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PERCEPTION OF VEGETABLE GROWERS TOWARDS TOMATO PRODUCTION IN DODA DISTRICT OF JAMMU & KASHMIR-INDIA

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ABSTRACT

Background: Tomatoes are very important ingredients of our food or diet system. In India tomato occupies second position amongst the vegetable crops in terms of production next to potato. India ranks 3rd tomato producing country in the world in 2010, accounting for 8.22 percent of total world's tomato production.

Aims and Objective: This study assessed the perception of vegetable growers towards tomato production in Doda district of Jammu & Kashmir.

Material and Methods: Out of total 8 blocks in the district we have selected two blocks-Assar and Marmat because tomato production is mostly confined in these blocks. The target population of this study consists of tomato growers of the two blocks and a structured questionnaire was administered to 120 respondents (20 farmers from each village) in the study area. Data collected were analysed using frequencies, percentages and chi-square analysis.

Results: Results showed that majority of the respondents (83.33%) used HYV seeds. About 13 percent of the farmers had no formal education and only 56.67 percent of the farmers had secondary education. Also, most of the respondents (58.33%) perceived that tomato production was not profitable. The result shows that factors like land owned, educational level, and sources of labour affect the level of satisfaction of the tomato growers.

KEYWORDS: vegetable growers, tomato, level of satisfaction.

INTRODUCTION

Background

Vegetables are very important ingredients of our food system and tomato is one important of them. Tomato is said to be the native of South America and was spread around the world following the Spanish colonization of the America in the 16th century and it became popular in India within the last seven decades. The tomatoes are now grown and eaten worldwide. These are consumed in diverse ways, including raw in salads, as an ingredient in many dishes and sauces, processed into ketchup or tomato soup and unripe green tomatoes can also be breaded

and fried, used to make salsa, or pickled. Tomato juice is sold as a drink, and is used in cocktails such as the Bloody Mary. Tomatoes are acidic, making them especially easy to preserve in home canning whole, in pieces, as tomato sauce or paste. The fruit is also preserved by drying, often in the sun, and sold either in bags or in jars with oil. Tomatoes are used extensively in Mediterranean cuisine, especially Italian and Middle Eastern cuisines. They are a key ingredient in pizza, and are commonly used in pasta sauces.

While tomato is botanically a fruit, it is considered a vegetable. The most widely grown commercial tomatoes tend to be in the 5–6 centimeters diameter range. Most of the vegetable growers produce red tomato, but other varieties of tomato like orange, pink, purple, green, black, or white tomato are also available. Tomato is rich in lycopene, which may have beneficial health effects.

Tomatoes are now eaten freely throughout the world, and their consumption is believed to benefit the heart, among other organs. They contain the carotene lycopene, one of the most powerful natural antioxidants. In some studies, lycopene, especially in cooked tomatoes, has been found to help prevent the ovarian cancer, especially in premenopausal women, digestive tract cancers (mouth, throat, esophagus, pancreas, colon and rectum), cardiovascular disease, asthma and chronic lung disease and prostate cancer (*Leo Galland, 2011*). But other research contradicts this claim and claim that tomatoes might be nutritious and tasty, but don't count on them to prevent prostate cancer (*Science Daily -May 17, 2007*). Lycopene has also been shown to improve the skin's ability to protect against harmful UV rays (*BBC News- 28, April, 2008*).

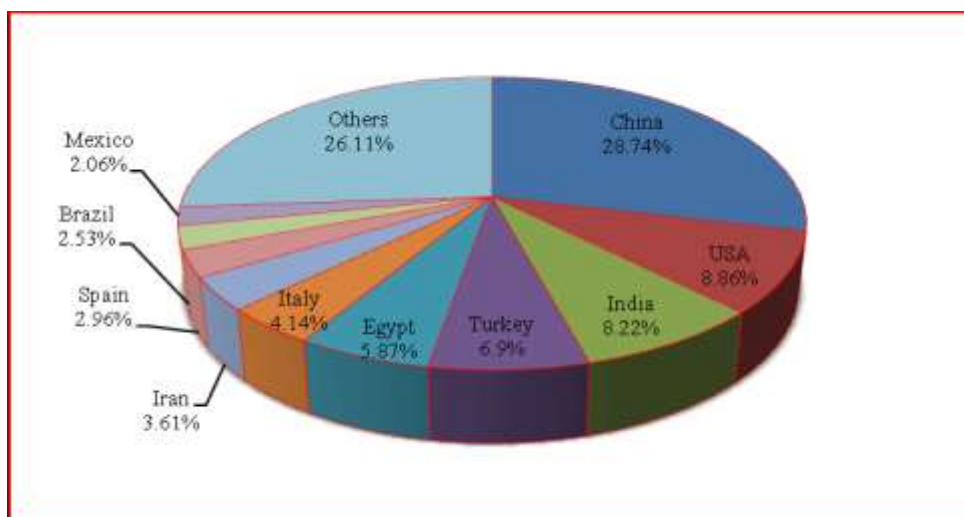
Global Tomato Production

In the world, tomato is grown in almost all the regions. In terms of area under this crop, Asia accounts for nearly half of the total area diverted for producing tomato. As far as area under tomato crop is concerned, China stands first followed by India, United Nations, Turkey, Egypt in the world (*Vigneshwara, 2001*). In 2010, world produces around 141,401 million tons of tomatoes (*Francois, 2010*) from an area of about 3170000 hectare (*Asgedom et al, 2011*), out of which China has emerged as the world's largest tomato producer, with global output share of 28.74 percent. United States and India occupy 2nd and 3rd places with global shares of 8.86 percent and 8.22 percent respectively.

