7). But market demand must be considered adequately for easy disposal.

Table 7. Net Profit ('000 Rs. per ropani) from some Vegetables Grown in Off-season.

Vegetables	Expenditure	Gross income	Net profit
Cauliflower	3	25	22
Tomato	3	20	17
Bell pepper	4	25	21
Cucumber	3	25	22
Carrot	3	15	12

Source: Shrestha (2060 BS). Off -season vegetable technology.

2.20 Vegetable Seed Production Potentiality in Nepal

Regarding vegetable seed production in Nepal, there exist enormous potentials. Among many of such factors, opportunities due to available agro-ecological variation and comparative advantages are most important.

A. Agro-ecological zones

With reference to agro-ecological conditions, Nepal is a land of extreme, as it has climatic features within its space geometry. Temperature in the cultivated area may go as low as -9^{0} C during winter months (Dec-Jan) to as high as 41^{0} C during summer months (May-June). The annual rainfall ranges from 250 mm to 2800 mm. Major portion of rain is received during June to September (i.e. monsoon). Due to above peculiar geographical and climatic conditions, Nepal can be divided into the following distinct ecological zones.

a. Terai:

The terai zone is a flat plain area in the southern part of Nepal. Running from east to west, it is in the elevation range of 60 m to 300 m above mean sea level. Terai has sub-tropical climate with more tropical towards east. The average daily temperature fluctuates between 7^{0} C to 24^{0} C during December-January and between 24^{0} C to 41^{0} C during June-July. The rainfall ranges from 600 mm in western part to 1300 mm in the eastern part. The following vegetable crops are suitable for seed production in this region:

Winter season (September-April): Tomato, eggplant, peas, carrot (Asiatic type), radish (Asiatic type), short day onion, early cauliflower (Asiatic type), beet spinach, Swiss chard and cress. Summer season (February-June): All cucurbits- watermelon, cucumber, squash, bottle gourd, bitter gourd, etc. Rainy season (June-October): Okra, chilies, cowpea, bottle gourd, bitter gourd, amaranths, etc.

b. Mid-hills:

The mid-hill zone is a wide belt running from east to west in the middle part of Nepal. Elevation ranges from 300 m to 2000 m above mean sea level, the average daily temperature fluctuates between 2^{0} C to 17^{0} C during December-January and between 13^{0} C to 27^{0} C during June-July. The average annual rainfall varies from 1000 mm in the western part to 2800 mm in the eastern part. The following vegetables crops are suitable for seed production in this region:

Winter season (September-May): Cauliflower, onion, radish, turnip, broad leaf mustard, cress, spinach, peas, and broad beans. Summer season (February-July): Tomato,
eggplant, sweet pepper, french beans, cucumbers, sponge gourds, squash, bottle gourd, okra, pumpkin.

c. Mountain (High hill)

The mountain zone is in the elevation above 2000 m above mean sea level. The cultivated parts in this zone are the inner himalayn regions. These regions are composed of dry and cool valleys and are similar to the Tibetan plateau and ranges from 2000 m to 4000 msl. The average daily temperature fluctuates between 9^{0} C 10^{0} C during June-July. The annual rainfall varies from 140 mm in the western part to 900 mm in the eastern part. The following vegetable crops are suitable for seed production in this region:

Winter season: Cabbage, carrot, beet, broad leaf mustard, radish, turnip, spinach and cauliflower (in warmer areas). Summer season: Peas, beans, and cress.

B. Special situations (Niches)

In addition to the above three distinct ecological zones, there exists some special pockets within the mid-hill and hill zones with different agro-climatic situations. These pockets are the low-lying deep valleys and deeply cut river basins. In such pockets, the microclimates are like that of the terai zones. These pockets can also be utilized for seed production; however, these are so far mostly used for off-season vegetable production.

C. Comparative advantage

In case of vegetable seed production in Nepal, the production is done by farmers not because the enterprise is profitable at the present price but because there is no other better alternative available (Thapa et al, 1992). The real cost of production has always remained higher than the worst return from the displaced crops like wheat, mustard, millet, maize, etc. The reason for taking up the vegetable seed production program is just like choosing a bad among the worst. Additional advantage is that because of the difficult terrain and expensive transportation, production of fresh vegetable and similar bulky crop is not profitable to the farmers in the remote areas. Vegetable seed is low volume and high value commodity with low perishable quality gives more remunerative value to the other bulky and perishable commodities.

2.21 Seed Production and Certification Process

Plant breeders are engaged in plant improvement. Old cultivars are changed by importing new genes that condition improved characteristics, making new cultivars more disease resistant, higher yielding, more beautiful, and better in other ways according to breeding objectives. Once the breeder has completed the breeding program and tested the new material extensively, the seed is then released by the researchers to special producers for propagation.

Before the seed becomes available to the ordinary grower, it goes through stages of certification. According to the stages, there are four classes of seed:

a. Breeder seed:

Small quantity of original seed is produced by plant breeders through a carefully designed and conducted breeding program and released as the source of foundation seed.

b. Foundation seed:

Breeder seed is increased under supervision of agricultural research stations and monitored for genetic purity and identity.

c. Registered seed:

Foundation seed is distributed to seed growers to be further increased for distribution.

d. Certified seed

The progeny of registered seed is sold to farmers. During the process of increase, certifying agencies in the state or region of production monitor the activities to ensure that the product meets standards set for the crop. In Nepal, the practice of Registered seed production is not followed. First (C1) and second (C2) generation's certified seeds are produced from foundation seed in cereal crops where as improved seeds produced directly from foundation seed in case of vegetable crops.

From the above review we can summarize that the seed has major role in agriculture. So it has to be taken as major technology for the agriculture commercialization. Vegetable seed has been kept as a major high value low volume commodity for the remote areas of country. The small farmers and disadvantaged group can earn from their small area of land if the external support in input and marketing will be provided by the concern agencies. The vast potentiality of the country for vegetable seed production and export should be explored by the government. And this seed business, which is comparatively advantageous than the traditional crops, will make support in poverty reduction.

CHAPTER THREE

3. INTRODUCTION OF THE STUDY AREA

3.1 Location

Geographically Rukum district is located at north latitude of $28^{\circ} 29'$ to $29^{\circ} 0'$ and $82^{\circ} 12'$ to $82^{\circ} 53'$ east longitude in global position. District covers about 754 mt altitudes from seal level subtropical area to 6000 mt.of temperate and Himalayan region. The popular Api Himal belongs to this district. There are Baglung and Myagdi district in eastern part of the district; Dolpa district in north side; Jajarkot in east border and Salyan and Rolpa district in southern part of the district.

In development regions, it belongs to Mid-western region of Nepal with five zones and fifteen districts. Rukum is one of the remotest districts within the Rapti zone. Musikot Khalanga is the headquarter of the district. Politically the district is divided in two constitutional electoral regions. There are forty three village development committees within eleven service centers or Ilaka.

3.2 Climate and soil

The district prevails sub tropical, warm temperate and temperate type of climate. The annual rainfall, according to the metrological station of Sub tropical Vegetable Seed Production Centre, is 1600 mm to 2400 mm. The average maximum temperature goes up to 24^{0} Celsius and average minimum is 0.4^{0} Celsius. The southern western part of the district has plain area with clay loam to sandy loamy type of soil suitable for cereal rice, wheat and vegetables. The middle part of the district prevails sandy loam type of soil with gravel mixed mostly suitable for maize, fruits and other dry land crops. The upper part of the district has sandy loam type of soil. In some part red clayey type of soil is also found mostly suitable for groundnuts and sugar beets

3.3 Population

According to Central Bureau of Statistics projection of 2065 BS, the total population of the district is 215270 and the population growth rate is 2.06. Out of total population, male population is 109021 and the female is 106249. Average population density per square kilometer is 74 with average family size is 6. There are about 36781 households with different ethnic group. According to National sample Census of Agriculture 2001/002, the total population engaged in agriculture was 89 percentages but now it may have been changed due

to migration and the other political scenario of the country. The male population is about 54 percentages where as it was 46 percentage of female population.

3.4 Social Structure

Socially the district is composed of different ethnic group of people. Out of total population about 126000 are belongs to the Chhetri and Brahmin caste group. Janjati includes Magar, Gurung, Newar occupy second position of about 44830 populations. Magar ethnic group seems in majority among the Janjati and they played major role in last decades' political conflict. The presence of Dalit is also significant, they are about 11000. And about 7000 population includes in others group like Jain, Christian, Shikha, and Islam. The social structure of the district is progressive in terms of inter cast activities like inter cast marriage, mostly in Chettri and Janjati and even in Dalit ethnic group. They have love marriage system in majority so the brides choose themselves; go out side for few days before marriage as a lover and then family members know it later. The formal marriage takes place formally after few months or years even after the child birth.

Religiously, there is majority of Hindu people about 185213 populations; second religious group is Buddhist about 1752 populations and Christian, Islam and others in minority. The religious relationship is harmonious among district. The major temple of the district is Saikumari Bhagwati (Digre Mata) situated at Khalanga Musikot. Digre Mela is famous in Rukum and it happens in Mangsir Chaturdashi. Kalika temple is also in Khalanga. Baraha temple and Shivaji temple in Rukumkot, Gadhidhar Deuti temple in Baphikot; Laxminarayan temple in Athbiskot and Shivaji temple in Bijayshowri are famous in Rukum. Besides these there is a Church at Khalanga, Musikot.

3.5 Main Trade Centers

The district has been connected by road link since last five years where as it has two airports at Khalanga and Chaurjahari for air link. At present there are different road networking has been developed by peoples own initiation among the district. But the management and sustainability of newly developed roads is in question. Due to the previous service centers and newly developed roads the development of trade centers is in progress. Some of them are in below:

Musikot	Rukumkot	Bafikot	Athbiskot	Nayag	adh C	haurjahari
Simrutu	Jhulkhet	Chunbang	Simli Baira	igithati	Gotamko	t Jhulneta
Pokhara	Mahat	Domai	Solabang			

3.6 Tourism Attractions

Rukum is one of the major districts of Rapti Zone for its geographical diversity and beautiful sceneries. It is known as a district of lakes and hills. There are beautiful lakes and mountains to give scenery for tourists. The district has beautiful plain pasture land in northern part. Some parts of the district are in Ghorepatan Conservation areas where different wild animals can be observe and it will be major natural resource of the district. The district possesses different kinds of herbs along the inner Himalayan zone. The major herb is Yarchagumba which is the major source of income of the northern part people. Panchaule, Kurilo, Timur, Dalchini, Gurjo, Katuki, Pangre, Jatamasi, Kumkum, Chiraito, etc are the other major herbs available in Rukum.

Vegetable seed producing area and the seed production centre are also the attractions for tourist. The flowering season of vegetable crop gives very attractive scenery for tourist. The rural settlements in different villages are also of attractions. The settlements of Taksera. Lukum are of some examples.

3.7 Major Rivers/Lakes

Rukum is rich in water. She has more than fifty natural lakes. Syarpu and Rukumkot lakes are of major attraction. Sanibheri is the major river nearly cross the whole Rukum from east north to south west. Many fertile land pieces are developed along its corridor with alluvial soil. It occupies major source of irrigation along the entire Rukum. Other rivers includes Thulibheri, Muglu Khola, Lukum Gad, Pelma Khola, Ranma Khola, Ruji Khola, Chunbang Khola, Seti Gad, Korja Khola, Puma Khola, etc.

3.8 Development Indicators

In development indicator Rukum lies in 58th position in Nepal. It shows that the district has been facing a common rural poverty line situation along other remote district of Nepal. According to District Development Committee the following development indicators are found in Rukum:

Human Development Indicator (HDI)	0.270
Gender Development Indicator (GDI)	0.238
Gender Empowerment Measurement	0.093
District Position (Out of 75)	58

3.9 Education Situation

There are 259 approved community based primary schools but total 368 are in operation by the local human and economic resources by the community people. One hundred fifteen lower secondary schools; forty nine secondary schools and fifteen higher secondary schools are in operation in Rukum. There are three campuses with bachelor level education. Total literacy rate of the district is about 45 percentages. Out of this 32 percentages are female and 58 percentages are male population.

3.10 Health Situation

There is one district level hospital in headquarter. One hospital is in Chaurjhari operated by Christian mission of Nepal. Total health service units are 43 including Ilaka health post, Sub health post and Ayurvedic health post. Private clinic and pharmacy are also not available in remote part of the district. There are about 53 such clinic and pharmacy along the major trade centers.

3.11 Communication Situation

Communication has been found much better than other sector of development. There is one district post office with internet, fax and photocopy machine facility. There are 34 additional post offices in different part of the district. Two FM radio service is in operation since last two years. Because of electric power problem these have not been used in full capacity. Telephone service is available in most of the VDCs by CDMA and VHF service. Mobile service is now available in most trade centers of the district.

3.12 Transportation Situation

There is 170 km gravel road connected with Dang district. About 199 track road has been developed within the district by the support of DDC and local participation. GTZ has constructed 32 km road from headquarter to major service centre Rukumkot. Nepal Army has been engaged in opening the track road to Mygdi district which is now been taken as a mid hill road of Nepal. There are 58 suspension bridges and 22 wooden bridges constructed in different part of the district.

3.13 Land Utilization

Total area of the district is 287700 ha. The utilization of land is as follows:

Agriculturally cultivable land: 29474 ha

Forest land: 171194 ha

Pasture land:	61952 ha
Others:	25080 ha
Cultivated land:	27450 ha
Irrigated land:	6550 ha

Source: DDC Rukum.

