MARKET TREND AND POTENTIAL ANALYSIS FOR BT COTTON SEEDS IN SOUTHERN TAMILNADU

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COIMBATORE – 641003

2010

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Project report submitted in part fulfillment of the requirements of the award of the degree of **MASTER OF BUSINESS ADMINISTRATION** *to the Tamil Nadu Agricultural University, Coimbatore – 641 003*

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CERTIFICATE

This is to certify that the project entitled **"Market Trend and Potential Analysis for Bt cotton Seeds in Southern Tamil Nadu"** submitted in part fulfillment of the requirements for the degree of **MASTER OF BUSINESS ADMINISTRATION** to the Tamil Nadu Agricultural University, Coimbatore is a record of bonafide research work carried out by **Mr. JAMES PAUL .R** under my supervision and guidance and that no part of this project has been submitted for the award of any other degree, diploma, fellowship or other similar titles and that work has not been published in part or full in any scientific or popular journal or magazine.

Place: Coimbatore.

Date:

(**Dr. K.R.ASHOK)**

Chairman

Approved by

Chairman : **Dr. K.R.ASHOK**

Members : **Dr. V.RAVICHANDRAN**

: **Dr.N. VENKATESA PALANICHAMY**

External Examiner

Date:

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(James Paul.R)

ABSTRACT

MARKET TREND AND POTENTIAL ANALYSIS FOR BT COTTON SEEDS IN SOUTHERN TAMILNADU

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Cotton production in India is increased after the introduction of Bt technology in 2002. Adoption of Bt cotton by the farmers is very high due to its special characters. Cotton growing area also increased over the past few years. So the case firm, Shriram Bioseeds and Genetics Ltd., was interested to know about the information on the acceptance and preference of their Bt cotton seed brand, so as to come up with suitable marketing mix for increasing the sale of Bt cotton seeds. In this context this study was undertaken with the specific objectives.

- To analyze the buying behaviour of farmers towards Bt Cotton seeds,
- To estimate the market potential for Bt Cotton Seeds,
- To analyze the trend in the sale of Bt Cotton seeds ; and
- To analyze the dealers perception towards promotion of Bt Cotton seeds.

To address the above objectives, three districts namely Virudhunagar, Thoothukudi and Tirunelveli were chosen for the study. The districts were selected based on the higher proportion of area under cotton. From the selected districts, blocks were selected based on the area under cotton and from each block two villages were selected at random. From the selected villages 150 farmers were selected at random for data collection. Besides 50 dealers were also contacted for data collection.

Majority of the sample farmers cultivating Bt cotton seeds (56 percent) were in the age group of 30-50 years in the study area. Among the sample farmers 38 per cent had primary level education and 27 per cent of the respondents were illiterates . 49 per cent of the farmers had experience of 20 to 30 years of cotton cultivation. Most of the respondents (72 percent) had agriculture as their primary occupation. Majority of the farmers fall under the category of medium and large scale farmers. Dealer was the major source of information for Bt cotton seeds followed by peer groups. Dealers were the major source for purchase of seeds. Most of the farmers were purchasing the seeds through cash payment. The important constraints encountered by the sample farmers were high cost of seeds and non-availability in their location.

Dealers were the highest influencing factor for the purchase of a particular brand followed by peer group influence. High yield of Bt cotton played a major role in influencing the farmers to buy Bt cotton seeds. Majority (84.66 per cent) of cotton growers sold their produce to the local traders because of the availability of the traders in their home place. Nearly 90 per cent of the farmers were willing to cultivate Bt cotton in next season and some farmers did not want to cultivate because of labour shortage. All the farmers (100 per cent) got the refugee seeds and it was available in the same pocket of Bt cotton and majority of the farmers (69.33 per cent) grown refugee crop in the border of the field.

Total market potential for Bt cotton seeds was estimated to be 17988 kg, 16078 kg for the years 2009-10 and 2010-11 in Virudhunagar district. In a similar way the total market potential for Thoothukudi and Tirunelveli districts were estimated. The projected market potential was found to decrease in the three districts. Human labour was the major component in cost of inputs applied for Bt cotton production. The share of pesticides in total cost was less compared to other expenditure.

Of the total dealers contacted for the study, majority (38 per cent) of the dealers belonged to the age group of 41-50 years and 46 per cent were studied up to higher secondary level education. Majority of the dealers (64 per cent) dealt with the major agro inputs viz., seeds, fertilizers and pesticides. 44 per cent of the dealers had 10-20 years experience in dealing with agricultural inputs. Rasi Seed Company had the highest

market share. Maize, Bajra, Jowar were the competing crops for Bt cotton. The two main factors which influenced the farmers to choose other crops were shortage of labour and cotton price variation. 96 percent of the dealers received promotional support from the company and most companies (42 per cent) provided promotional support to the dealers in the form of campaigns.

The main problem faced by the dealer was the high cost of the seeds. The seed companies introduced Bt cotton to reduce the pest problem. But Bt cotton was susceptible to sucking pests than non Bt cotton. So some farmers were reluctant to purchase Bt cotton seed, because of high cost coupled with sucking pest problems in Bt cotton.

Based on the study results, the following market strategies were suggested to improve the marketing share of the Case study firm. They are i) Bt cotton was introduced to reduce the pest problem but it did not control the sucking pests. Now a day's sucking pests are the major problems to Bt cotton. So the case firm should popularize low cost IPM measures to control sucking pests in Bt cotton. ii) Though Bt cotton reduce the pest problem and increase the yield, it faces competition from other competing crops. So affordable price and attractive credit policy may be formulated to encourage both the farmers and dealers. Reasonable margin should be given to dealers based on their sales volume of the seeds.

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CHAPTER I
INTRODUCTION

Cotton is one of the important commercial crops in India. Cotton crop in India is playing a vital role in the national economy both in rural and urban sectors. Cotton sustains huge employment in the rural and urban sector and plays a key role in economic and trade activities within our country. Though sometimes overshadowed by China (the world's largest producer, importer, and consumer of cotton), India is a dominant player in the cotton world.

Textile manufacturing is India's second-largest industry, after agriculture, employing over 35 million people. Growth in India's textile industry has been spurred by the opening up of world markets, particularly since the expiration of the World Trade Organization Multi-Fiber Agreement at the end of 2004. Since 2003-04, India's cotton consumption has grown 35 per cent, from 13.5 million bales to 22.5 million bales in 2009-10. India is now the third-largest exporter of cotton-dominant products to the United States, accounting for about 10 per cent of U.S. cotton-dominant imports. India's strong economic growth over the past decade has greatly expanded the country's domestic market, leading to increased apparel spending and evolving apparel preferences among Indian consumers.