Along with the supply, the demand for tomato products has risen in recent years in the international market. In 2003 the main importers were United States of America (26.5 percent), Germany (19.3 percent), United Kingdom (12.4 percent) and France (8.7 percent), which accounted together for more than 66 percent of the total world imports. The main exporting countries of tomato in the world in 2003 were the Netherlands (23.9 percent), Spain (20.5 percent), Mexico (20.5 percent), Belgium (6.5 percent) and Canada (5.5 percent), accounting together for 77 percent of the world exports (*Asgedom et al, 2011*).

See pie chart below:

FIGURE 1.1 PRODUCTION OF TOMATO IN TOP TEN COUNTRIES OF THE WORLD



Sources: agriexchange.gov.in

Analysis:

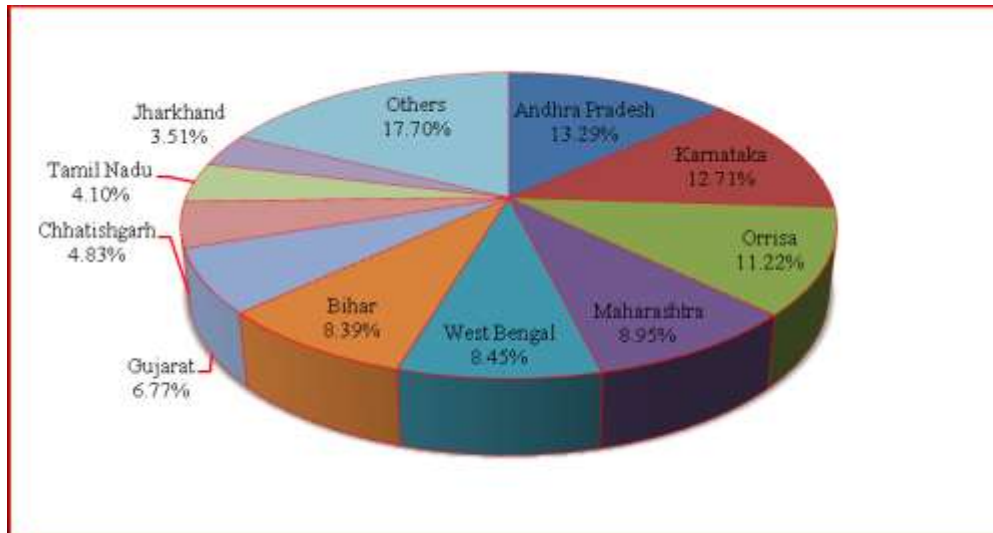
The top ten countries contribute 73.89 percent of the total tomato production in the world. Indian position in this regard is 3rd with a global share of 8.22 percent. The 3rd position in terms of production implies that the productivity of tomato is low in India when compared with China and United States of America.

✚ Production of Tomato in India

India is the leading producer of tomato in the world. Tomato occupies a significant position in vegetable production in India. Area under tomato in the country is about 4.97 lakh hectares and it is about 7.3 percent of the total cropped land under vegetables. Annual production of tomato in India is 86 lakh tons which is 8.22 percent of the total vegetable production in the world. There has been a gradual increase in the area under tomato while the production has been fluctuating due to weather related factors (*Safal National Exchange India Ltd, 2005*).

In 2010, India is a 3rd tomato producing country in the world, accounting for 8.22 percent of total world's tomato production. Tomato production is extremely important to farmers in India, because, it is an important source of income due to its high productivity and relatively low cost. Moderate temperatures in India allow growers to produce tomato widely in open fields. Also, tomato production is important for export earnings. In 2010, the export earnings from tomato were ₹1,480.55 lakhs.

Figure 1.2 Production of Tomato in Top Ten States in India



Sources: assessed from agriexchange.gov.in

Analysis:

The top ten states in India contribute 82.30 percent of the total tomato production in the country. Andhra Pradesh is at number one position accounting for 13.29 percent of the tomato production in the country. Karnataka and Orissa occupy 2nd and 3rd places with shares of 12.71 percent and 11.22 percent respectively.

1.2 Significance of the Study

Tomatoes are so common in today human diet that a meal without a tomato is supposed to be incomplete not only in India but in all the regions of the world. These are grown both in home gardens and commercially, are one of the world's most popular vegetable crops. It is an alternative cash crop for small farmers and a potential source of rural employment (*Abdullahi et al, 2009*). Tomato growing being a labour intensive commodity can substantially increase employment opportunities for the growing labour force in the country. India is gifted with a wide range of agro-climatic conditions which enable the production of tomato throughout the year in one or other part of the country and can maintain a continuous supply of fresh tomato in the market even in the off seasons. These off season tomatoes are in great demand in home as well as in the foreign markets and give a remunerative prices to the tomato growers. In this way more research is needed in this area to enhance the production and productivity of tomatoes in India.