3.14 Food Availability Situation

Rukum is also a food deficit district as other districts of mid western region. The balance situation in 2009/10, according to DADO Rukum, shows that the total consumable food availability is deficit. The total deficit amount was 852 mt. This balance does not cover the potato which is also a major staple food of the remote area. The five percentage of potato if included in food availability the district comes in the food sufficient district. Last year the total available consumable food was 48429 mt and the requirement was about 49281 mt.

3.15 Major Crop and Production Situation

In terms of area and production maize is the major crop of Rukum. It occupies about 51 percentages of area and total food availability. Rice, wheat and other crops occupies rest of the production. The major crop and the production situation are given below Table 8:

S.N.	Crop	Area (ha)	Production (mt)	Productivity (mt/ha)
1	Rice	3750	1175	2.98
2	Maize	18650	35435	1.9
3	Wheat	11800	24780	2.1
4	Barley	925	925	1.0
5	Millet	960	960	1.0
6	Citrus fruit	681(363 productive)	4145	11.4
7	Temperate fruit	811(427 productive)	3652	8.55
8	Evergreen fruit	260(144 productive)	1514	10.52

Table 8. Crop Production and Productivity Situation of Rukum.

Source: DADO, Rukum, 2010.

3.16 Vegetable Seed Production Situation

Since the district as a vegetable seed producer, she has a long history of three decades of seed business. In the past the district has exported up to 170 metric tons of different vegetable seeds to other districts and abroad as well. In between the period of conflict the production status declined to 40 metric tons and the institutional capacity of the producers was also declined. According to DADO, the production was only 40 metric tons in 2010/11. One major reason behind it was the conflict which makes the productive labor to go here and there. The marketing and contract system went non functional and the all these cumulative effect happens to reduce the seed volume and quality.



The seed production trend of last ten years is shown in the figure below:



In fiscal year 2066/67, the total seed production of major seed producing VDCs with major crop is given below in Table 9 :

SN	VDC	Cauli flower	Radish	Onion	Rayo	Broad bean	Cres s	Carrot	Turnip	Swiss chard	Peas	P bean	Okra	Corian der	other	Total
1	Kholagaun	413	6171	830	672						5984	163				14233
2	Nuwakot	211	2067	150	329						7988	201				10946
3	Bijayshowri		298	42.5	46						992	223				1601.5
4	Khalanga			72.5			66				461	436				1035.5
5	Bhalakcha			363			330				160	351				1204
6	Sankh	85	2025	1745	2		35				318	523				4733
7	Chhibang		2141	776		75	70		102		351	235				3750
8	SVSPC	78	283	338	119		215	68.5	60	31	880	502	146	120	12	2852.8
Tot al		787	12985	4317	1168	75	716	68.5	162	31	17134	2634	146	120	12	40355.8

Table 9. Vegetable Seed Production Record in Fiscal Year 2066/67. (Kg)

Source: SVSPC, Rukum, 2010.

Figure 1 shows that the vegetable seed production trend is in decreasing trend. The highest seed production in fiscal year 2057/58 was recorded in DADO, Rukum. After that the conflict take its full momentum in Rukum and the manpower engaged in seed production disturebed in terms of input managemant, labor managemant and marketing management to make this business success. The production trend seems little bit positive in fiscal year 2062/62, it may be due to the last year of major insurgency of conflict so the farmers turn back to their own business. Due to the disturance in social structure of the production group the seed production trend seems not encouraging after this period too. The major problem mentioned by the farmers shows marketing as number one. That means after the long gap of conflict the developed marketing linkages were not functional or farmers are not capable to make fullfil that marketing gap. Input management is another problem they are still facing.

To address these problems DADO and SVSPC has conducted a massive institutional support to uplift the seed producing groups to cooperatives and technical trainings for post harvest promotion. To support market management farmers are organized either in cooperatives or supporting them to contract farming with Seed Entrepreeurs Association and other seed party. Information delivery system has been disseminated through FM and other media. The foundation seed has been distributed in subsidy and the field inspection and other quality control measures have been initiated. A seed laboratory has been established in SVSPC complex for germination, moisture and purity test by the economic support of UMN, Rukum cluster. The chief of SVSPC mentioned that this year farmer cooperatives will sale their seed with truth labelling in the market as directed by the seed act.

CHAPTER FOUR

4. RESEARCH METHODOLOGY

This study was carried out during May of 2010 in vegetable seed production pockets of Rukum. With the consultation of DADO and SVSPC, the vegetable seed production pockets and the seed producing family were listed. There were ten major vegetable seed producing VDCs and about eight hundreds families were involved in seed production program. The field survey was organized with the structured questionnaire. The check list was designed by the help of DADO and SVSPC and simple PRA was conducted with the key informants of the society.

4.1 Site Selection

According to DADO and SVSPC there were five vegetable seed producing pockets and which covers ten VDCs of the district. Namely the pockets are Kholagaun, Nuwakot, Peugha, Chhibang and Sankh and the VDCs are Kholagaun, Bijeshweri, Kotjahari, Purtimkanda, Nuwakot, Peugha, Khalanga, Chhibang, Garayla and Sankh. Since a long time, the farmer's family from these VDCs had been working in this vegetable seed business. Out of these ten VDCs three VDCs were selected for study with consultation of DADO and SVSPC. These VDCs were selected purposively but the selection base was location as well as the maximum seed producing VDCs and number of farmers.

Kholagaun VDC lies in the south western part of the district which produces radish, onion and peas as a major seed; Chhibang VDC lies in the central part of the whole geed growing areas and it produces cauliflower, radish, pea and onion as a major seed and; and Sankh VDC lies in the eastern part of the seed growing areas and it produces onion, radish, pole bean as a major seed.

It was considered about the production status of the sites; farmers involvement in seed production; geographical and political division; group activity; potential for collection centre; traders activity like contract farming; accessible and non accessible area, etc before selecting the sites.

4.2 Selection of Farmers

All together fifty farmers were selected from the list of total seven hundred ninety seven farm families involved in vegetable seed production business in Rukum provided by the SVSPC. Since, the VDCs were selected purposively and it should be followed the farmer selection according to the concern VDCs. It was used systematic probability sampling method

to select the farmer list for interview from the list of all three VDCs separately (Annex 2). The number of farmers was purposively fixed from each VDCs with the help of DADO and SVSPC before sampling and it was fixed twenty farmers from Kholagaun, fifteen from Chhibang and fifteen from Sankh. There were fewer farmers in Sankh than the other two VDCs but it was given fifteen farmers for interview because of the importance of major onion seed production area.

4.3 Collection of Primary Information

The primary information was collected by using structured questionnaire designed to meet the stated objectives of the study. The personal interview with the individual farmer was conducted by the researcher along with the help of Junior Technician Assistant of the production sites. Three JTAs, one in each VDC, were deputed for a week to conduct the survey. During interview discussion about the farming problem of the site were also noticed and advised for some general recommendations. During survey technicians visited their field; in some cases the group members were gathered to report their problems. PRA was conducted with group members as well as other farmers to take the general scenario of the area.

4.4 Collection of Secondary Information

The secondary information was collected through various literatures from library, key informants, DDC, DADO and SVSPC. A short PRA was conducted with key informants, JTA, farmer's group chairman, retailer and women leader farmer in a tea shop near to the SVSPC office. Different meeting and discussions were conducted with DADO and SVSPC chiefs. There were NGOs and INGOs supporting vegetable seed program and we make interactions with them about their support especially with UMN Rukum cluster; which supported economically to established seed testing lab in SVSPC complex.

4.5 Data Analysis and Report Preparation

The collected information was coded, tabulated, analyzed and necessary tables, figures and appendices were prepared. The information collected from the various sources was integrated and processed. The data collected from the field and from other secondary sources were analyzed and classified into descriptive and numerical character. The quantitative as well as the qualitative data were tabulated in MS Excel Spreadsheet and processed by the use of Statistical Package for Social Sciences (SPSS). The interpretation of the observation has been supported by figures, tables, diagrams, maps to make it more reliable and valid. The summery and conclusion was drawn from the study and recommendations for further improvement has been documented as report.

CHAPTER FIVE

5. RESULT AND DISCUSSION

5.1 Gender

There are ten major vegetable seed production VDCs in the district. Out of these, this study has covered three VDCs, namely Kholagaun, Chhibang and Sankh. About eight hundred families are engaged in commercial vegetable seed production program in Rukum district (DADO, 2010). Fifty families were selected randomly from these VDCs. Gender status of these families is shown in Table 10.

Out of fifty families 38 (76%) were male respondents and 12 (24%) were female respondents. Thirty percentage male and ten percentage female farmers were covered in Kholagaun, similarly twenty two and eight percentage in Chhibang and twenty four and six percentage in Sankh VDC.

Gender	VDC					
	Kholagaun	Chhibang	Sankha	Total		
Male	15 (30.0)	11 (22.0)	12 (24.0)	38 (76.0)		
Female	5 (10.0)	4 (8.0)	3 (6.0)	12 (24.0)		
Total	20 (40.0)	15 (30.0)	15 (30)	50 (100.0)		

Table 10. Gender of the Respondents.

Source: Field Survey 2010. Figures in parenthesis indicate percentage.

The contribution of female in vegetable seed production activities in national level is more than sixty percentage (MOAC, 2005). But in case of gender respondents during this study it is found only twenty four percentages of female participation. It seems logical because of male headed family structure of the society which prevails all over the western part of the country. Though, the female participation in vegetable seed production activities is not less than national reporting, about sixty seven percentages (SVSPC, 2008).

5.2 Ethnicity of Respondents

The ethnicity composition of the district is diversified. Bramin/Chhetri are in major ethnic majority followed by Magar Janjati as a major second ethnic group of the district. Dalit are also in all parts of the district. The district statistics shows that the Brahmin/Chhetri occupies about 67 percentages of total population; Janjati occupies about 24 percentages; Dalit occupies 6 percentages and others about 3 percentages (DADO, 2010).

Ethnicity	VDC					
-	Kholagau	Chhibang	Sankha	Total		
Bramin/Chhetri	14 (28.0)	12 (24.0)	13 (26.0)	39 (78.0)		
Janajati	6 (12.0)	3 (6.0)	2 (4.0)	11 (22.0)		
Dalit	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)		
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)		

Table 11. Ethnicity of the Respondents.

Source: Field Survey 2010. Figures in parenthesis indicate percentage.

In this study only three VDCs were covered and these areas are more accessible in terms of transportation and people settlement. Table 11 shows that the Bramin/Chhetri composition is more or less similar in all VDCs. Janjati composition is more in Kholagaun area as compard to Chhibang and Sankh. The major seed production area is scattered along the southern part of the district, which is major cereal growing irrigated area suitable for seed production.

This area of seed production is mostly covered by advantaged group of people where Janjati and Dalit are in small number. The major income commodity of the district is vegetable seed and the study shows that the advantaged group of people has occupied this business. Out of fifty respondents seventy eight percentages of respondents were Brahmin/Chhetri where as only twenty two percentage of respondents were Janjati. Because of random selection, this particular study could not cover the Dalit ethnic group and the study shows that the access of Dalit group in income generating activities is seem almost nil. Though, the district as a whole, dalit community are in good access of social and other economic activities as compared to the other districts of Mid-western region. Dalit communities are socially forward and active in most of the cases of enter cast marriage and political activities. Rukum is one of the major conflict affected area and participation was major of Dalit and Janjati community.

5.3 Family Size of the Respondents

The average family size of the district is about 5.62 (CBS, 2010). The average family size of respondents of this study shows more 7.42, Table 12, than the district and national family size. Maximum number of family size was found in Sankha VDC and the minimum in Chhibang. Out of 20 sample of Kholagaun VDC minimum no is found 4 where as maximum 16. It shows the family structure is still composite. Maximum number of households is tied up in joint family structure.

VDC	Sample HHs	Average	Minimum	Maximum	Modal size
	(No.)	family size	(No.)	(No.)	(No.)
		(No.)			
Kholagau	20	7.75	4	16	4
Chhibang	15	6.66	3	10	5
Sankha	15	7.86	4	13	8
Total	50	7.42	3	16	8

 Table 12. Family Size of the Respondents.

Source: Field Survey 2010.

These all three VDCs are in the most productive area and the population density is also high. Majority of the population belongs to Bramin/Chhetri and Janjati ethnic groups and the family structure is seems still composite. According to agriculture sample census there are 89 percentage population engaged in agriculture (CBS, 2002). Out of them 54 percentages male and 46 percentage female are involved in agriculture occupation. It shows that the total population engaged in agriculture is more than the national record and the family size involved in seed production is also more than the district and national record. The family size structure varies from 3 to 16 which show the variation of nucleus and joint family structure. The emerging structure of nucleus family and traditional structure of joint family combination seems such higher number of family size.

5.4 Education of Respondents

In Rukum district, there are 259 primary, 66 lower secondary, 34 secondary, 15 higher secondary and 3 colleges (DEO, 2010). According to 2058 National Census there are 49.49 percentage illiterate people in Rukum. Out of them 9.46 percentage population can only read; 39.75 percentage population can read and write.

Education	VDC					
-	Kholagau	Chhibang	Sankha	Total		
Illiterate	6 (12.0)	7 (14.0)	5 (10.0)	18 (36.0)		
Just literate	8 (16.0)	2 (4.0)	4 (8.0)	14 (28.0)		
Primary	1(2.0)	1 (2.0)	2 (4.0)	4 (8.0)		
Secondary	2 (4.0)	2 (4.0)	3 (6.0)	7 (14.0)		
SLC and above	3 (6.0)	3 (6.0)	1 (2.0)	7 (14.0)		
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)		

Table 13. Education of the Respondents.