Global Scenario

China is the largest producer and consumer of cotton with 6.9 million tonnes and 10.3 million tonnes respectively. Next to China, India is the second largest produer and consumer of cotton. Of the total production of 22.1 million tonnes, India accounts 5.1 million tonnes. Asian countries taken the leading position in Cotton production compared to other countries. Worldwide Cotton production is listed below.

Table 1.World Cotton Production

(in million of metric tones)

Country	2005-06	2006-07	2007-08	2008-09	2009-10(April)
China	6.2	7.7	8.1	8.0	6.9
India	4.1	4.7	5.2	4.9	5.1
United States	5.2	4.7	4.2	2.8	2.6
Pakistan	2.2	2.2	1.9	2.0	2.1
Brazil	1.0	1.5	1.6	1.2	1.3
Uzbekistan	1.2	1.2	1.2	1.0	0.9
Australia	0.6	0.3	0.1	0.3	0.3
Turkey	0.8	0.8	0.7	0.4	0.4
African Franc Zone	0.5	0.5	0.3	0.4	0.3
Turkmenistan	0.2	0.3	0.3	0.3	0.3
EU-27	0.5	0.4	0.4	0.3	0.2
Syria	0.3	0.2	0.2	0.2	0.2
Greece	0.4	0.3	0.3	0.3	0.2
Burkina	0.3	0.3	0.1	0.2	0.2
Argentina	0.1	0.2	0.2	0.1	0.2
Rest of World	2.3	1.9	1.7	1.5	1.3
World Total	25.4	26.6	26.1	23.4	22.1

(Source: USDA, 2009)

Indian Scenario

The area under cotton in India has grown considerably in recent years. Likewise, yield levels have increased significantly, from around 120 kg of lint per acre in the early 2000s, to more than 200 kg now .The Cotton Advisory Board (CAB) of India estimated an all-time record cotton production of 5.27 million tons and a record high 23.8 million acres in 2007-08. As a result, India has been able to improve its position in world cotton trade from the third largest importer in 2002-03 to the second largest exporter after the United States in 2007-08. This significant increase in cotton area and production in India is attributed to better returns realized by farmers during the last few years, which are largely due to the introduction and rapid spread of Bt cotton technology.

Table 2. Area, Production and Productivity of Cotton in India

Year	Area(lakh hectares)	Production(lakh bales of 170 kgs)	Yield(kg per hectare)
2000-01	85.76	140.00	278.00
2001-02	87.30	158.00	308.00
2002-03	76.67	136.00	302.00
2003-04	76.30	179.00	399.00
2004-05	87.86	243.00	470.00
2005-06	86.77	244.00	478.00
2006-07	91.44	280.00	521.00
2007-08	94.39	315.00	567.00
2008-09	93.73	290.00	526.00

(Source: Cotton Advisory Board,2009)

Area, Production and Productivity of Cotton in Tamil Nadu

In Tamil Nadu, cotton is cultivated in very minimum area compared to other states. Maharashtra having the highest area followed by Gujrat. According to productivity wise Tamil Nadu ranks second with 714 kg per hectare. Perambalur, Virudhunagar, Salem are the districts cultivating cotton in a large area.

Table. 3 Area, Production and Productivity of Cotton in Tamil Nadu

Year	Area(lakh hectares)	Production(lakh bales of 170 kgs)	Yield(kg per hectare)
2000-01	1.93	5.50	484.00
2001-02	2.00	5.00	425.00
2002-03	0.85	3.00	600.00
2003-04	1.03	3.75	619.00
2004-05	1.29	5.50	725.00
2005-06	1.40	5.50	668.00
2006-07	1.00	5.00	850.00
2007-08	1.19	5.00	714.00
2008-09	1.20	5.00	708.00

(Source : Cotton Advisory Board,2009)

Importance of Bt cotton

Though cotton is a important cash crop, it is affected by many pests mainly bollworms. Insecticides valued at US$660 million were used annually on all crops in India, of which about half are used on cotton alone (Manjunath, 2004; Rai et al., 2009). So Genetically modified (GM) cotton was developed to reduce the heavy reliance on pesticides. It increases the yield savings, leading to improved productivity. It provides significant health and environmental benefits. It reduces the risk of cotton growing.

Bt cotton Seed

Hybrid Cotton, hybrid maize and hybrid rice are projected to be the major growth drivers of the seed industry in the next decade. According to Rao (2009) , the requirement for Bt cotton seeds is expected to nearly double from 15 million pockets (450 gms) in 2006-07 to 29 million pockets by 2012-13,valued at millions US$ 468.04 at current price, since by 2012 the area under hybrid is expected to cover 81 per cent of the total cotton growing area.

Now there are many firms selling Bt cotton seeds with the help of Monsanto company. The firms get the technology from Monsanto company and release Bt cotton seeds in their trade names.

Bt Cotton Status in India

Biotech crops are produced in 25 countries of the world. The major area occupied by USA with 64 million hectares. They produce maize, cotton, soybean, canola, papaya, alfalfa, sugar beet. Followed by USA, Brazil and Argentina are the next two countries cultivated more GM crops with 21.4 and 21.3 million hectares respectively. India ranks fourth and cotton is the only GM crop produced in India with 8.4 million hectares.

GM cotton acreage in India continues to grow at a rapid rate increasing from 0.1 million hectares in 2002 to 8.4 million hectares in 2009. The total cotton area in India is the largest in the world or, about 25 per cent of world cotton area. India has the largest area of GM cotton in the world, surpassing China. The major reasons for this increase is a combination of increased farm income ($225/ha) and reduction in pesticide use to control the cotton bollworm.

About the Case Firm

Shri Ram BioSeed and Genetics Ltd, is one of the Agribusiness firm in India marketing hybrid seeds. The company has a total turn over of Rs.3523 crores engaged in marketing of agricultural inputs and nutrients such as Zinc Sulphate, soluble fertilizers etc., seeds and pesticides. It has more than 6000 retail outlets distributing these inputs to the farming communities and also established 100 Krish Vikas Kendras to provide technical support to increase the profitability of the farming communities across the country. At present, the company dealt with Corn, Bajra, Jowar, Paddy, Bt cotton, Vegetables and Sunflower seeds.

The company is being operating its seed business in Vietnam, Philippines and Thailand and proposed to expand to other locations in Asia Pacific Region. In order to increase the sales volume of their company, it is interested to assess the attitude of farmers, their preferences, and dealer's responses towards hybrid seeds in Tamil Nadu.