1.3 Statement of the Problem

The main purpose of the present study is to know the factors effecting the satisfaction of tomato growers. If these growers are satisfied, they can produce the tomato with efficiently and productively. Satisfaction in any field is assumed to be an important factor to raise the productivity and performance (*Katoch, 2012*). Dissatisfaction with the work leads to reduced level of performance (*Bretz & Thomas, 1992*); and also leads to absenteeism from the work place (*Weiner, 1980*). Most of the research regarding satisfaction was confined to banking sector, educational sector and corporate sector etc. and less energy has been diverted towards agricultural sector to know whether the farmers are satisfied with their works, production, marketing and other facilities or not. For the same objective an effort has been made in the

present study to know the satisfaction level and factors effecting the satisfaction of the tomato growers in district Doda in J&K.

1.3 Literature Review

The following studies are consulted for the present study:

Ogunniyi&Oladejo (2011), in a paper entitled, “Technical Efficiency of Tomato Production in Oyo State, Nigeria” found that the technical efficiency in tomato production is influenced by the factors like education, household size, experience, diversification and gender. He further found that there is a heavy scope (57 percent) for increasing tomato production by raising technical efficiency. The productivity improvements can be achieved by implementing policies such as improved farmers’ access to education and technical assistance, to ensure farmers use the existing technology more efficiently.

Francios (2010), in a report analysed the regional figures regarding the production and consumption of tomato found that global consumption of tomato remain focused on fresh tomato. It is estimated that only 0.66 percent of the tomato (from the total production worldwide) was shifted from fresh sector to processed sector over the period from 1999- 2009.

CecilioFilho A. B; Costa C.C, (2010), in a paper entitled, “Economic analysis of the intercropping of lettuce and tomato in different seasons under protected cultivation” analysed the economics of intercropping of tomato and lettuce and found that intercropping is an excellent alternative to optimize costs and has direct benefits, such as the increase in food production per cultivated area in comparison to single cropping; as well as indirect benefits, as the improvement of the biological diversity and reduction in labor and environmental impacts due to the smaller area that is diverted to cultivation. In addition, intercropping can increase profitability, especially as consequence of the more efficient use of the applied inputs, including machine hours and the energy spent in food production.

Sreenivasa, Murthy et al (2009), in a study entitled, “Technical Efficiency and its Determinants in Tomato Production in Karnataka, India: Data Envelopment Analysis (DEA) Approach” said that there is a potential to increase the output or production and efficiency of tomato in the area under study through the application of more and more inputs. They found in their study that the medium farmers could realize higher productivity largely due to use of higher level of inputs and the factors like land and labour are critical for impacting technical efficiencies in all the farms to provide the high yields.

Matthews (2008), in a study entitled, “Perception of farmers about profitability of vegetable gardening enterprise in AhiazaMbaise local government area of IMO state, Nigeria” found that the vegetable sustains the family in rural areas in Nigeria with a small earning to buy basic domestic needs, as vegetables forms an important part of their daily diet. He recommended that the government should provide necessary materials to farmers to increase the production.

Basheer (2006), in project report on entitled, “Tomatoes Perspectives in Syria” found that Syria’s tomato quality is not satisfying the customer preferences in international markets. Further he cautioned that if it continued would badly affect Syrian reputation as tomato exporter country

and have negative effects on the Syrian ability to compete with countries such as Turkey, Egypt, and Morocco.

Robin et al (1993) opined that consumer perceptions of product characteristics such as color, freshness nutrition, and appearance do not appear to significantly influence tomato purchase patterns. However, prices of the tomatoes or substitutes and income were important determinants of quantity purchased of tomatoes.

Asgedom et al (2011), in their paper found that farmers preferred varieties with a prolonged harvesting period and a long storage life. The knowledge of farmers on varieties is limited while maintain their own seeds. The crop of tomato is based on season which is responsible to cause problems with marketing and price fluctuation. To improve the seed system, they recommended; improving farmers knowledge on variety characteristics.

Majeed et al (2006), asserted that attitude of the farmers towards extension work of Punjab Rural Support Program (PRSP) was positive. However, it needed to arrange more motivation programs for increasing their participation in the program.

1.4 Profile of Jammu & Kashmir Economy

Jammu and Kashmir, the northernmost state of the Indian union consists of three divisions - Jammu, Kashmir Valley and Ladakh. It has two capitals- Jammu, the winter capital and Srinagar, the summer capital. It contributes less than 1 per cent to the national Gross Domestic Product (GDP). Jammu and Kashmir State is predominantly an agrarian economy with about 80 percent of its population engaged in agriculture and allied sectors. These sectors contribute around 27 percent to the State's Domestic Product. Jammu and Kashmir is known for its mono-cropped and rain-fed economy with 40 percent area in the Jammu division and 60 percent in Kashmir. The agro-climatic diversity of the State varying from sub-tropical in Jammu, temperate in Kashmir and cold arid in Ladakh, makes it ideal for varied cultivation.

The diversity in physiographic features, agro-climatic variations at macro and micro level, existence of cold arid, temperate, inter-mediate and sub-tropical zones within a small geographical area of 2.22 lakh square kilometers, speaks volumes about the vast agricultural potential in the State. Over the years, the agriculturists and farmers in J&K have adopted several area specific cultivation practices to meet the requirement of their staple food crops like Rice, maize and wheat. But now the farmers are diversifying to cash crops such as flowers and vegetables. As far as the tomato production is concern the state is producing nearly 1 percent of the tomatoes in the country. Within the State, Jammu division itself is a home for large diversity in agro-climatic variations again underlines the vast agricultural potential in the division. Net irrigated area in Jammu region is just 24 percent and double and multiple cropping systems are followed on a larger scale in the intermediate and warmer plain sub-tropical areas. Vegetables are grown in specific areas of the region.