Source: Field Survey 2010. Figures in parenthesis indicate percentage.

In this study, out of 50 respondents 36 percentage were illiterate, 28 percentage were just literate, 8 percentage with primary education, 14 percentage secondary school education holders and about 14 percentage were SLC and above. More illiterate were observed in Chhibang as compared to Kholagaun and Sankha as shown in Table 13. There were 16 percentage just literate respondents in Kholagaun which is more than other pockets. Primary education holders were observed less than the other category. About 14 percentage of respondents were secondary level education holders and about another 14 percentage of respondents were SLC and above SLC holders.

The education information taken for whole family but the analysis was done for the respondents only. The overall education situation of these three pockets gives about 64 percentage of respondents deserves education, which needs to handle this seed business from the production phase to market handling. Because of the advantageous group of people, the education level is higher than the district average.

5.5 Land Holding Pattern of Sampled Households

Total cultivated area in Rukum is 27480 ha, 77 percentage of total cultivable area. The average land holding size of the district is about 0.5 ha (10 ropani) per family. The average land holding size of the respondents of this study is observed 17.82 ropani (Table 14), minimum 2 ropani and maximum 67 ropani. The total land area covered by total respondents is about 891 ha.

VDCs	Land in <i>ropani</i>						
	Average	Maximum	Minimum	Total	Standard	Standard	
					Deviation	Error	
Kholagau	21.60	67.00	3.00	432.00	12.98	2.90	
Chhibang	19.53	45.00	3.00	293.00	12.21	3.15	
Sankha	11.06	25.00	2.00	166.00	7.34	1.89	
Total	17.82	67.00	2.00	891.00	10.84	1.69	

 Table 14. Land Holding Pattern of Sampled Households.

Source: Field Survey 2010.

The average land holding pattern is seems more than the district average holding pattern. It is logical that the selection of the respondents was random and the land area coverage pattern was not in major consideration. Since these pocket areas are in the holding of advantageous group of the district, mostly Bramin/Chettri. The highest land holding pattern has been observed in Kholagaun area, which is major vegetable seed growing area and the majority of the farmers holds more than 20 ropanies of khet land. Chhibang is also a major

seed growing area and the khet land holding is higher than the other area of the district. Sankh area land holding pattern is lower than the other two because this area has more bari land than the khet, where as seed production is mostly done in khet land.

The standard deviation is highest in Chhibang and Kholagaun area, which shows higher standard error. Since the sampling of the seed growing farmers was done by random method and the land holding pattern was not in consideration so it happens as a sampling error of the study.

5.6 Ownership of Land Holding of Respondents

As shown in the Table 15, 38 respondents have their own land which is about 76 percentage of the total. It shows that the farmers growing vegetable seed in their own land in majority. Kholagaun area about 36 respondents grow vegetable seed in their own land which is only 20 percentage in Chhibang and Sankha area.

Ownership of	VDC					
land holding	Kholagau	Chhibang	Sankha	Total		
Own land	18 (36.0)	10 (20.0)	10 (20.0)	38 (76.0)		
Own and rented	2 (4.0)	3 (6.0)	4 (8.0)	9 (18.0)		
land						
Own and hired	0 (0.0)	2 (4.0)	1 (2.0)	3 (6.0)		
land						
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)		

Table 15. Ownership of Land Holding of Households.

Source: Field Survey 2010. Figures in parenthesis indicate percentage.

Only 9 respondents rented land, which is more in Sankh, 8 percentages. The total land rented respondents were observed 9 which is only 18 percentages. It shows that the landlords who possesses rented land to poor and small farmers is not in big scale and it ultimately prove that our land division system within the family has made land fragmentation and very less landlords are in existence.

There is no hired land used in Kholagaun among our 20 respondents. Two respondents in Chhibang and 1 respondent in Sankha use hired land which is only 4 and 2 percentage respectively. The observation shows that the vegetable seed growing practice is in their own land which is our traditional practice of farming. Though there are different strategies of cooperative farming and other contract farming has been in government approach but in practice these systems are not functional. Some farmers provided rent land and this study could not cover the rented land status because this study confined within the respondents

production practices. In case of hired land the respondent farmers are growing vegetable seed, but the study could not digout more information about their hiring system except hired charge per annum.

5.7 Occupation of Household Heads

There are about 89 percentage of people engaged in agriculture occupation in Rukum district. Male covered about 54 percentages and female covered about 46 percentages out of total. The major occupation of the district is agriculture. Because of lack of year round road access people have very less outside exposure and job opportunity within the district. Road networking is now in progress within the district. Major commercial production going outside is vegetable seed, potato and cereal (rice and maize) takes second step.

Occupation	VDC						
	Kholagau	Chhibang	Sankha	Total			
Agriculture	18 (36.0)	14 (28.0)	14 (28.0)	46 (92.0)			
Services	2 (4.0)	1 (2.0)	0 (0.0)	3 (6.00			
Labour	0 (0.0)	0 (0.0)	1 (2.0)	1 (2.0)			
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)			

Table 16. Occupation of Household Heads.

Source: Field Survey 2010. Figures in parenthesis indicate percent.

Basically the major income of the district is based on agriculture product and herbes found in the northern part of the district. The major income comes through vegetable seeds produced in the southern part of the district. There are major two commercial exportable commodity of the district they are vegetable seed and honey. Though herbs mostly Yarsagumba is also an exportable commodity but it is not within the reach of the common people and it has not been legalized as a commercial product yet. In this particular study, major occupation of the respondents is observed as agriculture. Out of total 50 respondents 46 respondents occupy agriculture as a major occupation which is 92 percentages. Three respondents occupy service and one respondent occupy labor as a major occupation with agriculture as a minor occupation. As the occupation information of the district it coincides with 89 percentages of people engaged in agriculture occupation. There is no service as a major occupation of the respondents in Sankh where as it was only 2 and 1 in Kholagaun and Chhibang.

The remoteness of the district, low education status and long conflict situation prevailed in the district and the non agricultural occupation could not emerge as a major occupation. Vegetable seed is one of the major commercial products of the district for more than twenty years of time. Due to low volume and high value commodity it has been introduced and commercialized by the Government. There is a history of 170 mt seed produced and marketed even abroad. But it has been declined to 30-40 mt nowadays. The promotion of seed business ultimately supports to create the employment opportunity in different value chain processes from seed production to its disposal.

5.8 Sources of Information of Agricultural Technology

The information flow about agriculture technology plays a crucial role in the dissemination of extension activities. Because of different information sources farmers are getting more informative environment in Rukum district too. In information dissemination section the questionnaire has given options of different sources of information which make them aware to adopt this particular vegetable seed production technology. There are different sources of information among the communities but we are trying to dig out the major source which is much important in technology delivery process in the district.

Out of total, thirty percentage respondents reported (Table 17) that they get agricultural information from JT/JTA, radio and villagers as a maximum scorer of the study. The second source of information is the same as first including booklet, which occupy about fourteen percentages of total respondents.

Source of information of agricultural	VDC				
technology	Kholagau	Chhibang	Sankha	Total	
JT/JTA and NGO staff	0 (0.0)	1 (2.0)	3 (6.0)	4 (8.0)	
JT/JTA, radio and villagers	2 (4.0)	4 (8.0)	9 (18.0)	15 (30.0)	
JT/JTA and villagers	0 (0.0)	1 (2.0)	1 (2.0)	2 (4.0)	
JT/JTA, villagers and local leaders	0 (0.0)	1 (2.00	0 (0.0)	1 (2.0)	
JT/JTA, radio, villagers, local leaders	4 (8.0)	0 (0.0)	0 (0.0)	4 (8.0)	
and booklets					
Radio, TV, villagers and local leaders	1(2.0)	0 (0.0)	0 (0.0)	1 (2.0)	
JT/JJTA, radio and booklets	1 (2.0)	4 (8.0)	1 (2.0)	6 (12.0)	
JT/JTA and radio	1 (2.0)	3 (6.0)	0 (0.0)	4 (8.0)	
JT/JTA, NGO, radio and local leaders	4 (8.0)	1 (2.0)	1 (2.0)	6 (12.0)	
JT/JTA, Radio, villagers and booklets	7 (14.0)	0 (0.0)	0 (0.0)	7 (14.0)	
Total	20 (40.0)	15 (30.0)	15 (30.0)	50	
				(100.0)	

Table 17.	Sources of	f Informatio	n of Agricultura	l Technology.

Source: Field Survey 2010. Figures in parenthesis indicate percent.

The third source of information occupy twelve percentage of total respondents and which include two options of answer JT/JJTA, radio and booklets and JT/JTA, NGO, radio and local leaders. The study shows that the major source of information is not confined in one aspect of information but it governs by different sources of information at time. In Sankh VDC JT/JTA, radio and villagers provides maximum eighteen percentage of information where as it is only four and eight percentage in Kholagaun and Chhibang. The combination of JT/JTA, radio and villagers shows highest percentage of information flow in total. So the junior technicians' role seems very important in this aspect of agricultural information flow. Since the role of junior technicians was very much important during the early period of vegetable seed production in Rukum. In those days villagers were not aware in sufficient number to disseminate the information as nowadays. Because villagers became information carrier after the intervention of junior technician where they provide different extension tools like training, demonstration, etc. It is important aspect of technology dissemination for agricultural technicians that the villagers are carrying their approaches for non leader farmers because the technical training and demonstration were basically designed for leader farmers of the community.

Radio is one of the major and easily available tools for the remote farmers which they can use for their farming purpose too. The agriculture information centre, of Ministry of Agriculture and Cooperatives, conducted an agriculture program in the evening time was very popular in most part of the country. Similarly, the study shows radio plays a major role in agriculture information dissemination in some parts of the Rukum district too. Nowadays the radio program has been supported by different local FM programs. In Rukum there are two FM stations working in information flow process and they bears some of the agricultural information programs supported by District Agriculture Development Office, local NGOs and INGOs working in agriculture related activities.

From the above study it can be concluded that the different people gets information from different sources information channel. So the role in information flow of one organization or institute may not work properly due to the variation in social structure of the society. Some farmers make their connection with governmental offices whereas other makes connection with non governmental offices as the field coverage by the institutes according to their working modality. Information flow within the farming community by the farmers would be an important achievement in agriculture extension program.

5.9 Sources of Information of Vegetable Production

Fresh vegetable production for daily consumption is one of the major commercial activities in dense populated area like district headquarter, rural market places, road corridor and service centers. Fresh vegetable is produced along the road corridor and dense populated areas of the district and these products get commercial value for the farmers as a cash crop. Because of perishable nature these products are not possible to produce and dispose in remote parts of the districts.

The government policy is also to promote the fresh vegetable production programs along the road corridor and dense populate areas. The distance of production pockets to road head should be within 2-3 hours walking distance. Fresh vegetable farming is also a primary learning process for seed production program. So the farmers who grow fresh vegetable even in the kitchen garden would be helpful to extend the vegetable seed production farming. In this aspect this study tries to dig out some information with the respondents, who are vegetable seed growers, where from they gets information about vegetable production.

Source of information		VDC				
of vegetable	Kholagau	Chhibang	Sankha	Total		
production						
DADO	12 (24.0)	7 (14.0)	4 (8.0)	23 (46.0)		
SVSPC	4 (8.0)	2 (4.0)	3 (6.0)	9 (18.0)		
NGO	1 (2.0)	1 (2.0)	0 (0.0)	2 (4.0)		
DADO and NGO	0 (0.0)	0 (0.0)	1 (2.0)	1 (2.0)		
DADO and Villagers	1 (2.0)	1 (2.0)	3 (6.0)	5 (10.0)		
SVSPC and villagers	0 (0.0)	1 (2.0)	0 (0.0)	1 (2.0)		
Radio	1 (2.0)	2 (4.0)	1 (2.0)	4 (8.0)		
Villagers	1 (2.0)	1 (2.0)	3 (6.0)	5 (10.0)		
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)		

Table 18. S	Sources of	Information	of V	egetable	Production
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Source: Field Survey 2010. Figures in parenthesis indicate percent.

Out of total fifty respondents forty six percentage respondents (Table 18) mentioned that they gets information about fresh vegetable production form District Agriculture Development Office (DADO). Similarly eighteen percentage of respondents reported that they gets information on vegetable production from Sub-temperate Vegetable Seed Production Center (SVSPC), Rukum. The combination of DADO and villagers option gets response of ten percentage respondents similarly villagers as a source of information dissemination gets ten percentage of response.

Since DADO and SVSPC are two major institute of agricultural promotion of the district. DADO plays a major role in the agricultural extension activities in the district, basically responsible for policy making, planning, implementing the agricultural extension, production and marketing activities through the farmers' group approach modality. In the aspect of vegetable seed production, it plays role from foundation seed management to safe marketing of the produce. Seed producer group formation, cooperative formation, training, seed management, field monitoring, roughing, contract management in case of contract seed production are the major activities run by DADO. Where as SVSPC is responsible for the foundation seed production of officially notified crop seed within its farm area, training to the farmers and out reach program within the command area of the farm, may be more than one district.

In this study the result shows that the farmers are getting vegetable cultivating technology through DADO and SVSPC as a major. As the responsibility of these offices to aware the farmers about vegetable importance in our daily diet, to convince them vegetable as major commercial commodity so they can earn more than five times of money than the traditional crops maize, wheat to change their livelihood by changing the subsistence types of farming by utilizing the climate and other factors into commercial one. This study shows that these offices roles seem positive in terms of information flow.