Problem Focus

Cotton production in India is increased after the introduction of Bt technology in 2002. Adoption of Bt cotton by the farmers is very high due to its special characters. Cotton growing area also increased over the past few years. So the case firm was interested to know about the information on the acceptance and preference of their Bt cotton seed brand, so as to come up with suitable marketing mix for increasing the sale of Bt cotton seeds. In this context, the case firm was interested to have a detailed study of Bt cotton seeds' market potential and trend in the sale of Bt cotton seeds.

Objectives of the Study

The broader objective of the study is to assess the market trend and potential for Bt cotton seeds. The specific objectives of the study are,

- To analyze the buying behaviour of farmers towards Bt cotton seeds,
- To estimate the market potential for Bt cotton Seeds,
- To analyze the trend in the sale of Bt cotton seeds; and
- To analyze the dealers perception towards promotion of Bt cotton seeds.

Scope of the Study

With the technological developments and the modernization of Indian agriculture, the agricultural input firms were gaining strategic importance in the country. The strategy and product development of any business was based on the demand and the market potential of its products. To realize the potential, the input firms should have adequate information on the preference, acceptance and buying behaviour of their products. This study will give information on the market potential for Bt cotton seeds. The results of the study will give a feedback to the firm regarding the popularity of their product and the effectiveness of their promotional activities. The results of the study will enable the case firm to design its future marketing programes and formulate appropriate strategies to increase the market share of the product.

Limitation of the Study

Since the study area is limited to three districts, viz., Virudhunagar, Thoothukudi and Tirunelveli, extending the findings to other areas need to be done with caution. The study is based on primary data collected from the farmers and dealers by survey method. As many of the farmers have not maintained proper records about farming operations, they furnished the required information from their memory and experience and hence the collected data may be subjected to recall bias. However every effort was taken to minimize the bias by including questions that would facilitate cross checking. Hence, the findings of the study may be considered appropriate for the situation prevailing in the study area and extra care should be taken while generalizing the results.

Organization of the Project

The thesis is organized into six chapters as follows:

Chapter I: Introduction- It covers the information such as objectives, problem focus, scope and limitation of the study.

Chapter II: Concepts and Review- It encompasses discussion on the concepts used in the present study and review of the earlier studies done by other workers.

Chapter III: Design of the Study- it specifies the sampling design, method of data collection and tools used to conduct research and analysis of data.

Chapter IV: Description of the Study Area- the general and agricultural characteristics features of the study area .

Chapter V: Results and Discussion - the results of the analysis were presented and discussed to draw inferences with respect to the objectives of the study

Chapter VI: Summary and Conclusion- a summary of the above chapters is presented and conclusions are highlighted.

CHAPTER II

CONCEPTS AND REVIEW

Any systematic and scientific enquiry requires critical review of past studies. The main objective of this chapter is to review the theoretical and empirical information available on the research topic. An attempt has been made to present the available literature under the following heads. The concepts related to:

1. Bt cotton
2. Market
3. Marketing
4. Dealer
5. Marketing Strategies
6. Market Potential
7. Buying Behaviour
8. Perception
9. Related past studies
    - 9.1. Bt cotton
    - 9.2. Market Potential
    - 9.3. Buying Behaviour

1. Bt cotton

According to **Prakash (1997)** the development of insect resistant crop varieties has been the most successful application of agricultural biotechnology research so far. The Bt transgenic crops derive their resistance from the insecticidal gene of the bacterium, *Bacillus thuringiensis.*

Reuter's news service (2001) referred the transgenic Bt cotton which contains the bacterium *Bacillus thuringiensis* protein and is resistant to corn borers, bollworms and other pests that damage cotton plants. Pesticide poisoning had also been reduced significantly.

According to **Singh (2001)** cotton seeds are modified genetically to contain a common bacterium, Bt (*Bacillus thuringiensis*) that is potent enough to resist the boll worm, one of the most dreaded pests of cotton.

According to **Shiva (2002)** Bt cotton is genetically engineered cotton, which contains genes taken from a soil bacterium (*Bacillus thuringiensis*) to produce toxins in the plant. It has promoter genes to create high doses of the toxin, which are released in all parts of the plant during the entire life span of the crop.

2. Market

The word market was derived from Latin word "marcatus" which referred merchandise (or) place where business was conducted.

According to **Larson (1953)** a market may be broadly described as the entire area within which the forces of demand and supply of a given commodity or service interact in effective exchange there by establishing prices. Thus whenever and wherever buyers and sellers were brought together through whatever means of communication, market exists.

Cundiff and Still (1968) defined market as the aggregates of forces or conditions within which buyers and sellers make decisions that resulted in the transfer of goods and services and determination of prices.

Arvind (1982) viewed market as a set of all actual potential buyers of a product.

According to **Kotler (2000)** market consists of all the potential customers sharing a particular need or wants and might be willing and able to engage in exchange to satisfy that need or want.

3. Marketing

Pyle (1956) defined marketing as that phase of business activity through which human wants are satisfied by the exchange of goods and services.

According to **Buzzel *et al.*, (1974)** marketing referred to the business activities that directed the flow of goods and services from the producer to the ultimate consumer or user.

Padolecchea (1984) opined marketing as merely an instrument or technique to stimulate demand, accelerate production process at profit.

Subrahmanyam *et al*., (1985) defined marketing as the process of anticipating and creating consumers' needs and wants and of organizing all the resources of the company to satisfy them.

Bishwambhar (1986) considered the marketing concepts with management orientation. The task of the organization was to determine the needs and wants of target market and the organization has to deliver the desired satisfaction more effectively and efficiently than its competitors.

Manmohan Singh (1986) considered marketing as the creative management function which promotes trade, employment by assessing consumer needs and initiating research and development to meet them.

4. Dealer

According to **Kulshreshtha (1986)** the term dealer included the wholesalers, retailers, distributors, stockiest or any other designation by which a distribution intermediary was known.

Dealer was defined by **Pandey and Vivek (1992)** as a person or institution carrying on the business of selling products either wholesale or retail.

Kumar (1997) stated that dealer is one who carries on business of selling inputs. The category includes wholesaler, retailers, wholesaler-cum-retailer, private retailers or co-operative societies.

According to **Beena (2003)** dealer may be a wholesaler or retailer, who sold whole or part of the volume of sales of agricultural inputs like fertilizers, pesticides and micronutrients directly to the farmers.

5. Marketing Strategy

Bagozzi (1986) considered marketing strategy as to how an organization chose to allocate its resources to meet the consumer needs and achieved a competitive advantage. This was done primarily through product design, development and management, larger market selection, product positioning and management communication, pricing and distribution.