We have drawn the sample from district Doda which falls in Jammu province is one of the backward districts of the state. In view of its vastness and due to the inconvenience faced by people living in its far-flung areas and for making the whole area administratively manageable,

the State Government, in July, 2006, trifurcated the erstwhile district Doda into the districts namely Doda, Ramban and Kishtwar. Present Doda district is a hilly district consisting of 8 blocks and having diversity in agro-climatic conditions. Very huge quantities of vegetables are grown in this district which also satisfies the consumption requirement of other districts of the state. Main blocks producing vegetable in the district are Assar, some parts of Marmat, Bhaderwah and some parts of Gandoh. Tomatoes are mainly producing in lower areas along with the sides of Batote-Doda road such as Ramgarh, Kanota, Assar, Jathi, Malhori, Khellani etc.

1.5 Objectives of the Study

The following objectives have been taken into consideration for the present study:

- ✚ To analyse the socio-economic characteristics of the area under study.
- ✚ To know the level of information and inputs used by the tomato growers.
- ✚ To know the factors effecting the level of satisfaction of the tomato growers.

1.6 Limitations of the Study

The present study has the following limitations:

- ✚ Due to lack of time, energy and money, only two blocks of the district Doda were chosen for analysis. In this way, this study was restricted to Doda district only.
- ✚ This study was also confined to tomato production only.

1.7 Research Hypotheses

The following hypotheses are set up to carry the present study:

Hypothesis 1:

Tomato growers are significantly using the information regularly for promoting the tomato production.

Hypothesis 2:

Tomato growers are significantly using High Yielding Varieties (HYV) seeds, fertilizers and pesticides in the area under study.

Hypothesis 3:

Land owned is not related to Satisfaction of the Tomato growers.

Hypothesis 4:

Source of labour is not related to Satisfaction of the Tomato growers.

Hypothesis 5:

Family type is not related to Satisfaction of the Tomato growers.

Hypothesis 6:

Economic categories are not related to Satisfaction of the Tomato growers.

Hypothesis 7:

Education level is not related to Satisfaction of the Tomato growers.

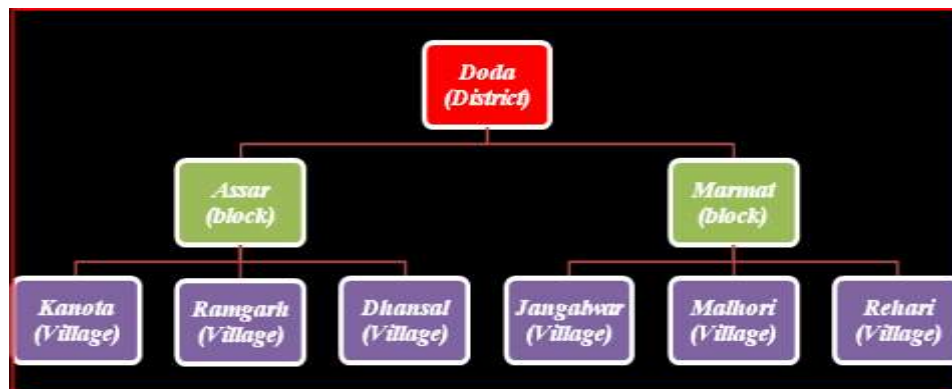
1.8 Research Methodology

This study is an empirical in nature and based on the survey method.

✚ Sample Design and Area under Study

Out of total 8 blocks-Bhagwa, Assar, Doda (Ghat), Gundana, Marmat, Bhaderwah, Gandoh (Bhalessa), and Thathri in Doda district we have selected two blocks-*Assar* and *Marmat* because tomato production is mostly confined in these blocks.

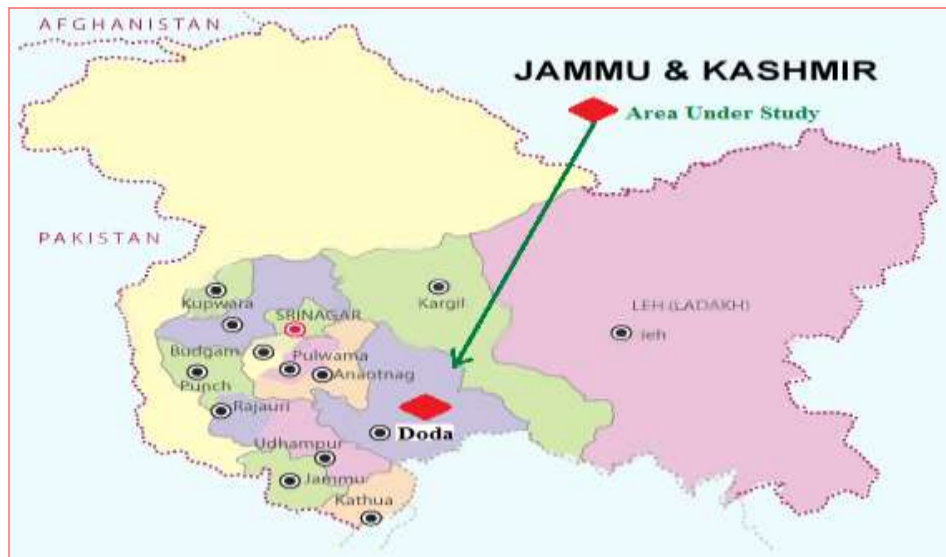
FIGURE 1.3 SAMPLE DESIGN



After selecting three villages in each block (*Kanota, Ramgarh and Dhansal in Assar block and Jangalwar, Malhori and Rehari in Marmat block*), 20 tomato growers from each village have been chosen randomly.