5.10 Sources of Information of Vegetable Seed Production

Since three decades, vegetable seed production plays a major role in income security part of the district. Agricultural Perspective Plan of Nepal envisage mid hill as a potential area of commercial horticultural commodities to boost up the the livelihood of hilly people. Vegetable seed has been kept as one of the major high value crop of hill and high hill. Due to the high value and low volume nature vegetable seed occupy a important place of commercial commodity particularly in the irrigated areas of the remote hill and high hill. Among the major vegetable seed producing district Rukum plays major producer role particularly in onion and radish seed. According to District Agriculture Office Rukum, in Fiscal Year 2056/57 about 170 mt of different vegetable seed was produced and marketed by the framers of Rukum. About forty percentage of total onion seed produced in the country was supported by Rukum only. So it seems the vegetable seed was very fruitful and economical activity in the district and the farmers were getting outside income from vegetable seed as a major commercial commodity.

Source of information of	VDC				
vegetable seed	Kholagau	Chhibang	Sankha	Total	
production					
DADO	12 (24.0)	3 (6.0)	5 (10.0)	20 (40.0)	
SVSPC	5 (10.0)	6 (12.0)	3 (6.0)	14 (28.0)	
NGO	1 (2.0)	1 (2.0)	0 (0.0)	2 (4.0)	
DADO and SVSPC	0 (0.0)	0 (0.0)	1 (2.0)	1 (2.0)	
DADO and Villagers	1 (2.0)	1 (2.0)	2 (4.0)	4 (8.0)	
SVSPC and villagers	0 (0.0)	1 (2.0)	0 (0.0)	1 (2.0)	
Radio	0 (0.0)	2 (4.0)	1 (2.0)	3 (6.0)	
Villagers	1 (2.0)	1 (2.0)	3 (6.0)	5 (10.0)	
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)	

 Table 19. Sources of Information of Vegetable Seed Production.

Source: Field Survey 2010. Figures in parenthesis indicate percent.

In this study we try to dig out the sources of information related to vegetable seed production for knowing the information system flow in seed production activities. The study shows that forty percentages of total respondents gets vegetable seed technology information from District Agriculture Development Office (Table 19). Twelve respondents of Kholagaun VDC says that they are acquiring technical information on vegetable seed from DADO. Sub-tropical vegetable seed production centre (SVSPC) occupies second position to provide the vegetable seed production technology to the farmers. Twenty eight percentage of respondents mentioned that they get information from seed production centre, which is resource centre for foundation seed production and management.

The combined effort of concern organizations in information flow of vegetable seed production seems negligible. Non-governmental offices role in vegetable seed information flow is only four percentages where as villagers sharing is about ten percentages. The combined effort of DADO and villagers in information flow is about eight percentages where as the effort of SVSPC and villagers seem only two percentage. The major source of information flow radio is seems very less effective in case of vegetable seed information flow process. This may be due to the less concern of the related stakeholders working for seed production in development and dissemination of vegetable seed production related technology information. Since the vegetable seed production has very long history in Rukum; more than twelve hundred farmers family are directly engaged in seed production occupation and the major outside income of Rukum is vegetable seed which is about twenty million per year (SVSPC, 2009).

Most of the farmers in informal sharing mentioned that the role in initiation and promotion of vegetable seed activity was supported by Sub-tropical vegetable seed production centre and its programs. Though the organized production and marketing system is still lacking, Rukum has made its identification through vegetable seed. The climatic and land patterns are suitable; the commodity is high value with low volume for remote production and marketing; make the business suitable and profitable as comparing the traditional crops like wheat, maize, etc. In relation to the particular business, technology information is the major part of whole production and disposal system. There are two major organization responsible for the information production and dissemination are District Agriculture Development Office and Sub-tropical vegetable seed production centre, Rukum. Besides these organizations, different non-governmental offices and community based cooperatives and farmers groups are also being responsible and sharing this business in different aspects of production and marketing. International donors like UMN, national NGO like CEAPREAD and other local NGOs are also contributing this business as a income generating activity of the district. Recently SVSPC and UMN has made a contract of partnership for three years of time to run the vegetable seed promotion program in ten village development committees. So the importance of vegetable seed business in Rukum seems as a major income generating activity for income security of the district.

5.11 Types of Insect Pest Control Measures

The vegetable seed production is one of the technical activities it needs to be take care from the very beginning of crop sowing. Nursery is the first step to prepare the seedling where farmers have to save the seedling to make them transplanting age. After transplantation in main field it is basically an important activity to protect the plant from insect pest. The plant protection activity is needy up to the marketing of seed, so plant protection is very important part of this business.

Insect pest control measures	VDC				
-	Kholagau	Chhibang	Sankha	Total	
Chemical pesticide/insecticide	15 (30.0)	9 (18.0)	7 (14.0)	31 (62.0)	
Other than chemical pesticide/insecticide	5 (10.0)	6 (12.0)	8 (16.0)	19 (38.0)	
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)	

Table 20. Types of Insect Pest Control Measures.

Source: Field Survey 2010. Figures in parenthesis indicate percent.

According to respondent farmers they have to face insect pest and other disorder in vegetable seed production process. They mentioned that they try to control by using different chemical and biological control measures in different stages of plant. In this study it was try to dig out the insect pest control measures used by the farmers. Chemical pesticides are the main controlling measures used by the farmers. But nowadays biological control measures are in attention after the intervention of Integrated Pest Management (IPM) method. Among the fifty respondents thirty one respondents i.e sixty two percentages mentioned that they use chemical pesticides. It was highest in Kholagaun VDC where fifteen respondents accepted that they use chemical pesticides as a control measure. Similarly nine and seven respondents informed that they are using chemical pesticide as a plant protection measure in Sankh and Chhibang respectively. It shows that the use of chemical pesticide is higher than the biological pesticides. According to DADO office there are thirty IPM field school were conducted in last five years of period to aware the farmers about Integrated Pest Management control measure practice. DADO officials mention that IPM is the integrated management practice with the balance use of chemical, biological, hormonal and manual treatment process to control the insect pests with the consideration of pollution free environment.

Nineteen respondents out of total reported (Table 20) that they are using non chemical pesticides to control the insect pest problem, which is thirty eight percentage. They reported that they are using locally available materials like cow dung urine, wood ash with kerosene, Neem solution, etc. They mentioned that it was less effective than the chemical fertilizer but it makes the friendly environment so they will make it continue to control the insect pest. They reported that it was very difficult to control the diseases of onion and cauliflower. Out of total nineteen respondents, eight respondents of Sankh VDC, six respondents of Chhibang and five respondents of Kholagaun were using non chemical pesticide to control the insect pest of vegetable.

Integrated Pest Management (IPM) and Integrated Disease Management (IDM) are the main fundamental concept of Department of Agriculture to control the insect and disease problem in most of cash as well as food crops to make the cropping system sustainable and environment friendly. IPM has been practiced in cereal rice, vegetables, fruits where as the IDM has been practiced in potato crop. The philosophy of these two methods is based on the farmers involvement in whole cropping season to identify harmful and beneficial insect pest, to save the beneficial insect pests, using local methods of harmful pest control, to understand the plant morphology and environmental interaction, and to make aware the farming community to manage and save the crop by biological and chemical control method in integrated way for sustainable farming with healthy food production. So from this study we can summarize that the farmers of Rukum are in the way of integrated pest management practice and it needs to be promoted by the concern agencies working in agriculture field.

During survey most of the respondents reported that insect and disease attack is the major production problem. The decreasing trend of vegetable seed production in Rukum is also related with disease problem. The main problem is in onion and the disease is related with fungus. They mentioned that they are facing different insect and disease problem in Radish, Cauliflower but the sever problem is in onion. It is necessary to support the farmers in plant protection part by the concern agencies working in this field. The use of chemical pesticides as a control measure seems higher than the non chemical pesticides use so it is advisable to aware the farmers and implement the integrated approaches to control insect pest.

5.12 Types of Seed Storage

Storage facility is one of the major technologies to handle the seed in convenient environment for its longevity. According to SVSPC Rukum, farmers are using local materials to store the seed as they use the materials for all seeds. Locally the farmers use jute sacks and plastic sacks for seed storage purpose too. It has been mentioned as a major problem to handle the seed properly to maintain its viability and germination capacity which is directly related with the crop field establishment, germination and yield.

In this study we try to dig out the storage facilities using by the farmers of selected VDCs. After harvesting, post harvest handling starts from the moisture content of the seed to the cleanliness of store, packaging materials, store ventilation facility, rodent and other pest control measures etc makes the seed storage condition suitable or not for seed. It has been reported that the loss of handling of fresh vegetable crops is about twenty to thirty percentage where as in case of vegetable seed it is about twelve to fifteen percentage in storage handling.

Seed storage	VDC				
-	Kholagau	Chhibang	Sankha	Total	
Local room	9 (18.0)	0 (0.0)	2 (4.0)	11 (22.0)	
Plastic sacks	9 (18.0)	8 (16.0)	6 (12.0)	23 (46.0)	
Local seed bin	1 (2.0)	1 (2.0)	6 (12.0)	8 (16.0)	
Jute sacks	1 (2.0)	6 (12.0)	1 (2.0)	8 (16.0)	
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)	

Table 21.	Types	of Seed	Storage.
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Source: Field Survey 2010. Figures in parenthesis indicate percent.

In this particular study four options were given to the respondents to answer which storage type they are using for vegetable seed storage before they dispose it to the market. Out of total respondents forty six percentage respondents (Table 21) reported that they use the plastic sacks for vegetable seed storage. This sacks they used to store in local room condition. About eighteen percentages of respondents from Kholagaun VDC, sixteen percentages from Chhibang VDC and twelve percentages from Sankha VDC were reported that they are using plastic sacks for vegetable seed storage purpose.

After that twenty percentages of respondents reported that they use local room for vegetable seed storage. It is the process where they just keep seed in open room by using locally made mattresses and other wooden planks. This is not very common practice, mostly they use local room for seed storage by using jute or other bags but these respondents reported as they are using the room solely for seed in open storage.

Sixteen percentages of respondents are using local seed bins for seed storage, mostly these seed bins are made of local materials like bamboo, rice straw and wooden boxes. The questionnaire did not cover to dig out about improved seed bins i.e. metal seed bins and other improved storage materials for seed in Rukum condition. Similarly, sixteen percentage of respondents reported that they use jute sacks for vegetable seed storage and they keep these sacks in wooden racks or planks openly in local room condition.

In rural part of the country, mostly farmers use jute sacks and bamboo made seed bins for seed storage. It is very common practice of bamboo seed bins for cereal and vegetable seed storage, some farmers keep maize seeds open in *kausi* and *bardali*. Farmers mentioned that they face insect pest and rodent problem in store, which is very common in case of local storage with jut or plastic sacks in open rooms. There is no practice of using disinfectant in store before keeping the seed so it is advisable to give training and other support for seed growers.

5.13 Input Management

Input includes seed, fertilizers, insecticides; pesticides and other production related materials need to be managed in time and quality for seed production. The Farm Manager, SVSPC Chanpa, Rukum, Mr. Poudel mentioned that it is very important to manage the foundation seed from reliable source for the seed growers. SVSPC Rukum provides foundation seeds of Radish, Cauliflower, Onion, Peas, Rayo, Pole Bean and other seeds produced by the farm. So the vegetable seed growers of Rukum have this facility to get foundation seed within the district where as some farmers bought foundation seed from SEAN (Seed Entrepreneurs Association of Nepal), Kathmandu.

Most of the respondents reported that they have problem in chemical fertilizer availability during the peak season. Private dealers are the main source of chemical fertilizer and pesticides. Since last two years Government giving subsidy in chemical fertilizer but it is not adequate for all the farmers and they complained during interview that the subsidy material is not available in time and they have to depend on private dealers and mostly they sell low quality fertilizers. Most of the vegetable seed growers use chemical fertilizer but they are not using balanced recommended dose. According to the agriculture technician of DADO most of the farmers used nitrogen fertilizer i.e. urea and ammonium sulphate as a basal dose and they did not use phosphorous and potash fertilizer which are vital source of nutrient for the crop specially growing for seed production. The technicians are very much serious on this problem of unbalanced fertilization practice running in Rukum as other part of the country. DADO reported that the seed growing area has been affected by low _PH problem i.e. acidic soil concentration so it seems necessary to address this problem of soil management by awaking the farmers to use of balanced fertilization by concern authorities.

Input management	VDC					
	Kholagau	Chhibang	Sankha	Total		
Local market/Agrovet	10 (20.0)	4 (8.0)	5 (10.0)	19 (38.0)		
SVSPC	1(2.0)	1 (2.0)	1 (1.0)	3 (6.0)		
DADO/ASC	1 (2.0)	1 (2.0)	1 (2.0)	3 (6.0)		
DADO and SVSPC	1 (2.0)	4 (8.0)	1 (2.0)	6 (12.0)		
DADO and Local market/Agrovet	3 (6.0)	3 (6.0)	5 (10.0)	11 (22.0)		
SVSPC and local market/Agrovet	4 (8.0)	2 (4.0)	2 (4.0)	8 (16.0)		
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)		

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Source: Field Survey 2010. Figures in parenthesis indicate percent.

According to DADO, they have started cowshed improvement and compost making demonstration in different part of the district to aware the farmers to use compost, cow dung and cow urine combination with recommended doses of chemical fertilizers. Similarly, according to respondents they are buying chemical pesticides from local agro vets. Some farmers using local material as pesticides like cow dung urine.