According to **Cannon (1986)** marketing strategy should show the overall direction that the firm would adopt to achieve its purpose or objective. A clear and communicable strategy statement can play a major part in facilitating the evaluation and play a major part in facilitating the evaluation of tactics.

Nair Paul and George (1986) defined marketing strategy as the scheme whereby a firm's resource and advantages are managed in order to surprise and surpass competitions or to exploit opportunities.

Baker (1987) described strategy as the direction; the organization will propose within its closest environment and guides the allocation of resources.

According to **Stanton (1988)** marketing strategy is broad, basic plan of action by which an organization intends to reach one or more goals.

6. Market Potential

Roland (1984) defined market potential as the limit approached by market demand as industry's marketing effort goes to infinity for a given environment. Market potential will always be greater than the market forecast and market demand. Narrowing the gap is the goal of the firm. Therefore it is necessary first to estimate the market potential. There are two methods used for estimation of market potential, they are (1) Chain ratio method (2) Compound growth rate method.

Dale (1985) defined market potential as the maximum sales of a product that could be achieved per time period for a specified environment and a specified marketing effort.

Ramaswamy and Namakumari (1990) defined market potential as a quantitative estimate of the total possible sales by all the firms selling the product in a given market. It gave an indication of the maximum demand or the ultimate potential for that product assuming that the ideal marketing effort is made.

7. Buying Behaviour

Mehta (1974) observed that buying behaviour involved those activities like search of alternatives, evaluation of alternatives, choice decision and post purchase feelings and reactions.

Walters (1974) defined buying behaviour as the process wherein individuals, decide on whether, what, when, where, how and from whom to purchase goods and services.

Iyer (1990) indicated that consumer's decisions in buying play a key role in the success or failure of products. The level of involvement on the part of the customers depicts their interest and distaste for the demand of the particular product.

For the present study, buying behaviour refers to the factors which influence the farmers in purchase of seeds, considering individuals decision of whether, when, where, how and from whom to purchase Bt cotton seed.

8. Perception

Rao (1989) defined perception as the intellectual process by which a person acquires the information from the environment, organize it, obtain the meaning from it.

Narayanan (1990) stated that perception represented a psychological process whereby people select, organize and interpret sensory stimulations into meaningful information about their environment.

Robbins (2005) defined perception as the process by which individuals organize and interpret their sensory impressions in order to give meaning to their environment and stated that attitudes, motives, interests, experience and expectations influenced the perception of individuals.

Kotler (2005) defined perception as the process by which an individual selects, organizes and interprets information inputs to create a meaningful picture of the world. Perception depends not only on the physical stimuli, but also on the stimuli's reaction to the surrounding field and on conditions within the individual. The key point is that perceptions can vary widely among individuals exposed to the same reality.

Reddy (2005) described in his study that perception as 'how we see the world around us'.

9. Related past studies

9.1. Bt cotton

According to **Venugopal (2001)** results from the trials conducted over the years indicate that cotton hybrids containing the Bt gene provided significantly increased yield as compared to their non-Bt controls at each location tested. The data showed that the mean yield performance of all Bt hybrids was 29-40 per cent higher in comparison the mean performance of all non Bt-controls.

According to **Swaminathan (2002)** bollworm has started developing resistance to Bt gene in Australia and China.

According to **Gopal Raj (2002)** Bt cotton farmers reduced pesticide use an average of 13 sprays per season. The savings in pesticide and spraying costs lowered their production costs by 28 per cent.

According to **Mayee *et* al, (2002)** the recent multi location trials with GE cotton hybrids showed that it was superior to conventional hybrids in respect of reducing pesticide consumption and increasing seed cotton yield. Their economic superiority coupled with biological and environmental safety would offer an excellent opportunity to fit into the integrated pest management (IPM) system for the cotton cultivars with inherently excellent fiber properties.

According to **Bennet *et* al, (2004)** Bt cotton had a significant positive impact on yields and on the economic performance of cotton growers in Maharashtra. Yields of Bt cotton were significantly higher than those of non-Bt varieties, and use of insecticide was less.

According to **Bennett *et* al, (2005)** Bt-cotton generated higher yields and gross margins than non-Bt-cotton. In addition, Bt-cotton significantly reduced the use of pesticide with consequent potential benefits to human health and the environment.

According to **Qaim (2006)** the Bt technology increased aggregate employment with interesting gender implications. It increased household incomes, including for poor and vulnerable farmers. The study concluded that Bt cotton contributes to poverty reduction and rural development.

9.2. Market Potential

Rajasekaran (1991) used chain ratio method for estimating the market potential for new herbicides for tapioca crop and found that the herbicide market was expected to grow because of the increasing trend in tapioca area.

Geetha (1991) estimated the market potential for gypsum using chain ratio method and concluded that the market would be increasing due to increasing trend in groundnut area.

Thiruneelakandan (1991) estimated the market potential by taking into consideration area under different crops and recommended doses of different pesticides. He used the compound growth rate method to project the area under crops.

Kamalam (1994) estimated the market potential of pesticides by estimating compound growth rate of area under different crops in Salem district and by multiplying the projected area with recommended dose of pesticide.

Ravichandran (1995) has employed chain ratio method for estimating the market potential for tomato and bhendi hybrid seeds in Karnataka.

Ramanan (1997) estimated the market potential of neem pesticides taking three crops into consideration namely paddy, cotton and groundnut using chain ratio method.

Jacob (1999) used chain ratio method to study the market potential of neem gold on vegetable in Tamil Nadu.

Jissy Johnson (2000) used chain ratio method for estimating the market potential of pesticides for cardamom crop in Theni and Idukki districts and found that the market for the case firm was in increasing trend.

Abinaya Saraswathi (2006) estimated the market potential for pesticides in Hosur taluk and reported that the farmers were not aware of the case firm’s products and so promotional activities must be done through intensive farm visits and providing consultations regarding crop protection aspects.

Sangeetha (2007) estimated the market potential for Pursuit 10 SL herbicide in groundnut in Thiruvannamalai district by using compound growth rate and chain ratio methods and she concluded that the market potential for Pursuit 10 SL market was expected to decline.

Mohan (2008) estimated the market potential of sunflower hybrid seeds in Erode district. The market potential for Sunbred-275 was estimated using compound growth rate of area under sunflower using chain ratio method. He concluded that potential for hybrid sunflower was expected to grow.

For the present study, chain ratio method and compound growth rate were used to assess the market potential for Bt Cotton.

9.3. Buying Behaviour

Thanmathi (1995) in her study on economic analysis of consumption behaviour of households in Coimbatore found that consumers bought noodles mainly for their taste, followed by just for a change, easy to cook and preference of children.