In this way the target population of this study consists of tomato growers of the two blocks of Doda district and the size of the sample is 120 respondents. Following is the map of Jammu and Kashmir in which the area under study has been shown:

FIGURE 1.4 AREA UNDER STUDY



✚ Tools of Data Collection

A well designed questionnaire was used for collecting data from the respondents (tomato growers). The questionnaire consists of two parts:

1. First part of the questionnaire was containing information of the respondents regarding gender, type of family, family size; land owned, land used for tomato production, age of the respondents, social category, educational status, economic category-APL/BPL, and marital status etc.
2. The second part of the questionnaire was containing questions regarding source of labour, information and the level of satisfaction among tomato growers.

✚ Statistical Techniques

We have used two types of analysis in the present study:

1. FREQUENCY AND PERCENTAGE ANALYSIS

To determine the socio-economic characteristic of the sample, we used frequency and percentage analysis.

2. Chi-Square Analysis.

We had proposed seven factors –information, use of inputs (hybrid seeds, fertilizers and pesticides), land owned by the growers, sources of labour, family type, economic category i.e. APL/BPL and educational level to test that whether the satisfaction of the tomato growers is associated with these factors or not. For this purpose we used Chi-Square analysis.

Results and Discussions

✚ Frequency and Percentage Analysis

1. Socio-economic characteristics

The table 1.1 describes the socio-economic characteristics of the respondents in the area under study:

Table 1.1 General Profiles of the Respondents

Respondents' Profile	Frequency	Percentage	
Gender	Female	8	6.67
	Male	112	93.33
Age	Up to 25 Years	16	13.33
	25 to 40 Years	44	36.67
	40 and above years	60	50.00
Marital Status	Unmarried	12	10.00
	Married	100	83.33
	Widow	8	6.67
Members in the Family	3 Members	12	10.00
	3 to 5 Members	60	50.00
	5 & above Members	48	40.00
Type of Family	Nuclear	96	80.00
	Joint	24	20.00
Social Category	General	60	50.00
	Schedule Caste	60	50.00
Economic Category	Above the Poverty Line	52	43.33
	Below the Poverty Line	68	56.67
Type of House	Pacca	48	40.00
	Kacha	72	60.00
Educational Level	No Formal Education	16	13.33
	Up to Primary & Middle	68	56.67

	Up to Secondary Level	32	26.67
	Up to Higher Level	4	3.33
Land Owned	Less than 1hectare	48	40.00
	1 to 3 hectares	52	43.33
	3 to 5 hectares	12	10.00
	above 5 hectares	8	6.67
Land Used for Tomato Production	Less than 2 kanals	32	26.67
	2 to 4 kanals	48	40.00
	Above 4 kanals	40	33.33
Sources of Labour	Family	88	73.33
	Hired	12	10.00
	Both Family & Hired	20	16.67
Number of Crops in a Year	Single	4	3.33
	Double	88	73.33
	Multiple	28	23.33
Satisfaction with the Occupation	Satisfied	36	30.00
	Not Satisfied	84	70.00

Source: Primary Data

Findings revealed that majority of the farmers (93.33 percent) are males, while 6.67 percent are females. This implies that majority of the farmers that are into tomato production are males. Majority of the tomato growers (50 percent) fall within the age group of 40 and above years. This implies that the young people are not interested in vegetable production. Also, it was observed that 83.33 percent of the farmers in the study area are married 10.00 percent unmarried and 6.67 percent are widow.

Findings show that 80 percent of the respondents belong to nuclear family and 20 percent to joint family system. The mean household size is about 4 people per household. This implies that most of the farmers have fairly small household and they are not producing the children merely for labour purpose.

It was found that 50 percent of the farmers belong to SCs and 50 percent to General categories. Majority of the farmers are Below the Poverty Line (56.67 percent) and 43.33 percent are Above the Poverty Line. This shows that most of the farmers are in bad position and cannot acquire modern inputs which require funds. Findings show that 40 percent of the respondents have Pacca houses, while 60 percent have Kacha type of houses. This shows the miserable conditions of the respondents.

A large number (70 percent) of the farmers engaged in vegetable production had not any formal education (13.33 percent) or up to the level of primary and middle (56.67 percent) which is disadvantageous to farmers in adopting improved farming practices. Findings of the study show that only 6.67 percent of the vegetable growers owned 5 hectare or above land for cultivation, while 40 percent, 43.33 percent, and 10 percent owned <1, 1 to 3, and 3 to 5 hectares respectively. This implies that farmers in Doda district are largely small scale farmers. Out of total land owned 33.33 percent of the farmers cultivate 4 hectares or above land for tomato production, while 40 percent, and 26.67 percent cultivate 2 to 4 kanal less than 2 kanal respectively.

About 73.33 percent of the farmers use family source of labour, while 10 percent and 16.67 percent use hired labour and both hired and family labour respectively. This implies that majority of the farmers considers that the employment of family labour is profitable when compared with hired labour.

From the table 1.1, 73.33 percent of the farmers practice double cropping, while 23.33 percent and 3.33 percent practice multiple and single cropping system respectively. It implies that the farmers do not grow only tomato but they add other vegetables etc. to supplement their income. Majority (70 percent) of the farmers say no regarding satisfaction with the occupation. This implies that the farmers are not satisfied with their occupation and make small profit only. This may be due to the small farm size, absence of information, lack of marketing facilities etc.