In this particular study, we try to dig out the input management practices used by the farmers. Out of total respondents, thirty eight percentages reported (Table 22) that they are managing input from local market and agro vet. Similarly, twenty two percentage of respondents mentioned that they depends on DADO and local market and agro vet. It shows that the most of the i.e. about sixty percentage of respondents depends on DADO and local market and agro vets to manage the inputs necessary for vegetable seed production. Sixteen

percentage of respondents reported that they are depending on SVSPC and local market and agro vets for input management. Twelve percentage of farmers mentioned that they are depending on both DADO and SVSPC. Very few, only six percentages of farmers are depending on DADO and SVSPC respectively. The study shows that input management in time and quality is very important aspect of seed production and it shows that it more dependent on local market and agro vets so the authorities should address this problem by improving the local markets material quality and the quality of agro vet owner.

5.14 Marketing Channels of Seed Production

Vegetable seed production is one of the high value and low volume commodity prioritized by Agriculture Perspective Plan. Among the eight high value commodity vegetable seed has been kept as a major commodity of the mid and high hill of Nepal. Due to its high value and low volume nature, seed production program has got value in remote irrigated areas of Nepal.

1. Producers — Retailers (agro vets) — Consumers

- 2. Producers \longrightarrow Local collectors \longrightarrow Wholesalers (Dang) \longrightarrow Retailers \longrightarrow Consumers
- 3. Producers → Local collectors → Wholesalers (Nepalgunj) → Retailers Consumers
- 4. Producers → Local collector → Wholesalers (SEAN Seed Company Ltd. Kathmandu) → Retailers → Consumers
- 5. Producers Local collectors District collectors (Dang) —

Figure: 2. Marketing Channels of Vegetable Seed Production. Field Survey 2010.

There are different channels of seed marketing found in different parts of the country. Most of the seed business related channels are related with private sector. Many institutions are making contractual seed production program with farmers directly. The practice of contract is much unorganized event it is practiced as verbal contract only. Most of the seed collector reported that it is often seen the quantity of seed delivered is far less than the contracted quantity. Producer has also mentioned that they could not get their price in time and sometime the collector refused to give the contracted money when it fluctuates in market. There is still no special legal provision or incentive to make the contract agreement more binding and effective for either party. If these issues are not solved, the easiness of importing seed and attractive profit margin will motivate seed dealers away from domestic seed. Nepalese seeds are not properly dried, graded and packed. Very often proper inspection, certification and other quality control measures are not working. There is no active institution to supervise or check the quality of the seeds with regards to competitive market. Adequate efforts are lacking for institutional development of seed dealers and seed growers, besides government quality control agencies as well. There is an increasing shift from open pollinated varieties to hybrids and in the Nepalese seed market there are many varieties of seed widely used but not released by authority. There is generally a lack of information on the demand and supply of different seeds in the country with no regular surveys of the market or of production and marketing costs from different production pockets to major markets is also lacking.

Similarly, in case of Rukum the respondents reported that there are different channels of marketing followed by farmers and vendors. Different marketing channels were found in this study (Figure 2). First channel is simple where the producer disposes his product to the retailer and it directly goes to consumer. This channel is basically practice in Rukum by the local businessman. They buy seed with farmers in unorganized way and make it deliver to the consumers. In this practice farmers are making their business with their own way where they do not know how to handle the seed marketing business.

According to District Agriculture Development Office farmers are not organized in group marketing and cooperatives to make the marketing easy and productive. There is no organized contract farming so that they will have access to market without any bargaining with local vendors. In the second category of marketing it seems little longer to reach the consumers' hand. The producer sells the product to the collector, the persons basically from local area work as producer as well as businessman; collector gives the produce to wholesaler of Nepalgunj and Dang; and this wholesaler sold it to the retailer and then consumer gets seed from retailer. This seems very common process of worldwide seed business but it is very rare that the situation does not favor all the time so this practice is more applicable all the time.

The third category of marketing system reported by the respondents is same as second but it differs in case of wholesalers. The wholesalers in this category are private seed companies like Seed Entrepreneurs Association of Nepal; these companies involved in production part also. According to farmers they provide foundation seeds. Sometimes they have contract for seed marketing before seed sowing but this is not regular. Some farmers mentioned that this contract farming is not working properly; both farmers and contractors were not responsible in words in past so both parties had not benefited. The fourth category of marketing channel is more complex they reported during survey. The local collector first collects seed in the district; they sell it to district collectors like Dang; these district collectors sell it to the wholesalers from Kathmandu. The wholesalers from Kathmandu make it process to export in Bangladesh and other neighbor countries.

According to the chief of vegetable seed centre there was about one hundred and seventy metric tons of seed was produced and marketed abroad like Bangladesh before conflict in Nepal. It shows that the vegetable seed production and marketing if goes together than this business takes its momentum in every aspect. From above study we can conclude that there are different marketing channels practicing by the farmers and traders. According to the chief of District Agriculture Development Office, at present the district facing major problem in this business is well managed channel of marketing where producer, trader and consumer gets benefit.

5.15 Major Problems of Vegetable Seed Production

Vegetable seed production is one of the major production processes of agricultural commodity which needs more technical and managerial support to make it profitable. The major problems related to the fresh vegetable production like input, pests and other infrastructures are also comes as major problem in case of seed production too. The national policy as a high value and low volume commodity vegetable seed gets its priority in irrigated remote part of the country where fresh vegetable and other cash are not suitable due to lack of road and other facility. Rukum is one of the remote districts with high potentiality for seed production, where government has established a vegetable seed production centre to support the farmers in case of technology and source seed.

In this study we tried to dig out some major problems faced by the farmers. In problems ranking (Table 23) market facility has been found as a number one major problem in all three pockets.

Problems	Khol	agau	Chhi	bang	San	kha
	Index	Rank	Index	Rank	Index	Rank
Market facility	2.78	Ι	2.67	Ι	2.85	Ι
Insect/Pest	2.11	IV	2.17	IV	2.11	V
Transportation	2.23	II	2.42	II	2.24	III
Chemical fertilizers	2.16	III	1.05	VII	2.04	VI
Lack of technical knowledge	1.98	VI	1.20	VI	1.93	VII
Lack of good quality seed	2.01	V	2.35	III	2.46	II
Lack of irrigation facility	1.95	VII	2.06	V	2.16	IV

Table 23. Major Problems of Vegetable Seed Production.

Note: scale value range from 1 to 3, where 3= most serious, 2= moderately serious and 1=

little bit serious

Source: Field Survey 2010.

Transportation has been reported by the respondents as a second major problem in two pockets where as it has been kept as third major problem in pocket Sankh. In Sankh lack of good quality seed has been reported as second major problem where as it has been reported as third and fifth major problem in Chhibang and Kholagaun respectively. Chemical fertilizer availability was third major problem in Kholagaun pocket where as it has been kept as sixth and seventh major problem in Sankh and Chhibang respectively. Lack of technical knowledge has been reported as sixth major problem in Kholagaun and Chhibang where as it has been reported as seventh major problem in Sankh.

Insect pest is another major problem faced by the farmers during seed production. In this survey they reported it as a fourth major problem in Kholagaun and Chhibang where as it has been kept as fifth major problem in Sankh VDC. Another major problem, lack of irrigation facility, has been reported as fourth, fifth and seventh major problem in Sankh, Chhibang and Kholagaun VDC respectively. According to DADO office vegetable seed production business had reached up to the one hundred seventy metric tons of production to meet about forty percentages of total seed produced in Nepal during fiscal year 2056/57. It includes some amount disposes to abroad specially Bangladesh. So the district has crossed a long way to handle seed business and faced and overcome many problems.

During this survey majority of the respondents reported marketing as a major serious problem (index 2.85 out of 3). Marketing is the process which comes as a post harvest activity. Crop harvesting in time, drying, threshing, cleaning, grading, packing, etc are the fundamental activities which affects the marketed product for it pricing and quality. But our farmers are more concerned with the material disposal part and its price value as marketing. The other major post harvest activities are less important for the respondents and they talk more about the price and selling process difficulties as a major problem. According to technical person of Rukum district there are so many problems even in the production part like quality source seed, fertilizer, insect disease problems, labor problem, etc. Nowadays farmers are facing major problem marketing because there is no rule regulation properly; they have to pay extra duties to the different agents; farmers are not organized so they have not using their group strength for market promotion; it is advisable that either they have to promote cooperative marketing system or they need to make contract farming with seed companies or agro vets for market security.

The second major problem transportation is now been addressed by different projects and local level resourced and the road network has been developed around the district. The major seed production areas are within the network so the transportation problem will not exist in near future.

The third problem is inputs related which includes fertilizers, seed and irrigation facility. In case of source seed there is seed production centre in Rukum where they can have foundation seeds of Radish, Onion, Cauliflower, Peas, Pole Bean, etc. So source seed problem within district of winter vegetables is not major but it is problem in case of tropical vegetables. Chemical fertilizer in the production site is mostly unavailable during cropping season. Sometimes they get low quality fertilizer in high cost. Since last three years government has been providing chemical fertilizer in subsidy so the farmers are getting fertilizer in subsidy. The other problems insect pest and technical support are regular type of problems that they have to face in every crop and season. There are two major technical offices working to support the farmers in technical aspects from production part to plant protection and post harvest activities. There are other nongovernmental offices working in agricultural field and they also supporting in technical as well as social aspect of commercial agriculture.

Besides these problems reported by the farmers, there are some other problems like labor shortage and social cooperation. Due to the long conflict situation the social structure of the community is not working properly and the social norms, values are not being applicable, it is difficult to make a social harmony so that people can seat together and work for community. In this situation a social integration and interaction is necessary.

From above discussion we can conclude that the marketing problem is now should address by the production community either through cooperative or contract farming. It is very necessary to establish a common forum to tackle marketing problem. The seed act is also in active phase that it should be followed by the seed stakeholders. Source seed management, field inspection, roughing, seed cleaning, grading, lab testing, packaging, truth labeling and then sending for disposal are the basic phenomena which producer, technician and traders has to follow according to seed act. These whole integrated types of activities are not possible by a single farmer. It needs common approach of implementation for effective and efficient marketing channel.

Other problems like technical and input support is more related to the technical offices where the farmers need to improve the common approach to gain the technical support from technical offices. Limited technical human resource of those offices will not be effective in future so group approach to the concern offices makes the technical problem solving way. Local government has been planning for the district road linkages around the production areas so transportation facility will not be problem in future.

5.16 Benefit Cost Analysis of Seed Production

One of the major objectives of this study is to find out the benefit cost ratio of major vegetable seed and the common cereal crop wheat. The study has focused on the comparative advantages of vegetable seed with the cereal crop wheat. So we tried to take detailed information of cultivation practices of major vegetable seed crops onion and radish and the cereal crop wheat.

Crops	VDC	Item	Rs. per <i>Ropani</i>	B : C ratio	
	Kholagau	Gross return	22902.5	2.17	
		Average production cost	10544.5	2.17	
	Chhibang	Gross return	20446.0	0.11	
0		Average production cost	9675.2	2.11	
Onion	Sankha	Gross return	20070.0	2.01	
		Average production cost	9979.3	2.01	
	-	Average Gross return	21139.5	2 10	
		Average production cost	10066.3	2.10	
	Kholagau	Gross return	7087.0	1.05	
		Average production cost	3630.0	1.95	
Radish 	Chhibang	Gross return	6500.0	2.01	
		Average production cost	3229	2.01	
	Sankha	Gross return	6566.6	1.72	
		Average production cost	3800	1.72	
		Average Gross return	6717.9		
		Average production cost	3553.0	1.89	
	Kholagau	Gross return	2521.5	1 14	
Wheat		Average production cost	2205.3	1.14	
	Chhibang	Gross return	2274.0	1 17	
		Average production cost	1942.1	1.1/	
	Sankha	Gross return	2270.0	1 15	
		Average production cost	1964.7	1.15	
		Average Gross return	2355.3	1 15	
		Average production cost	2037.3	1.13	

Table 24. Benefit Cost Analysis of Seed Production.

Source: Field Survey 2010.

During study of onion crop, it has been incorporated to take the bulb production in one cropping season and then onion seed production in another season. In case of radish it has been tried to take the nursery management for radish root head cutting sowing practice but it was not in practice and the farm manager of seed production centre mentioned that root head cutting and sowing is practiced only in foundation seed production.

Wheat is also not very traditional crop in Rukum. It has been entered as a second major crop in irrigated areas after rice and before maize. Comparatively it is much better than the other cereal crop and gives cash crop value for farmers. This crop was taken as traditional crop in this study because mostly winter vegetables replace this crop during seed production. Vegetable seed takes long gestation period of time and have to wait about five to twelve months for general crops but even more than one year in case of cabbage, onion and carrot. In remote part of the country it is not possible to produce fresh vegetables in bulk; which needs nearby market and good transportation. So the alternate commodity for income generation in remote with certain irrigation facilities gives opportunity to produce vegetable seed which categorized as a high value and low volume crop in long term agriculture perspective plan too.

High hill and mountain area of Nepal possess very favorable climatic condition for different kind of vegetable seed without much high technology due to large isolated pockets around the inner Himalayan range of Nepal. Farmers using traditional crops like maize, millet, oat, wheat, etc since a long time of history and their farming practices never compared with other commercial approaches of farming and commodities for agriculture profit. Besides the long range of inner Himalayan, there are different niches found all over the country. These niches are suitable for off season crop production as well as for vegetable seed production like onion in Rukum area. Some tropical vegetable crop like tomato, okra, cucurbits, asparagus bean, etc are used to produce seed in terai and some sub tropical pockets of different sub tropical and warm temperate types of vegetables are used to produce seeds. So in this study we tried to cover major vegetable crops radish and onion to compare the benefit cost ratio of wheat as traditional crop.