Bonke (1996) studied economic influences on food choice. The overall finding was that very rich and very busy households spend more on convenience foods than poor and time idle households.

Elangovan (1998) in his study on consumer behaviour towards buying of processed fruits and vegetables products inferred that, consumers considered price as the most important factor followed by good taste and quality. His study also revealed that in majority of the consumer households, wife made the decisions relating to the purchase of processed products.

Srinivasan *et al.*, (2000) found that consumers with higher educational level consumed more of processed products and the quantities consumed was more in high income group. Their study revealed that the total household expenditure and total income of household significantly influenced the expenditure incurred on the processed products.

Padmavathy (2005) in her study on consumer perception on store brand of Food World found that high income households preferred modern supermarkets and middle income households preferred local grocery stores for purchasing food and grocery items.

Srivastav (2005) in his study on consumer behaviour in relation to Nestle Maggi noodles found that noodles being a convenience food and preferred by children were the factors influenced the purchase of noodles. The choice of particular flavour of noodles was influenced by the taste and eating habits of the consumers. His study also revealed that the buying frequency was increased with the introduction of five rupee pack as it was felt to be affordable and majority of them were motivated by promotions and offers given to noodles.

Binu (2006) in her study on consumer preference for ready-to-eat and ready-to-cook products in Eranakulam district found that while purchasing ready to eat and ready to cook food products, the most important factor preferred by the consumers were taste, cooking time, price and brand.

Reeti (2007) in her study on spousal influence in family purchase decisions found that when to shop and which grocery products to buy decisions were dominated by wife, while how much to spend and which store to buy decisions were dominated by husband.

CHAPTER III

DESIGN OF THE STUDY

This chapter describes the sampling design, methods of data collection, study period and the analytical framework followed in the study. The research interest of the case firm was to estimate the market potential for Bt cotton seeds and to analyze farmers preference regarding Bt cotton seeds.

Sampling Design

Virudhunagar, Thoothukudi and Tirunelveli districts were purposively selected for the study based on the requirement of the case firm.

From the selected districts, blocks were selected based on cotton area. Thus four blocks namely Virudhunagar, Aruppukottai, Rajapalayam and Sathur were selected from Virudhunagar district. In Thoothukudi district, Kovilpatti and Kazhugumalai blocks and in Tirunelveli district, Thiruvengadam block were purposively selected. From each taluk, two villages were selected and from these villages 150 farmers were selected at random. The scheme of data collection is presented in table 4.

Table 4. Scheme of data collection

S. No	District	Blocks	Villages	No of Farmers	No of Dealers
1.	Virudhunagar	Rajapalayam Aruppukottai Virudhunagar Sathur	Kovilur Sivalingapuram Palayampatti Thottiyangulam Alagapuri Endapuli Melmadai Nenmeni	**70**	**30**

S. No	District	Blocks	Villages	No of Farmers	No of Dealers
2.	Thoothukudi	Kovilpatti Kazhugumalai	Pillayarnatham Ilayarasanenthal Duraichamipuram Sangaralingapuram	**50**	**14**
3.	Tirunelveli	Thiruvengadam	Athipatti Vagaikulam	**30**	**6**
Total				**150**	**50**

Besides fifty dealers who sold Bt cotton seeds were selected at random from the selected districts.

Collection of Data

Two sets of questionnaires, one for farmers and the other for the dealers were designed. After pretesting the questionnaire, primary data from the respondents were gathered by means of personal interviews. The details collected from the farmers included farming experience, size of holding, literacy level, occupation, source of information, factors influencing purchase of hybrids etc., The details collected from the dealers included their experience in the business, age, education level and problems faced while selling the seeds etc.

Secondary data relating to the study area regarding agriculture and general information were collected from the offices of the Joint Directors of Agriculture and Assistant Directors of Agriculture. Other information like location of the study area, soil type, rainfall pattern, cropping pattern, demography, land use pattern, irrigation sources etc., were collected from the offices of the Assistant Director of Statistics of Virudhunagar, Thoothukudi and Tirunelveli districts.

Period of the Study

The reference year for the study was the agricultural year 2008 – 2009 and the collection of data from the sample respondents were taken up during the months of February-March 2010.

Tools of Analysis

Collected data were processed, classified and tabulated to make a meaningful inference. These data were also subjected to both conventional and functional analysis. The analytical tools were presented below.

1. Conventional Analysis

Percentage analysis was used to study the general characteristics of the farmers like age, education, farming experience, sources of information, awareness about hybrid seeds, source of purchase etc,.

2. Garrett's Ranking Technique

Using Garret's ranking technique, the order of brand preference level assigned by the farmers was converted into ranks by using the formula,

Percent position = $100(R_{ij} - 0.5) / N_j$

Where,

R_{ij} – Rank given for the i^{th} brand by the j^{th} individual

N_j – Number of brands ranked by the j^{th} individual

By referring to Garett's table, the percent positions estimated were converted into scores. The scores of farmers were added and mean score was calculated. The brands were ranked according to their corresponding mean scores.

3. Rank Based Quotient (RBQ)

This technique was used to delineate the factors influencing the selection of brand, reasons for usage of Bt cotton seeds. The ranks given by the respondents were converted into RBQ using the formula given below.

$$RBQ = \sum_{i=1}^{n} \frac{(F_i)(n+1-i)}{Nn} \times 100$$

Where,

RBQ= Rank Based Quotient

F_i = Frequency of the farmers for the i^{th} rank of the factor

N = Number of farmers contacted for factor identification

n = The maximum number of ranks given for various factors

The factor with the highest RBQ score was ranked first and hence considered the most important factor by the farmers and the dealers.

4. Weighted Average Method

An average that takes into account the proportional relevance of each component, rather than treating each component equally.

This means:

$$\bar{x} = \frac{w_1 x_1 + w_2 x_2 + \cdots + w_n x_n}{w_1 + w_2 + \cdots + w_n}.$$

Here $x_1, x_2, \ldots\ldots x_n$ were different attributes values, $w_1, w_2 \ldots\ldots w_n$ were weight given to attributes $x_1, x_2 \ldots\ldots x_n$ respectively.

Simplified form,

$$\bar{x} = \sum_{i=1}^{n} w_i x_i$$

Therefore data elements with a high weight contribute more to the weighted mean than do elements with a low weight. The weights cannot be negative.

5. Compound Growth Rate (CGR)

Compound growth rate was used to project demand for Bt cotton. The data on area of Bt cotton for past 10 years was used for calculation of CGR. By taking time as an independent variable and area under Bt cotton as dependent variable the CGR was worked out by using the formula.