2. *Transplanting and Harvesting of Tomatoes*

Tomatoes are normally transplanted because much better results are gained when seedlings are raised in a nursery. Generally the growers transplant the seedlings along with irrigation in the month of April every year. The growers use canal and pipe as sources of irrigation. Harvesting time in tomato in the area under study is determined mainly by colour (red/pink) and it started in the month of July. It is done by hand and placed in a hard box made of wood. Tomato growers after packing send the boxes to Jammu (*Narwal Mandi*) in a truck for disposing. The process of harvesting continues for a month or two depending on the weather conditions.

3. *Marketing and Irrigational facilities and Profitability in Tomato Production*

The tomato growers produce tomato in a huge quantity which could not be disposed in the local market and they take these tomatoes to Jammu city which is at a distance of 150 km. It implies that this will add to the production cost of tomato. The farmers in the study area have two sources of irrigation—canal irrigation and pipe irrigation, which fulfill their needs. The level of profit from tomato production is not stabilize one, it keep on fluctuated.

Table 1.2 Respondents' Opinion regarding, Marketing, Irrigational facilities and Profitability of Tomato

Factors	Satisfied	Not Satisfied
Marketing	36 (30.00)	84 (70.00)
Profitability	50 (41.67)	70 (58.33)
Irrigation	90 (75.00)	30 (25.00)

Source: Primary Data (figures in the parentheses are percentage)

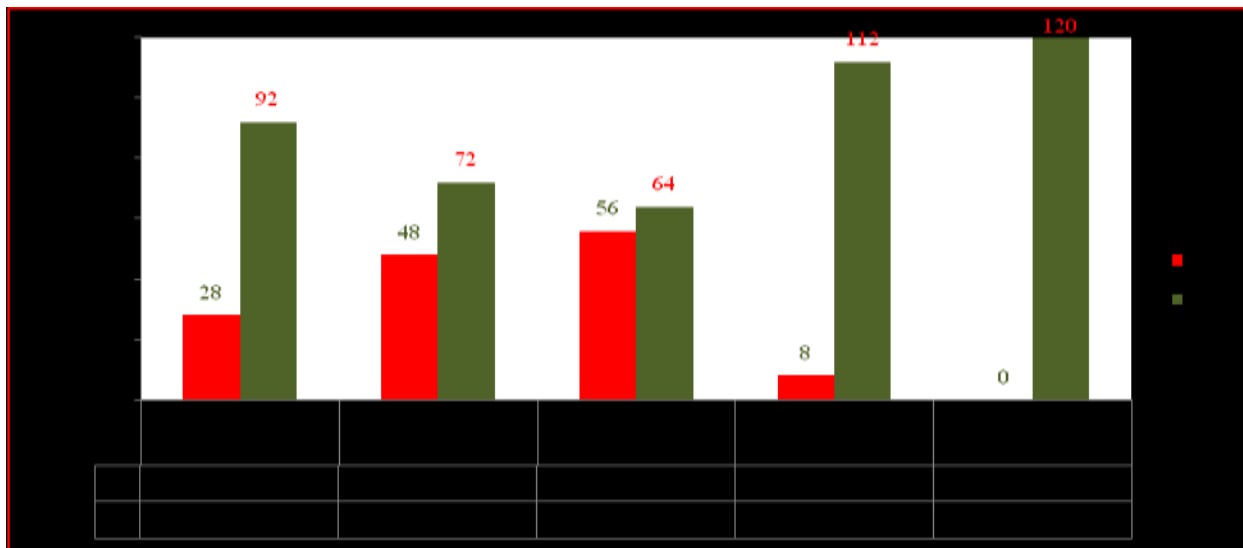
Analysis:

Majority of the respondents opined that they are not satisfied with the marketing facilities and the level of profit they earned from the cultivation of tomato. But one interested thing in the study area is that majority of them are fully satisfied with the irrigational facilities they are using.

Chi-Square Analysis

To know whether the tomato growers are using the information, HYV seeds, fertilizers and pesticides significantly, and the factors determine the level of satisfaction of the tomato growers, the Chi-Square analysis has been used:

Figure 1.5 Distribution of Sample Respondents using Information for Producing Tomato in the Area under Study