The benefit cost analysis of seed production in Table 24, shows that the seed production status of vegetable seems significant as compared to the cereal crop wheat. In case of onion, benefit cost ratio in Kholagaun is 2.17, 2.11 in Chhibang and 2.01 in Sankha VDC. The average production cost and the gross return both are higher in Kholagaun area as compared to other VDCs. This may be due to the use of more chemical fertilizer as input,

which is much accessible area for availability of fertilizers and other inputs. Labor cost in this area is higher than the other part so it also contributed to swell up the average production cost. According to the DADO, irrigation facility is much better than other area. The study also shows that they have used more chemical and other fertilizers, micronutrients and other inputs to care the plant health.

Even in the wheat crop in Kholagaun, the average production cost is more than the other VDCs. Similarly, the the gross income in wheat is also much better than other part. It proves that, Kholagaun area has more investment in crop either in input or other resources. This area is more accessible in transportation, very old irrigation system is working there and the DADO record shows that there are more farmers trained for technology dissemination than other VDCs. The average production cost and gross income in Chhibang and Sankh seems similar in onion crop. The benefit cost ratio is also similar 2.11 and 2.01. These pockets are less accessible than Kholagaun and are less resourceful in terms of irrigation and other inputs. Farmers are also backward and the record shows that number of trained farmers is also less than the Kholagaun. The availability of chemical fertilizer and other input to these areas is also difficult. So the total investment and income both are less than the Kholagaun area.

In case of radish, it seems 1.89 benefit ratio of all pockets average, which is statistically significant. In Kholagaun, it is 1.95 where as it is 2.01 in Chhibang and 1.72 in Sankh VDC. Chhibang has been seen as more significant area for radish seed production. It may be due to the major area for radish seed production so that farmers know more about the seed production technology. In total vegetable seed production in Rukum, radish covers about sixty percentage of total amount so this crop has major role in contribution in income generating part. The major radish growing area is also Chhibang and Sankh. According to DADO last year in 2010, Rukum exported about twenty seven metric tons of radish seed to different part of the country. It was exported in small amount to Bangladesh and other countries fifteen years ago but due to the conflict and other migration problems it could not take up its momentum.

In case of wheat the average benefit cost ratio is 1.15. The benefit cost ratio is more or less similar to all the pockets 1.14, 1.17 and 1.15 in Kholagaun, Chhibang and Sankh respectively. It is comparable with the BC ratio of onion and radish in all the pockets. Economically, the study shows that the vegetable seed production in Rukum seems that hypothesis taken in this study as a wheat crop as traditional crop is seems very positive in the result. As the national policy to comparative advantage as major indicator to choose the commercial crop for income generating activities vegetable seeds in such areas like is seems encouraging. The earning capacity of the farmers is directly related to the poverty situation. When they grow competitive and comparatively advantageous crop in their field means farmer change their subsistence level of farming and trying to be commercial one in the society. Poverty prevails mostly in rural part of the country where more than seventy percentages of population lives. Though there is poverty prevails in urban area but the majority lives with comparative types of poverty. So rural area means the more number of farmer family and poverty prevails around them. Poverty reduction program should address this reality to touch the poor people.

From the above study we can conclude that, in the basis of comparative advantage onion and radish are comparatively profitable than the wheat. Farmers can earn about twenty to twenty five thousands of rupees from one ropani land of onion; similarly six to seven thousands rupees from one ropani land of radish and it comes only two thousands to two thousands five hundred rupees from one ropani of wheat land. From this figure we can conclude that the comparatively advantageous crop onion and radish should be recommended for the farmers to make change their income level and reduce the poverty.

5.17 Changes in Livelihood

5.17.1 Change in Food Habit

In this study we try to understand about the living condition of the farmers engaged in vegetable seed production program. Poverty is one of the major issues of the country. The whole development approach of the country is directly related with poverty reduction program of the people of below poverty line. According to National Living Standard Survey (2003), there are thirty one percentage populations in below poverty line. In recent, Three Yearly Plan (B.S.2064/65 - 2067/68) reported that the poverty has been declined to about twenty five percentage below poverty line. So the living standard and physical facilities for the people seems increasing but it has been coming because of non agricultural side than the agricultural production.

The overall goal of Nepal Government since eighth plan is poverty reduction and the whole programs related to agriculture and non agriculture is basically related to income generation and employment generation. Poverty is defined as an incapable stage of a person to maintain the daily basic needs, minimum infrastructure for living and clothes for wearing. This type of definition addresses that type of poverty which is not comparable but shows the ultra poor condition. It has been also measured in terms of health, education and nutrition facility available to the people. Another type of poverty, which is comparable with the upper society where the people are getting minimum basic needs of life but are poor condition also
known as absolute poverty and another aspect of poverty is relative poverty which is comparative to other less poor people. In Nepalese condition, it has been taken as a below poverty line people whose income is less than one American dollar per day. Because of different non agricultural activities, basically remittance from abroad of unskilled labor, the poverty level of people is decreasing and it has been reported about twenty five percentage level from thirty one percentages in last three years. And this study is also concentrated to assess the livelihood changing condition because of vegetable seed production program in some pockets of Rukum district.

Change in food	VDC							
habit	Kholagau	Chhibang	Sankha	Total				
Yes	20 (40.0)	15 (30.0)	13 (26.0)	48 (96.0)				
No	0 (0.0)	0 (0.0)	2 (4.0)	2 (4.0)				
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)				

 Table 25 Change in Food Habit of Respondents.

Source: Field Survey 2010. Figures in parenthesis indicate percent.

It has been envisaged that the food habit is also one of the major indicator to find out the livelihood condition of the farming community so we tried to dig out their food habit changing pattern after the seed production activity adopted by those particular families involved in this study survey. The use of nutritious food according to availability is the major concern of this study. That is, how people put their concern on food item consumed by their family members. In rural areas it is difficult to find the nutritious food material available but meat is one of the major food stuff taken as a rich family food. So how frequently they use meat is one of the indicator to find out the level of food standard. We use to question them that how many times per month they use meat similarly we ask them about the regular use of milk, green vegetables and fruits to know the changing scenario of food habit.

The result found was interesting; only two respondents out of fifty answered no change in food habit after doing this seed production business (Table 25). But it was very significant response that ninety six percentage respondents answered that they get change in their food habit i.e. use of meat regularly (three to four times a month), daily use of milk, green vegetable from kitchen garden and market as well, dal local or imported and own produced rice, wheat and maize. All the farmers of two pockets mentioned that they get changed in their food habit after adopting the vegetable seed production as commercially where as two farmers of one pocket mentioned as not changing their food habit after this occupation. It may be because of their low level of consciousness on nutrition and hygiene.

Though, the district is remote but living level and their concern in food seems very appreciative as compared to other remote district of this region. District agriculture development officer of DADO mentioned that this is due to the fertile irrigated land of the south-western part of the district where most of the cereals are grown year round. Mid and high mountain are fertile for fruit, potato, vegetable and herbs; which are major source of income to support in quality foodstuff. Ninety six percentage of respondents mentioned that they are getting changed in food habit after this occupation which is responsible to upgrade their social status unknowingly. Form this study we can conclude that this occupation of seed business has role in poverty reduction process as we discussed in earlier part of the topic. The use of nutritious food in the family means one major part of the poverty reduction process has been addressed and the society getting up towards the relative poverty searching group of society.

5.17.2 Change in Housing Condition

Housing condition of the farmer family is another major part of living related to poverty. Food, house and shelter are prerequisites to be fulfilled in absolute poverty. It is major dream of most family to have a well house which can occupy all the family members. Even in the urban area people invest their major income in house construction. In most of the rural parts of the country, farmers occupy their family members and livestock in the common shed. They construct a separate house, than the main house with kitchen, which is called dhansar is used by family members as a main bed room in upstairs and they keep livestock in ground floor. Most of the respondents mentioned that they have separate livestock cowshed after they use to cultivate vegetable seed in their farm.

Change in	VDC							
housing	Kholagau Chhibang		Sankha	Total				
condition								
Yes	16 (32.0)	14 (28.0)	12 (24.0)	42 (84.0)				
No	4 (8.0)	1 (2.0)	3 (6.0)	8 (16.0)				
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)				

 Table 26. Change in Housing Condition of Respondents.

Source: Field Survey 2010. Figures in parenthesis indicate percent.

In this study we tried to assess their housing condition in term of family members use of rooms, kitchen condition and livestock management. In rural area, kitchen used by the farmers is mostly in main common house without ventilated facility so mostly women farmers get respiratory problems. There is no separate room for the student; they use the same common room of the family members. In particular part of this study area, we found some change in case of their living styles.

Forty two respondents out of fifty mentioned that they have found change in their housing condition after they get some income from vegetable seed business. Only eight respondents reported that they have not changed their housing condition even after they use to cultivate vegetable seed. In Table 26, eighty four percentages of the respondents have mentioned that there is change in their housing condition where as sixteen percentage farmers reported that they have no made no change in their housing condition. The study shows that it is significantly found change in their housing condition by majority of farmers so the seed business has helped them to repair and construct their house according to the family size requirement.

It was found that most of the farmers have replaced their grass roof by tin roof and they managed a separate kitchen room and a cow shed as well. Rural poverty is mostly seen through the housing condition of the farmers where they live together man and livestock. They compromise their living either by the lack of earning or awareness. But most of the farmers mentioned that they are not managing their housing condition because of their low income source. From this study we can conclude that the major part of poverty has been addressed by the vegetable seed farming activities in Rukum.

5.17.3 Change in Children Education Condition

Education is another major part of the poverty. According to Central Beauro of Statistics (CBS,2001), there are only about sixty five percentage population is literate in Nepal and it is about forty five percentage in case of Rukum. Since last two decades there is very much attention has been given by all the habitants of rural and urban. There are many school and colleges has been established privately. Farmers in the rural areas are also very much eager to give quality education to their children. Since education is one of the major component to be fulfilled to overcome the poverty.

This study has been focused to assess the change condition of education by this vegetable seed production activities running in the remote part of the Rukum district. The education level of the rural people is directly indirectly related with the earning capacity of the farmers. The major earning in rural part of the country is now being focused by giving priority to high value crops like vegetable seed, fresh vegetable, fruit and other cash crops. These commodities have been selected by their comparative advantage value among the other crops and the niches available in different zone.

Tuble 27. Change in Chinaren Education Condition.										
Change in children education		VDC								
condition	Kholagau	Chhibang	Sankha	Total						
Yes	20 (40.0)	15 (30.0)	14 (28.0)	49 (98.0)						
No	0 (0.0)	0 (0.0)	1 (2.0)	1 (2.0)						
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)						

Table 27. Change in Children Education Condition.

Source: Field Survey 2010. Figures in parenthesis indicate percent.

The literacy rate of Rukum district is about forty five percentage, which is less than the national but it is quite significant than the other part of mid-western region. Literacy rate of the community is directly related with their income generating activities so it can be defined vice versa that education can promote to accelerate the new technological way of farming where as it can be assumed that the positive change in income level may accelerate or change their children education level. In this study we tried to assess the change condition in education of their children and it has been found that 98 percentage of respondents reported that they get change in their children education condition after doing this vegetable seed production business commercially (Table 27). Only one percentage respondent reported that he has not been found change in their children education level. This may be due to the new farmer who has still to be commercialized.

During the study we observed that most of the respondents mentioned that their children mostly the girls get chance to enroll in school, before it was boys who get more chance to study. Almost all farmers of this study were found positive toward the children education. Even some farmers mentioned that their life motto is to provide education to their children so they do not compromise to children education. Some farmers changed children's school from public to private after the seed business promotion. They are now able to manage their children's needs like education materials, playing materials and other daily use goods.

Rural poverty is major in our condition and the majority of population, about seventy percentage populations, is in rural areas so the poverty reduction means the upgrading of rural areas in terms of food, health, shelter and education. When rural farmers get able to manage their family members in all the aspects of minimum requirement of life than it is not necessary to keep any indicator to measure the poverty. From this study we can conclude that after doing this vegetable seed farming the farmers of Rukum district of those particular pockets has been able to change their children's education level in positive direction which is quite significant change found the study.

5.17.4 Change in Saving Condition

One of the major indicators to overcome the poverty is saving condition of the family for emergency happenings like natural disaster and the health related problems. In rural part of the country, farmers have to face different problems related to family health and other day to day problems. Due to lack of saving condition, financially they could not manage these problems and farmers depend on land lords to have loan facility. In such condition some farmers sell their land and other properties to manage family problems. So the saving condition of the farmers always saves them from local landlords' loan scheme and they can operate their farm house and family maintenance themselves.

	anon of hespondents.			
Change in family saving				
condition	Kholagau	Chhibang	Sankha	Total
Yes	8 (16.0)	13 (26.0)	10 (20.0)	31 (62.0)
No	12 (24.0)	2 (4.0)	5 (10.0)	19 (38.0)
Total	20 (40.0)	15 (30.0)	15 (30.0)	50 (100.0)

 Table 28. Change in Saving Condition of Respondents.

Source: Field Survey 2010. Figures in parenthesis indicate percent.

In this particular study we tried to assess the respondent's farmers about their saving condition after this seed production business. The study data (Table 28) shows that thirty one respondents out fifty mentioned that it has been changed positively their saving condition after this vegetable seed production activity which is about sixty two percentage. Nineteen respondents reported that they have not been able to change their saving condition but during interview they mentioned that they are not taking any loan from local landlords to operate farm activities and maintain family problems.