$Y=AB^X$

Where,

Y= area under Bt cotton in ha

A= constant term

B= parameter to be estimated

X= time measured in year

By linearising the model,

log y = log A+X log B

Taking log A =a; log B= b,

log Y = a+ bX

This is a linear function with independent variable 'X' and dependent variable 'Y'. The CGR is given by,

CGR = (Anti log of b-1) *100

After finding the compound growth rate, it was substituted in the formula,

$Qa= Qo\left(1+\frac{r}{100}\right)N$

where,

Qa = Projected area of Bt cotton in ha.

Qo = area in the base year

r = compound growth rate

N= No. of years

6. Chain Ratio Method

Chain ratio method is an effective method for estimation of market potential. This method is also referred as ‘top down method’.

The chain ratio approach for the estimation of total market potential of Bt cotton seed is:

TMP= PA * AS

Where,

TMP = Total Market Potential for Bt Cotton

PA= Projected area of Bt Cotton

AS=Average Adopted Seed rate per ha.

CHAPTER IV

DESCRIPTION OF THE STUDY AREA

A profile of the study area in terms of agro climatic conditions, topography and other socio-economic characteristics of a region are important for understanding the problems of agricultural development in that region. The present study mainly focuses on assessing the market potential for Bt cotton seeds in Southern Tamilnadu. The basic information of the study area like location, climatic condition, soil type, irrigation facilities, cropping pattern, infrastructural facilities of the study area are reported in this section.

I. Virudhunagar District

i) Geographical Location

Virudhunagar District is situated in the southern portion of Tamil Nadu State. It is bounded on the north by the districts of Madurai and Sivagangai, on the east by the districts of Sivagangai and Ramanathapuram, on the south by the districts of Thoothukudi and Tirunelveli and on the west by a portion of Kerala State and the district of Madurai. It has an area of 4432.55 sq. kms. The administrative headquarters is located at Virudhunagar town. The District lies between 90°20' and 90°72'north latitude and 77°20' and 78°70' east longitude.

ii) Demography

The population of Virudhunagar district is 5.04 lakhs of which 49.88 per cent are males and 50.11 per cent are females. Literate population of the district is 74.14 per cent.

Table .5 Demographic Details

S. No	Name of the Municipality	Population			Literacy Rate		
		Persons	Male	Female	Persons	Male	Female
1.	Virudhunagar	72081	35769	36312	57456	30049	27407
2.	Srivilliputhur	73183	36411	36772	52515	28988	23527
3.	Aruppukottai	84029	41929	42100	65144	35057	30087
4.	Sivakasi	72168	36312	35856	54598	29329	25269
5.	Sattur	31443	15439	16004	23241	12410	10831
6.	Rajapalayam	122307	61221	16004	88790	48710	40080
7.	Thiruthangal	49190	24529	24661	32227	18024	14203
Total		504401	251610	252791	373971	202567	171404

iii) Soil Type

The soil type of a particular area plays a vital role in determining the cropping pattern, productivity of crops and input requirements. The area comprising of Sattur, Srivilliputtur and Aruppukkottai are mainly covered by black loamy soil. This soil is very much suited for the cultivation of cotton, chillies and millets. The district has two naturally distinct regions viz. (i) Eastern slopes of the Western Ghats in the Srivilliputtur taluk and (ii) the plains of the Sattur and Aruppukkottai. The plain of Sattur and Aruppukkottai taluks mostly has black cotton soil, locally known as `Karisal'. Cotton mainly grown in the black cotton soil. Black soil is the predominant soil type in this district accounting for 39.23 per cent.

iv) Land Use Pattern

In Virudhunagar district, the total geographical area is 4.24 lakh ha, of which net sown area occupied 1.30 lakh hectares and this accounted for 30.62 per cent of total area. Land not available for cultivation accounted for 16.61 per cent of the total land in the district. Nearly 42.43 per cent of the area was classified under fallow lands and 6.23 per cent of the lands were under forest coverage. The remaining lands were classified under groves and orchards category.

Table 6. Land Use Pattern of Virudhunagar district

S. No.	Particulars	Area (in ha.)	Per cent to Geographical Area
1.	Forests	26466.00	6.23
2.	Barren and uncultivable land	4525.00	1.08
3.	Land put to non agricultural uses	70510.00	16.62
4.	Cultivable waste	9571.50	2.25
5.	Permanent pastures and other grazing lands	804.00	0.18
6.	Land under miscellaneous tree crops and groves	6634.80	1.56
7.	Current fallows	15241.99	3.59
8.	Other fallow lands	160618.00	37.85
9.	Net Area Sown	129951.30	30.64
10.	Geographical area according to village papers	424323.00	100.00
11.	Total cropped area	134884.80	
12.	Area sown more than once	4933.50	

(Source: G Return 2007 – 2008)

v) Agriculture and Horticulture

Paddy is the most important food crop in Virudhunagar district. It is grown on wetlands irrigated by rivers, channels, tanks and wells. Cumbu, Cholam, Ragi, Varagu, Samai, and Kudiravali are the millets produced in the district. Large area in the taluks of Sattur and Aruppukkottai comes under Cumbu, whereas Cholam is grown in the taluk of Aruppukkottai. Fodder Cholam in Sattur, Srivilliputtur and Aruppukkottai taluks, Varagu in Arupukkottai, and Samai in Aruppukkottai and Srivilliputtur taluks are grown in larger areas.

Of the commercial crops of the district, the most important is cotton followed by chillies. Cotton is the major crop in the black cotton soils of Sattur, Srivilliputtur and Aruppukkottai taluks. `Sattur Chillies' is famous in the market. Groundnut is the prominent oilseed grown in Sattur and Aruppukkottai taluks.

vi) Climate and Rainfall Distribution

The climate of the district is semi-arid tropical monsoon type. It has a high mean temperature and a low degree of humidity. The temperatures range from 20° C to 37° C. April, May and June are the hottest months of the year. Virudhunagar receives scanty rainfall with an annual average of 829 mm. The South West monsoon which sets in June and lasts till August brings scanty rain. The bulk of the rainfall is received during the North East monsoon in the months of October, November and December.

Table. 7 Rainfall Distribution (2007-2008)

S.No.	Season	Rainfall(mm)	Per cent
1.	Winter (Jan-Feb)	42.00	5.06
2.	Summer (March-May)	174.60	21.05
3.	South-West (June-Sep)	181.80	21.92
4.	North-East (Oct-Dec)	431.20	51.99
Total		829.30	100.00

vii) Irrigation Pattern

The main sources of irrigation in Virudhunagar district are Tanks and Wells. Canal system is not present for irrigation in the district. The total area irrigated by tanks, wells and other sources was 58,305 hectares. The net area irrigated by tanks and wells were 24,024 hectares and 34,281 hectares respectively. On an average about 50.81 per cent of the total cropped area is irrigated.