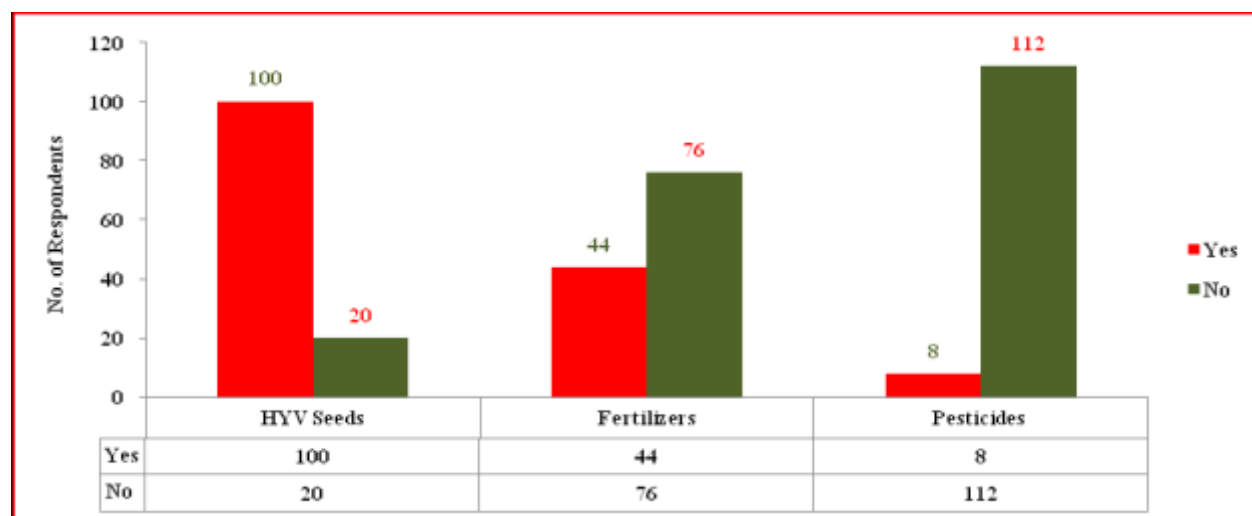


Source: Primary Data

Statistical analysis shows that at 5% level of significance for 4 degree of freedom the table value of $\chi^2 = 9.49$. Since the calculated value of $\chi^2 = 73.788$ is greater than the table value. Hence the difference is significant. Therefore 1st hypothesis (*Tomato growers are significantly using the information regularly for promoting the tomato production*) is rejected.

It is concluded that the vegetable growers are not using information from different sources regularly for producing the tomato which means they are using obsolete methods of farming in the study area.

Figure 1.6 Distribution of Sample Respondents using HYV Seeds, Fertilizers and Pesticides in the Production of Tomato



Source: Primary Data

The analysis shows that the calculated value of (Chi-square) $\chi^2 = 146.482$ is greater than the table value of $\chi^2 = 5.991$ at 2 degree of freedom and 5% level of significance. Hence, the difference is significant. Therefore, the framed 2nd hypothesis (*Tomato growers are significantly using High Yielding Varieties (HYV) seeds, fertilizers and pesticides in the area under study*) is rejected.

It is concluded that the vegetable growers are not using high yielding varieties seeds, fertilizers and pesticides regularly in the production of tomato.

Table 1.3 Distribution of Sample Respondents according to Land Owned and the Level of Satisfaction as a Tomato Grower

Land Owned	Level of Satisfaction				Total
	High	Medium	Low	Indifferent	
Less than 1 hectare	4 (3.33)	36 (30.00)	4 (3.33)	4 (3.33)	48
1 to 3 hectares	8 (6.67)	28 (23.33)	4 (3.33)	12 (10.00)	52
3 to 5 hectares	---	8 (6.67)	---	4 (3.33)	12
Above 5 hectares	4 (3.33)	---	4 (3.33)	---	8
Total	16	72	12	20	120

Source: Primary Data (Values in parentheses are percentage)

The calculated value of (Chi-square) $\chi^2 = 38.773$ which is greater than the table value of $\chi^2 = 16.92$ at 5% level of significance for 9 degree of freedom. The difference is significant.

Therefore, the framed 3rd hypothesis (*land owned is not related to Satisfaction of the Tomato grower*) is rejected.

It can be concluded that land owned is a factor influencing the level of satisfaction. In this way we can say that only those tomato growers are highly satisfied as a grower who owned greater quantity of land.

Table 1.4 Distribution of Sample Respondents according to Source of Labour and the Level of Satisfaction as a Tomato Grower

Source of Labour	Level of Satisfaction				Total
	High	Medium	Low	Indifferent	
Family Labour	4 (3.33)	60 (50.00)	12 (10.00)	12 (10.00)	88
Hired Labour	8 (6.67)	4 (3.33)	---	---	12
Family & Hired	4 (3.33)	8 (3.33)	---	8 (6.67)	20
Total	16	72	12	20	120

Source: Primary Data (values in parentheses are percentage)

Statistical analysis shows that at 5% level of significance for 6 degree of freedom the table value of $\chi^2 = 12.59$. Since the calculated value of $\chi^2 = 48.482$ is more than the table value. Hence the difference is significant. Therefore 4th hypothesis (*source of labour is not related to Satisfaction of the Tomato growers*) is rejected.

It is concluded that there is significant relationship between the level of satisfaction of the tomato growers and the sources of labour used.

Table 1.5 Distribution of Sample Respondents according to their Family Type and the Level of Satisfaction as a Tomato Grower

Family Type	Level of Satisfaction				Total
	High	Medium	Low	Indifferent	
Nuclear Family	12 (10.00)	60 (50.00)	8 (6.67)	16 (13.33)	96
Joint Family	4 (3.33)	12 (10.00)	4 (3.33)	4 (3.33)	24
Total	16	72	12	20	120

Source: Primary Data (values in parentheses are percentage)

The data shows that 50 percent of the respondents who belong to joint families are highly satisfied as a tomato grower. Statistical analysis shows that at 5% level of significance for 3 degree of freedom the table value of $\chi^2 = 7.82$. Since the calculated value of $\chi^2 = 2.083$ is less than

the table value. Hence the difference is insignificant. Therefore 5th hypothesis (*family type is not related to Satisfaction of the Tomato growers*) is accepted.

It is concluded that there is no significant relationship between the level of satisfaction of the tomato growers and the type of family system.