It shows that the income from vegetable seed farming is encouraging and the respondents of this study are able to manage their daily problems without lending loan from local landlords. It is highly appreciative to be free from land lords lending to our farmers for their basic needs fulfillment. The rural development process is now emerging in remote part of the country; local roads and other infrastructures are being constructed and different new and modern technologies are introducing which ultimately related to the income of rural people. So, income generating activities to change the saving condition of the farmer is most in rural part. The major income generating activities in rural areas are farm related and farmers' occupation related which includes cereal, vegetable, fruit and other cash crops income. Some non-farm activities are also in practice like carpentry, masonry and other activities. From this study we can conclude that the vegetable seed farming has very significant role in changing the saving condition of the farm family.

CHAPTER SIX

6. SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

Rukum is one of the remotest districts of Rapti Zone which lies in the Mid-Western Region of Nepal. District covers about 754 mt altitudes from seal level subtropical area to 6000 mt.of temperate and Himalayan region. It shows the geographical diversity within the district for agricultural diversification too. Due to its geography and the water resources available in the district are major factors to enhance the seed business in Rukum. Since last thirty years, the district has been producing vegetable seed as major income source for the farmers. The production trends shows that district has exported about 170 metric tons of seed in FY 2056/57 where as it was only 40 metric tons in FY 2066/67. The reason behind it, was obviously the conflict, disturb in the seed production labor support and destroy the institutional and marketing chains. According to DADO and SVSPC of Rukum, the production trend has been improving for last three years. The additional support form UMN Rukum has been given in institutional and marketing aspects of seed business.

The finding of this study shows that the out of fifty families 38 percentage of respondents were male and the 12 percentages were female. Though the female contribution in vegetable seed production is more than that of male but due to the male headed family the respondents appeared more in this study. Similarly, out of fifty respondents seventy eight percentages of respondents were Bramin/Chhetri where as only twenty two percentage of respondents were Janjati. Because of random selection, this particular study could not cover the Dalit ethnic group and the study shows that the access of Dalit group in income generating activities like vegetable seed is seems almost nil.

The average family size of the district is 5.62 and the average family size in study area recorded was 7.42. It shows that the family structure is still composite and they are tied up in joint family structure. The education situation of the respondents was recorded that out of 50 respondents 36 percentage were illiterate, 28 percentage were just literate, 8 percentage with primary education, 14 percentage secondary school education holders and about 14 percentage were SLC and above.

Similarly the average land holding size of the respondents of this study area is observed 17.82 ropani where as it is about 0.5 ha (10 ropani) per family in the district. The minimum was recorded 2 ropani where as it was 67 ropani as a maximum. Out of total respondents 38 respondents have their own land which is about 76 percentage of the total. It shows that the farmers growing vegetable seed in their own land in majority. Only 6

percentages of respondents are using their own land with hired land for vegetable seed production.

The occupational situation seems as the national scenario or more i.e. out of 50 respondents 46 respondents reported that their major occupation is agriculture. Only 6 percentages of respondents mentioned about the services they are doing in the district or out side the district. It was asked to dig out the information on sources of information of agricultural technology and it shows that the 30 percentages of farmers gets agricultural information from JT/JTA, radio and villagers. Similarly the 14 percentages of respondents reported that they get agricultural information from JT/JTA, Radio and booklets. Twelve percentages of respondents mentioned JT/JTA, NGO, Radio and local leaders as a source of agricultural technology information.

In case of the technology related to the vegetable production is the most important for the vegetable growers. Out of total respondents 46 percentages respondents reported that they gets information about fresh vegetable production from DADO and the 18 percentages of respondents reported that they get it from SVSPC. Since DADO and SVSPC are the major institute to have a responsibility of technology dissemination. Similarly in case of vegetable seed production they reported that DADO as the major source of information for vegetable seed production technology which is about 40 percentages of out of total respondents. As in the case of vegetable production SVSPC has also the second major support they reported in case of vegetable seed production technology dissemination.

Input management is another major component of seed production. In this study 38 percentages of respondents reported that they managed input like foundation seed, fertilizers, pesticides, etc. from nearby local market and Agro vets. Twenty percentages of respondents mentioned DADO and local market as source of input. DADO and SVSPC joint contribution seems 12 percent in input management.

Vegetable seed growing is mostly a year or more than a year business. It needs protection from insect, diseases and other pests. Chemical hazards are now being problem for environment and food material. So in this perspective, we asked them to know about the types of insect pest measures they are using. Out of total 62 percentages respondents reported that they are using chemical pesticides to control the insect pests where as 38 percentages of respondents use other than chemical pesticides like organic pesticides, indigenous plant materials, etc.

In case of seed storage 46 percentage of respondents reported that they use plastic sacks for seed storage. Seed storage is one of the most important parts of the seed quality control measures. These farmers use plastic sacks for seed storage and these sacks keep in local rooms. 22 percentages farmers reported that they use local rooms for seed storage and they keep seed in plastic sacks or local jute bags. Only 16 percentages respondents reported that they use seed bins for seed storage which is the best way to keep the seed with maintaining the quality.

Marketing of vegetable seed is another major aspect of business to dispose the product in reasonable price. There are different channels of seed marketing in Nepal. Similarly, from the study we found that there are five types of marketing channels reported by the respondents. It includes very simple and common channel of marketing which includes producers, retailers and consumers as a marketing chain. Some respondents reported more complex channel which includes producers, local collectors, district collectors, wholesalers, exporters and consumers as marketing chain members. During the study it has been identified marketing as major problem of seed business but both the producers and the traders were not accountable and transparent to run the business sustainable. There is no authorized contract business system. Contract marketing can be seen but it is running as ad hoc system both the producers and traders do not follow the agreement. DADO and SVSPC are making the congenial environment for both the party to transparent and accountable seed business. Farmers have been grouped to form a cooperative to handle the whole production to marketing chains by themselves. It has been concluded that either the seed growers has to be unified in a cooperative or make a authorized contract agreement with the seed company like SSSC.

As we tried to dig out the major problems related to the vegetable seed business market facility problem has been reported by all three pockets respondents as a number one problem. Market facility problem includes lack of seed processing plants, packaging and reliable party who buy the seed in reasonable price and give money in time. The second major problem they reported was transportation. Rukum has been linked with the Dang, a major trade centre of mid-western region, by a gravel road since last two years. Still there is a problem of year round easy access to the district headquarter though the internal road networking can be seen all around the district. Similarly the third problem includes lack of input availability and insect pest problem. Most respondents reported that they face problem on quality foundation seed and chemical fertilizer. The other problems listed were lack of irrigation facility and lack of technical knowledge.

The benefit cost analysis of vegetable seed radish, onion with traditional crop wheat was the major objective of this study. Vegetable seed production demands a fertile and irrigated land and gives high value and low volume product. In the remote part of the country where transportation is lacking and the comparative advantages has to be find out for the farmers to raise their income and support in poverty reduction. In this aspect we tried to find out the benefit cost ratio of major vegetable crops with considering the wheat as a replacing crop comparing for the comparative advantage. The benefit cost analysis shows that, it was 2.10 in case of onion, 1.89 in case of radish and 1.15 in case of wheat. Economically, the study shows that the vegetable seed production in Rukum seems very positive as the BC ratio of onion and radish indicates comparatively advantageous than the wheat. As the national policy to comparative advantage as major indicator to choose the commercial crop for income generating activities vegetable seeds in such areas is very much encouraging.

In the last part of the questionnaire we asked the respondents about their income and living condition. What has been changing in their livelihood like food habit, housing condition, education condition, saving condition because of the vegetable seed production? Did vegetable seed production program get success to change the livelihood of the seed grower's family? This was the major concern to dig out the subjective information about livelihood change and support in poverty reduction. In this aspect, change in food habit has been kept as a major indicator to know their food habit towards the nutritious food after the seed production business. The finding was interesting; out of total respondents 96 percentages reported that they have changed their food habit towards the nutritious food specially the regular use of meat, daily use of milk and green vegetables.

Similarly, improved housing condition has been taken as another indicator of better livelihood. This study focused to find out their housing condition in terms of separate rooms for family members, separate kitchen and separate livestock stall. And the result was very significant that out of 50 respondents 42 respondents reported they have changed their housing condition after they get surplus income from vegetable seed i.e. 84 percentages of respondents.

Another indicator was education of the children. It has been assumed that the education level of the rural children is directly related with the income of the family. So they will have quality education support then. In this study out of total respondents 98 percentages reported that they changed in their children education condition after doing this seed business. During study most of the respondents mentioned that the girls get chance to enroll in school. Some reported they enrolled their children in private school instead of public school.

The last indicator we keep to fine out the change in livelihood was saving condition of the seed growers. Saving with a farmer family means they can face with natural disaster and other health problems of the family by themselves. It makes them far from landlords loan which means poverty reduction of the family. In this study we observed that out of total respondents 62 percentages reported that they have now saving for the emergency. Thirty eight percentages reported they do not have saving but they do not need to go to the landlords to operate the farm activities. So from the study it can be taken positively that the vegetable seed business has given advantageous outcome to the seed growers to support in poverty reduction.

6.2 Conclusion

From the study it can be concluded that the most of the respondents accepted that they get changed their livelihood after starting this commercial vegetable seed farming as an occupation. Most of the respondents reported that they have now saving fund and no need to go to the landlords for farm activities and which is the major change we can conclude as a support in poverty reduction. The significant answer from the respondents towards their changing food habits shows their promotion to meet the nutritional food for the family. Similarly they reported that they are enrolling girls in school with the income from vegetable seed and even some farmers promoting their children to the private from public school indicates that the educational change has been supported by seed business.

The benefit cost analysis of vegetable seed production of onion, radish and wheat shows that the seed production status of vegetable seeds seems significant as compared to the cereal crop wheat. This makes us to conclude that the vegetable seed is comparatively advantageous to the traditional crop wheat. The benefit cost analysis indicates that onion vegetable seed gives about Rs.20-22 thousands per ropani gross income and the average production cost is about Rs. 9-10 thousands. The gross income of radish found was about Rs. 6-7 thousands where as the average production cost was Rs.3-4 thousands. In case of wheat the gross return found was Rs, 2 thousands 3 hundreds to 2 thousands 5 hundreds and the average production cost was around Rs. 2 thousands. The data guide us to conclude that the vegetable seed producers of Rukum has been cultivating a high value vegetable crops to produce seed which are economically profitable than the traditional crop like wheat.

Since last three decades Rukum has been promoted itself as a commercial vegetable seed producing district in the country. On the other hand there are many problems has to be addressed to make this business sustainable. The study assessed some major problems, reported by the farmers, are very much logical and practical facing by the seed growers. Marketing has been reported as a number one problem. Marketing itself a big subject it includes all the post harvest activities with institutional background of the producers. Due to the conflict institutional development became disturbed and the farmers needs to be reunite again and make a strong institutional seed growers cooperatives to handle the seed business in this open marketing system. At least two collection and processing plants have to be established by the authority to promote their seed quality as an exportable commodity for the foreign market.

Transportation problem has been addressing by the local government and the road networking can be utilized for seed in near future. Input is another major problem to produce the quality seed, basically the availability of quality foundation seed should be in consideration of the authority. Insect pest problem of the area has to be addressed by the use of insecticides and pesticides in environment friendly way i.e. Integrated Pest Management system. The another problem of technical support raised by the farmers needs to be concentrate not only on the production part but in the post harvest part basically in seed cleaning, grading and packaging with truthful labelling by the DADO and SVSPC and other concerned agencies. In some farmers field they have no year round access of irrigation so it needs to be concentrate the small irrigation programs of DADO in such seed producing pockets.

From the above conclusion we now are at the recommendation to the farmers, concern agencies and stakeholders to make attention of these problems of vegetable seed business of Rukum.

6.3 Recommendations

-) Since there are some formal organizational set up of farmers' group, but they should be reunite institutionally, upgrade them to the cooperatives and trained them in production as well as marketing aspects.
-) Marketing of seed should be managed either by the cooperatives or making legal contract system before plantation with seed companies.
-) Since DADO and SVSPC are responsible for technical support so now their technical support should go intensively towards the post harvest activities with production activities.
-) This study concluded that the vegetable seed production is comparatively advantageous than the traditional crops like wheat; BC ratio is 2.10 over 1.15; and it is recommended to all the farmers and concern agencies to give priority to promote the vegetable seed production program in such potential pockets of remote areas like Rukum.

- Farmers' groups or cooperatives should make a plan to arrange all the inputs including foundation seeds in every three years in advance; seed cleaning, grading, testing and packaging with truth labeling must be followed.
-) Though there is road track opening in the seed production area but a year round access with gravel road to the area should be in the plan of local government DDC to make the marketing accessible.
-) Small irrigation programs of DADO should give priority to these seed production areas to support in polythene pipe, sprinkle and plastic ponds for small farmers/ disadvantage groups.
-) Women farmers' groups should be in focus to mobilize them in seed production business. Women farmers' cooperatives may lead as a model cooperative of seed business due to the nature of the seed production and processing.
-) Integrated Pest Management School in the seed growing area will be a major tool to manage the insect pest problem in environment friendly way so DADO and SVSPC should support them to run the field school.
-) Two seed collection and processing plants; one in Sankh VDC and another in Kholagaun; are very urgent to establish so DADO should lead to manage local level resources from NGOs, donors like UMN and others to initiate the project.
- A seed testing laboratory has been established in SVSPC with the economic support of UMN, Rukum; needs regular technical support from Central Lab of SQCC and DOA/MOAC should manage a permanent post of lab technician for its sustainability.

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ANNEX: 1

List of Respondent Farmers.