Table.8 Source of irrigation

S.No.	Source	Net area irrigated(ha)	Per cent to total
1.	Canals	-	-
2.	Tanks	24024	41.21
3.	Dug wells	34281	58.79
Total		58305	100.00

viii) Research Station

Virudhunagar district has one Regional Research station at Aruppukottai and one Cotton Research station in Srivilliputtur.

II Thoothukudi District

i) Geographical Location

It is situated in the extreme south-eastern corner of Tamil Nadu state and bounded on the north by the districts of Tirunelveli, Virudhunagar and Ramanathapuram, on the east and south-east by Gulf of Mannar and on the west and south-west by the district of Tirunelveli. Total area of this district is 4621 sq. kms. and the administrative headquarters is an Urban agglomeration and also one of the taluk headquarters within the district.

ii) Demography

Thoothukudi district had a total population of 15.72 lakhs as per 2001 Census, which included 7.66 lakhs males and 8.05 lakhs females. The density of population per Sq.km is 340 as against the 478 for the State. The sex ratio is 1050 females for every 1000 males. The percentage of literacy is 63.

Table 9. Demographic Details of Thoothukudi district

S. No	Name of the Taluk	Male	Female	Total	Density per sq.km.	Females per 1000 males	Literacy rate
1.	Thoothukudi	203368	201995	405363	1008	993	76
2.	Tiruchendur	138040	153388	291428	874	1100	87
3.	Kovilpatti	128711	133538	262249	488	1036	70
4.	Sathankulam	43692	53128	96820	291	1224	75
5.	Srivaikuntam	93472	98411	191883	461	1052	70
6.	Vilattikulam	66743	68542	135285	147	1038	66
7.	Ottapidaram	57201	58053	115254	156	1014	63
8.	Ettayapuram	35596	38395	73991	-	-	-
9.	Karunkulam	-	-	-	228	1054	66
10.	Udangudi	-	-	-	368	1165	78
11.	Alwarthirunagari	-	-	-	549	1099	75
12.	Kayatar	-	-	-	182	1065	60
13.	Pudur	-	-	-	147	1026	65
District Total		766823	805450	1572273	340	1050	63

iii) Soil Classification

The area comprising of Kovilpatti, Kayatar, Vilathikulam, Thoothukudi, Ottapidaram are mainly covered by black soil. This soil is very much suited for the cultivation of cotton and also for chillies and millets. Another major soil type is red sandy soil.

Table.10 Soil Type

Year:2006-2007

S.No	Type of Soil	Places in District
1.	Red Loam	Udangudy,Kayatar,Sattankulam
2.	Lateritic Soil	Srivaikuntam,Tiruchendur
3.	Black Soil	Kovilpatti, Kayatar, Vilathikulam, Thoothukudi, Ottapidaram
4.	Sandy Coastal Alluviam	Tiruchendur,
5.	Red Sandy Soil	Udangudi,Sattankulam,Srivaikuntam,Karungulam, Ottapidaram,Vembar

(Source: Directorate of Economics and Statistics, Chennai)

iv) Land Use Pattern

The total geographical area of Thoothukudi district is 4.59 lakh ha, of which net sown area occupied 1.69 lakh hectares and this accounted for 36.96 per cent of total area. Land not available for cultivation accounted for 16.29 per cent of the total area in the district. Nearly 17.91 per cent of the area was classified under fallow lands and 2.39 per cent of the lands were under forest coverage. The remaining lands were classified under groves and orchards category.

Table 11. Land Use Pattern of Thoothukudi district

Sl. No.	Particulars	Area in ha	Per cent to total geographical area
1.	Forests	11012	2.39
2.	Barren and uncultivable land	19762	4.30
3.	Land put to non agricultural uses	74791	16.29
4.	Cultivable waste	56640	12.33
5.	Permanent pastures and other grazing lands	5132	1.11
6.	Land under miscellaneous tree crops and groves	39751	8.65
7.	Current fallows	10162	2.21
8.	Other fallow lands	72095	15.70
9.	Net Area Sown	169689	36.96
10.	Geographical area according to village papers	459054	100.00

v) Agriculture

The main food crop in this district is paddy. Out of the total area of 4.50 lakh hectares,1.69 lakh hectares were brought under the cultivation of different crops which is nearly 40 per cent of total area of the district. The important food crops in the district are paddy, cholam, cumbu, ragi, varagu, samai and commercial crops are banana, cotton chilly, sugarcane and groundnut.

vi) Climate and Rainfall Distribution

The average mean maximum and minimum temperatures were 31.40°C and 24.30°C respectively. During the months of October, November and December, the district receives high rainfall, which is 410.10 mm. It is 62 per cent of the total rainfall of the district.

Table. 12 Rainfall Distribution (2007-2008)

S.No.	Season	Rainfall(mm)	Per cent
1.	Winter (Jan-Feb)	46.60	7.11
2.	Summer (March-May)	112.20	17.11
3.	South-West (June-Sep)	86.80	13.24
4.	North-East (Oct-Dec)	410.10	62.54
Total		655.70	100.00

vii) Irrigation Pattern

The different sources of irrigation are canals, tanks and wells which covers 40130 hectares in the district. Out of this, 16705 hectares were covered by well.

Table.13 Source of Irrigation

S.No.	Source	Net Area Irrigated(ha)	Per cent
1.	Canals	13325	33.20
2.	Tanks	9654	24.06
3.	Private tube wells	446	1.12
4.	Dug wells	16705	41.62
Total		40130	100.00

viii) Research stations

Thoothukudi district has one Agricultural Research Station at Kovilpatti which conducts research on dry land crops including Cotton.

III Tirunelveli District

i) Geographical Location

Tirunelveli, district is located in the southern part of Tamil Nadu. It is situated between 8°05' and 9°30' the Northern latitude and 77°05' and 78°25' of the Eastern longitude. It is surrounded by Virudhunagar District on the north, Western Ghats on the west, Kanyakumari district on the south, Tuticorin district on the east. The lifeline of the district is the river Tamaraparini.

ii)Demography

The total population of Tirunelveli district is 28.01 lakh. The literacy rate in the district is 68 percentage.