Table 1.6 Distribution of Sample Respondents according to APL and BPL Category and the Level of Satisfaction as a Tomato Grower

Economic Categories	Level of Satisfaction				Total
	High	Medium	Low	Indifferent	
Above Poverty Line	12 (10.00)	28 (23.33)	4 (3.33)	8 (6.67)	52
Below Poverty Line	4 (3.33)	44 (36.67)	8 (6.67)	12 (10.00)	68
Total	16	72	12	20	120

Source: Primary Data (values in parentheses are percentage)

It is found from the above Statistical analysis that at 5% level of significance for 3 degree of freedom the table value of $\chi^2 = 7.82$. Since the calculated value of $\chi^2 = 7.692$ is less than the table value. Hence the difference is insignificant. Therefore the 6th hypothesis (*economic categories are not related to Satisfaction of the Tomato growers*) is accepted.

It is concluded that there is insignificant relationship between the level of satisfaction of the tomato growers and the economic categories.

Table 1.7 Distribution of Sample Respondents According to their Education and the Level of Satisfaction

Education Level	Level of Satisfaction				Total
	High	Medium	Low	Indifferent	
No formal Education	----	8 (6.67)	8 (6.67)	----	16
Up to Primary Level	4 (3.33)	44 (36.67)	4 (3.33)	16 (23.33)	68
Up to Secondary Level	12 (10.00)	16 (23.33)	----	4 (3.33)	32
Up to Higher Level	----	4 (3.33)	----	----	4
Total	16	72	12	20	120

Source: Primary Data (values in parentheses are percentage)

Education is a pre-requisite condition for introducing any kind of innovation, diversification or new methods of production. The level of education in the area under study is very low. The statistical analysis shows that at 5% level of significance for 9 degree of freedom the table value

of $\chi^2 = 16.92$. Since the calculated value of $\chi^2 = 26.505$ is more than the table value. Hence the difference is significant. Therefore the 7th hypothesis (*education level is not related to Satisfaction of the Tomato growers*) is rejected.

It is concluded that there is significant relationship between the level of satisfaction of the tomato growers and the educational level. In other words, those who are educated can utilize the modern techniques of farming and realize the higher productivity, that's why they are more satisfied than the uneducated.

1.10 Conclusions and Policy Recommendations

It is concluded that tomato at present is a popular crop worldwide and same is applicable to the present study area. The tomato growers in Doda district are largely small scale farmers, fall under below poverty line (BPL) and cannot acquire modern inputs at the right time. The findings show that the land owned, source of labour and educational level are important factors for determining the level of satisfaction of the tomato growers. A great number of the growers are uneducated and also dissatisfied with their occupation, because being uneducated they cannot adopt improved farming practices. The research shows that the tomato growers use HYV seeds, but they do not know the proper techniques required to materialize the higher yields from HYV seeds. It implies that merely using the HYV seeds cannot guarantee higher productivity, proper farming techniques are also equally important. Majority of the vegetable growers are dissatisfied with the services of agricultural office and marketing facilities. Keep in view the entire episode following are the policy recommendation for the present study area:

- ✚ Profitability of tomato depends largely upon the market supply conditions. The tomato growers sometime get ₹40-₹50 per kg of tomato and sometime the same quantity gives ₹5 to ₹10 only. Being a perishable item, the growers cannot wait for the reasonable prices in the near future. In this way, the government should first of all create storage facilities and then procure the tomato directly from the growers to avoid the fluctuation in the market and stabilize the income of the tomato growers.
- ✚ The tomato is one of the most popular crops grown in the world today. Sometimes farmers harvest a surplus of tomatoes - too many to sell. Tomato production and supply does not always equal with the demand and it is available in some seasons only, creating disequilibrium in the market. In some places there is surplus production of tomato, whereas in some other place there is inadequate supply. As tomato is a very delicate and perishable crop, its storage, packaging and transportation need greater technical care and caution. It is therefore important that the government should provide facilities for transportation facilities, storage and preservation of tomato for making the seasonal tomato available throughout the year, decreasing wastage, stabilizing prices of tomato in the market, creating additional

income to growers and increasing the confidence of the growers in tomato crop.

- ✚ No doubt, the tomato growers are using High Yielding Varieties seeds for tomato production, but the process or methods they are using are obsolete. Scientifically, they do not know the exact quantities of fertilizers, pesticides, watering etc. required to get the reasonable yield from the land used for tomato production. Therefore, there is a dire need for creating awareness among the tomato growers regarding the techniques of production to make tomato production in a best possible way.
- ✚ Marketing of tomato has been a neglected area requiring proper attention. The growers have to send their tomato to Jammu city (*which is about 150 km away*) for marketing, which involves many intermediaries. These intermediaries charge a very heavy commission from the growers, which reduce the profitability. By taking into consideration the marketing aspects, government should encourage local markets in these areas. This will definitely reduce the transportation and commission charges and enhance the profitability of the tomato growers.
- ✚ Use of fertilizers and pesticides are very important to raise the productivity. A very few shops and they are at large distant available from where the growers can purchase these inputs. Hence, co-operative types of centers are required to distribute these inputs among the tomato growers.
- ✚ Farmers' knowledge regarding tomato seeds is very limited. They classify the seed into two categories: 1) Desi seed (*which they prepared by themselves*). 2) Hybrids (*which they purchase from the market and termed it HYV*). But in general all market purchased seeds cannot be HYV seeds. Therefore, proper government depot should be assigned the job of distributing the tomato seeds among the growers, so that the market players are not in a position to mislead them.

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