S.No.	Farmers Name	Address	Remarks
1	Gopa B M	Kholagaun-2	
2	Mahila Oli	Chhibang-8	
3	Yogedra Oli	Kholagaun-2	
4	Bikram Khadaka	Kholagaun-3	
5	Ram Hari Adhikari	Chhibang-1	
6	Gyan Bahadur Oli	Chhibang- 1	
7	Sita Oli	Sankh-4	
8	Kiran Malla	Sankh- 2	
9	Dilli Saha	Kholagaun-7	
10	Hira Malla	Kholagaun-3	
11	Kul Bahadur Magar	Kholagaun-1	
12	Deepak Pandey	Sankh-5	
13	Dhana Maya Oli	Chhibang-7	
14	Maya Oli	Kholagaun-6	
15	Prem Jung Malla	Sankh-7	
16	Devi Oli	Sankh-1	
17	Ramesh B M	Kholagaun-5	
18	Sita Buda	Kholagaun-3	
19	Nandita BM	Chhibang-5	
20	Man Bdr. Gurung	Kholagaun-4	
21	Ram Kumar KC	Sankh-4	
22	Mahesh Gurung	Kholagaun-3	
23	Kumari Rana	Sankh-9	
24	Ram Oli	Sankh-6	
25	Gayatri Buda Magar	Kholagaun-4	
26	Om Bdr. BM	Chhibang-3	
27	Suresh Malla	Chhibang-1	
28	Hari Maya Khadka	Chhibang-7	
29	Ram Bdr. K.C.	Sankh-8	
30	Jeevan Malla	Sankh-5	
31	Krishna Saha	Kholagaun-6	
32	Rama Gurung	Chhibang-4	
33	Hare Ram Oli	Chhibang-7	
34	Kulbahadur Oli	Chhibang-5	
35	Mukunda Saha	Kholagaun-4	
36	Kuber Khadka	Sankh-9	
37	Lalbir Buda	Chhibang-2	
38	Mahendra Oli	Chhibang-8	
39	Kurbir Khadka	Kholagaun-5	
40	Mahesh BM	Sankh-7	
41	Ram Oli	Kholagaun-4	
42	Bharat KC	Chhibang-2	
43	Suresh Karki	Sankh-4	
44	Santosh Karki	Sankh-5	
45	Lok Bahadur Khatri	Kholagaun-6	
46	Nar Bahaddur Khatri	Sankh-6	

47	Brikhe KC	Chhibang-7	
48	Dinesh KC	Kholagaun-4	
49	Ramhari Oli	Kholagaun-1	
50	Mukunda GC	Kholagaun-4	

ANNEX: 2 Total Farmers Family Involved in Vegetable Seed Production according to VDCs.

गा.बि.स (पकेट क्षेत्र)	कृषक परिवार	कैफियत
खलंगा	४२	
छिवांग	११२	अध्ययन गरिएको गा.वि.स.
साँख	४६	अध्ययन गरिएको गा.वि.स.
पेउघा	३६	
गरायला	S	
नुवाकोट	१२७	
खोलागाउँ	ર૦૧	अध्ययन गरिएको गा.वि.स.
बिजेश्वरी	१४३	
कोटजहारी	४२	
पुर्तिमकाँडा	१९	
जम्मा	७९७	

रुकुम जिल्लामा तरकारी बीउ उत्पादनमा संलग्न कृषक परिवार

Source: DADO, Rukum, 2010.

ANNEX: 3

Questionnaire

ब्यावसायिक तरकारी बीउ उत्पादन खेतीले गरीवि न्यूनिकरणमा पुऱ्याएको योगदान सम्बन्धि प्रश्नावली एक अध्ययनः रुकुम

क. आधारभूत तथ्याङ्क अन्तरवार्ता दिनेको नाम:.....

मितिः २०६४ / /

क्षेत्र सम्बन्धी बिबरण

। राल्ला:	
गा.बि.सः	वडा.नं :
टोल वा बस्तिको नामः	

२) परिवार संम्बन्धी बिबरणः

२.१ पारीवारिक बिबरण		
घरम्लिको नामः		
घरमुलि: पूरुष/महिला		जातीः
घरमूलिको पेशाः मूख्य		सहायक
घरमूलिको शैक्षीक योग्यताः	नीरक्षर/साक्षर (अनैपचारिक	ऽ)∕प्रा.बि∕नि.मा.बि∕मा.बि∕एस.एल.सी
1	पास/प्रमाण पत्र तह/स्नात	क वा सो भन्दा माथि

२.२ पारिबार संख्या सम्बंन्धि बिबरण

उमेरको अबस्था	पूरुष	महिला	ज्ञम्मा
४ बर्ष भन्दा मुनि			
६ देखि १४ वर्ष सम्म			
१६ देखि ४४ वर्ष सम्म			
४४ देखि ६० बर्ष सम्म			
६० भन्दा माथि			

२.३ पारिबारिक शैक्षीक अवस्था सम्बन्धमा

५ बष	र्भ	५ वर्ष भन्दा माथि																																						
मुनि	मुनि		र	साक्षर		<u>प्राइ</u> मरि		मरि निमाबि एस.एल.		निमाबि		एस.एल. जी		सर्टिफिकेट		सर्टिफिकेट		सर्टिफिकेट ब		सर्टिफिकेट		सर्टिफिकेट		सर्टिफिकेट		सर्टिफिकेट		सर्टिफिकेट		सर्टिफिकेट		सर्टिफिकेट		सर्टिफिकेट		लर	स्नात	कोत्तर	ज	म्मा
										सा																														
म	पू	म	पू	म	पू	म	पू	म	पू	म	पू	म	पू	म	पू	म	पू	म	पू																					

नाटः म= महिला, पू= पूरुष

२.४ जग्गा जमीनको अबस्था बारे

जग्गाको बिबरण जोतको बिबरण							जम्मा				
			अरुलाइ	दिएको		अरुबाट	लिएको				
खेत	बारी		खेत	बारी		खेत	बारी		खेत	बारी	

ख. कृषि संग आधारित सूचना आधानप्रदान सम्बन्धि बिबरण

३) तपाइले कृषिको आधुनिक प्रबिधिबारे ज्ञान काहांबाट पा	उनुहून्छ?
सरकारि जे.टि/जे.टि.ए	
गैरसरकारि संस्थासंग आबद्य र्कमचारिबाट	
रेडियो बाट	
टेलिभिजन बाट	
गाउलेबाट	
स्थानिय लिडर बाट	
लिफलेट/बुकलेट/पत्रपत्रीका/किताब पढेर	
अन्य	

४) तपाईलाइ तल उल्लेखित काम सम्बन्धी जानकारि कहाँबाट प्राप्त भयो ?

ताजा तरकारी उत्पादन सम्बन्धि ज्ञान	
तरकारी बीउ उत्पादन सम्बन्धि ज्ञान	

५) ताजा तरकारी बाली को उत्पादन सम्बन्धि बिबरण

बालि				
	क्षेत्रफल	उत्पादन	उत्पादकत्व	कैफियत
			मेट⁄हे	
काउली				
बन्दा				
रायो				
मूला				
गाजर				
प्याज				
अन्य १				
२				
२				
४				
X				

६) प्याजको बीउ उत्पादनको लागत तथा आम्दानी

क) लागत (प्रति रोपनी)

विवरण	ईकाई	संख्या	दर (रु)	जम्मा (रु)	कैफियत

क) गानो तयार गर्न (
पहिलो वर्ष)					
९ नर्मरी लगन नगारी					
ा. गत्तरा ज्याङ रायारा					
खनजोत					
गोरु	जोडी				
ज्यामी-(खनजोत र बीउ	संख्या				
रोपाइ					
बेर्ना हेरचाह, सिचाई, बाली	संख्या				
संरक्षण तथा गोडमेल गर्न					
२. मुख्य जमीन तयारी					
गोरु (रु)	जोडी				
ज्यामी जग्गा तयार गर्न	जना				
मलखाद प्रयोग गर्न ज्यामी	जना				
बिरुवा रोप्न ज्यामी	जना				
गोडमेल गर्न ज्यामी	जना				
सिचाइ, विषादि प्रयोग गर्न ज्यामी	जना				
बाली भित्रया्उन	जना				-
जम्मा ज्यामी खर्च					
सामाग्री विवरण					
रासायनिक मल					
डी ए पी	के जी				
यूरिया	केजी				
पेटास	केजी				
कम्पोष्टमल/गोबरमल	डोको				
बिषादि	के जी				
बिउ	ग्राम				
जम्मा सामाग्री खर्च					
कूल खच:			(
ख) बाउ उत्पादन (दोस्रो बर्ष)	হঞাহ	સહ્યા	दर (रु)	जम्मा रु	
गानो रोप्न जग्गा तयारी					
गन ज्यामा खच					
खनजात गोरु	जोडी				कैफियत
ज्यामी	जना				
मलखाद को प्रयोग गर्न	जना				
ज्यामी					
प्याज गानो रोप्न ज्यामी	जना				
गोडमेल, बिषादि प्रयोग	जना				

तथा सिचाई गर्न ज्यामी				
प्याज बीउ बाली भित्र्याउन	जना			
ज्यामी				
बीउ कार्न तथा सफागर्न	जना			
ज्यामी				
बीउ प्याकेजिङ्ग तथा बीक्रि	जना			
वितरण गर्न ज्यामी				
जम्मा ज्यामी खर्च				
सामाग्री खर्च विवरण				
रासायनिक मल				
डि ए पी	के जी			
यूरिया	के जी			
पोटास	के जी			
कम्पोष्ट∕गोबरमल	डोको			
विषादी	के जी			
प्याज गानो	के.जी.			
जम्मा सामाग्री खर्च		·	•	
कूल खर्च				
जम्मा बीउ उत्पादन खर्च (
क+ख)				

<u>आम्दानी</u>

	उत्पादन के जी (प्रति रोपनी)	बजार भाउ (प्रति के जी)	जम्मा आम्दानी (रु)	कैफियत
प्याज				
बीउ				

७) मूला बीउ उत्पादनको लागत तथा आम्दानी लागत (प्रति रोपनी)

विवरण	ईकाई	संख्या	दर (रु)	जम्मा (रु)	कैफियत
खनजोत					
गोरु (रु)	जोडी				
नर्सरी ब्याड तयार गरी	जना				
विरुवा हुर्काउन ज्यामी					
जरा रोप्न जग्गा तयारी	जना				
गर्न ज्यामी					
सिधै मुख्य जमीनमा					
बीउ छरी रोप्नको					
लागी जमीन तयारी					
गर्न					
जग्गा तयारी गर्न					
गोरु	जोडी				
जग्गा तयार गर्न	जना				
ज्यामी					
बिउ रोप्न ज्यामी	जना				
गोडमेल तथा सिचाई	जना				

गर्न ज्यामी			
विषादि प्रयोग गर्न	जना		
बाली भित्रया्उन	जना		
क्योरिङ्ग गर्न, प्रशोधन	जना		
तथा सफा गर्न			
बजार लैजान	जना		
जम्मा ज्यामी खर्च			
सामाग्री खर्च विवरण			
रासायनिक मल			
डी ए पी	के जी		
यूरिया	के जी		
पेटास	के जी		
<i>कम्पोष्ट∕</i> गोबरमल	डोको		
विषादि	के.जी		
बिउ	ग्राम		
जम्मा सामाग्री खर्च			
कूल जम्मा खर्च :			

<u>आम्दानी</u>

बाली	उत्पादन के जी (प्रति रोपनी)	बजार भाउ (प्रति के जी)	जम्मा आम्दानी (रु)	कैफियत
मूला बीउ				

८. गहूँ खेतीको लागत तथा आम्दानी <u>लागत</u>

विवरण	ईकाई	संख्या	दर (रु)	जम्मा (रु)	कैफियत
खनजोत					
गोरु (रु)	जोडी				
जग्गा तयारी गर्न	जना				
ज्यामी					
बिउ छर्न ज्यामी	जना				
गोडमेल गर्न ज्यामी	जना				
सिचाइ, विषादि	जना				
प्रयोग गर्न					
बाली भित्रया्उन	जना				
बजार लैजान	जना				
जम्मा ज्यामी खर्च					
सामाग्री खर्च विवरण					
रासायनिक मल					
डी ए पी	के जी				
यूरिया	के जी				
पेटास	के जी				
कम्पोष्ट/गोबमल	डोको				
विषादि	ग्राम				

	बिउ		के जी					
जम्मा सामाग्री खर्च								
कूल खर्च :								
आम्दानी								
	बाली	उत्पादन के	जी (प्रति	बजार भाउ (प्रति के जी)	जम्मा आ	ाम्दानी (रु)	कैफियत
		रोपनी)						
	गहूँ							

९. व्यावसायिक तरकारी बिउ उत्पादन गर्दा देखा परेका मुख्य मुख्य समस्याहरु के के हुन ?

१०. तपाईले उत्पादन सामाग्री बीउ तथा मल कहाँबाट ल्याउनु हुन्छ ?

११. तपाईको उत्पादित सामाग्री कहाँ लगेर बेचबिखन गर्नु हुन्छ ?

१२. उत्पादित सामाग्री बेचविखन अगाडि भण्डारणको ब्यवस्था कसरी मिलाउनु हुन्छ ?

१३. प्याज, मूला तथा अन्य बालीमा रोग, किराको रोकथाम कसरी गर्नु हुन्छ ?

१४. तपाईले व्यावसायिक तरकारी बीउ उत्पादन खेती गरेर तपाईको परिवारको जीवनस्तरमा कस्तो सुधार आएको छ ?

खानपानको अवस्थामा सुधार

घरको अवस्थामा सुधार

बच्चाबच्चीको पढाई लेखाईमा सुधार

पारिवारिक बचतको अवस्थामा सुधार