Table 14. Demographic details of Tirunelveli District

S.No.	Particulars	Demography (2001)
1.	Total population	28,01,194
2.	Male population	1372082
3.	Female population	1429112
4.	Total Literates	1917238
5.	Male literates	1041964
6.	Female literates	875274

iii)Land Use Pattern

The total geographical area of Tirunelveli district was 6.70 lakh ha.The area under forest accounted for 17.70 per cent. The area under current fallow was 4.7 per cent and other fallow lands accounted for 24.32 per cent of the total geographical area. The net area sown occupied 24.42 per cent of the geographical area.

Table.15 Land Use Pattern of Tirunelveli district (2007-2008)

S.No	Particulars	Area (in ha)	Percentage
1.	Forests	120801	17.70
2.	Barren and uncultivable land	30843	4.53
3.	Land put to non agricultural uses	104109	15.19
4.	Cultivable waste	41513	6.95
5.	Permanent pastures and other grazing lands	5353	0.77
6.	Land under miscellaneous tree crops and groves	9828	1.46
7.	Current fallows	26309	4.70
8.	Other fallow lands	167793	24.32
9.	Net Area Sown	164089	24.42
10.	Gross area sown	192495	29.48
11.	Area sown more than once	28406	-
12.	Total geographical area	670638	100.00

(Source: Office of Joint Director of Agriculture)

iv) Climate and Rainfall Distribution

In May which is usually the hottest month the mean daily maximum temperature is 37.1 ° C. The maximum temperature sometimes reaches 45 °C. The period from November to January is the coolest part of the year with a mean daily maximum temperature of about 30 to 31 °C. The mean daily minimum in these months is about 22 to 23 ° C in the district in general.

Table.16 Distribution of Rainfall (2007-2008)

S.No.	Season	Rainfall(mm)	Per cent
1.	Winter (Jan-Feb)	72.60	9.86
2.	Summer (March-May)	141.90	19.25
3.	South-West (June-Sep)	92.60	12.54
4.	North-East (Oct-Dec)	429.80	58.35
Total		736.90	100.00

(Source: Joint Director of Agriculture)

v) Agriculture

Tirunelveli has fertile soils only in scattered regions. Less fertile red soils are distributed over most of the region.Wet cultivation is essentially paddy cultivation and the major share of the gross cropped area is under paddy. In dry regions, diversified cropping patterns exist and no single crop claims a larger share of the gross cropped area. Paddy occupies the largest area of cultivation followed by cotton. Paddy is cultivated mainly in Tirunelveli, Palayamkottai, Tenkasi,Shencottai,Ambasamudram and Nanguneri taluks.

vi) Irrigation Pattern

Tirunelveli District is benefited by the early showers of south west monsoon and later north-east monsoon. The district is mainly irrigated by rivers originating from Westernghats. The dams and anaicuts constructed on Tamiraparani and Manimuthar rivers serve to both agriculture and power generation. The Tamiraparani river affords perennial irrigation to a fairly large area on which two crops are normally raised. Several tanks and wells form the other sources of irrigation.

Table.17 Source of irrigation

S.No	Irrigation Source	Net Area irrigated(ha)	Per cent to total
1.	Bore well and Open well	49152	41.97
2.	Tank	47755	40.78
3.	Canal	20201	17.25
Total		117108	100.00

vii) Research Station

Tirunelveli district has one Rice Research Station at Ambasamudram which was opened at 1937 and a coconut crossing centre at Vadakarai.

CHAPTER V

RESULTS AND DISCUSSIONS

The data collected from the farmers and dealers of the study area were compiled, analyzed and the results are presented in this chapter. The presentation of results is organized under the following sections:

1. General characteristics of the sample farmers .
2. Buying behaviour of the sample farmers.
3. Factors influencing purchase of Bt cotton seeds.
4. Estimating the market potential for Bt cotton seeds.
5. General characteristics of the dealers.
6. Trend in the sale of Bt cotton seeds.
7. Dealers' perception towards promotion of Bt cotton seeds.

Farmers Analysis

1. General Characteristics of the Sample Respondents

Analyzing the general characteristics of the farmers with respect to gender, family type, family size, educational status, income level of the household will be helpful to the case firm in accomplishing the needs of the farmers.

1.1. Age of the Respondents

The data regarding the age of the sample farmers were analyzed and the results are given in the Table 18. The minimum age of the respondents is 35 and the maximum age is 60 years.

Table 18. Age of the Respondents

(Number of farmers)

S.No	Age (years)	Virudhunagar District	Thoothukudi District	Tirunelveli District	Over all
1.	Less than 30	7 (10.00)	4 (8.00)	2 (6.66)	13 (8.66)
2.	30-50	37 (52.85)	29 (58.00)	18 (60.00)	84 (56.00)
3.	Above 50	26 (37.14)	17 (34.00)	10 (33.33)	53 (35.33)
Total		70 (100.00)	50 (100.00)	30 (100.00)	150 (100.00)

(Figures in parentheses indicate percentage to total)

It could be observed from the Table 18, that a large proportion of farmers viz., 56 per cent belonged to the age group of 30-50 years in the study area. It was followed by the age groups of above 50 years and less than 30. The same pattern was seen in the individual districts also. In Virudhunagar, 52.85 per cent of farmers, in Thoothukudi, 58 per cent of farmers and in Tirunelveli 60 per cent of farmers belonged to 30-50 years age group.

1.2. Educational Status of the Respondents

The education level of the farmers may influence the level of adoption of various modern practices and use of hybrid seeds. Educated farmers may get awareness through various sources. For this study, the sample respondents were categorized into illiterate, primary, secondary and college level. The details are presented in Table 19.

Table 19. Educational Status of the Respondents

(Number of farmers)

S.No	Category	Virudhunagar District	Thoothukudi District	Tirunelveli District	Over all
1.	Illiterate	18 (25.71)	13 (26.00)	10 (33.33)	41 (27.33)
2.	Primary	26 (37.14)	21 (42.00)	10 (33.33)	57 (38.00)
3.	Higher secondary	20 (28.57)	12 (24.00)	6 (20.00)	38 (25.33)
4.	Collegiate	6 (8.57)	4 (8.00)	4 (13.33)	14 (9.33)
Total		70 (100.00)	50 (100.00)	30 (100.00)	150 (100.00)

(Figures in parentheses indicate percentage to total)

The sample farmers were categorized into four groups based on their educational status. About 38 per cent of the sample farmers had primary education followed by 25.33 per cent farmers with higher secondary education. Only 9.33 per cent gained college education. Thus it could be inferred that most of the farmers (72 per cent) were educated.

1.3. Occupational Status

The occupational status of the farmers influences the farming activities, cultivation of crops etc. The details of the occupational pattern of on the same for the sample farmers are furnished in Table 20.

Table 20. Occupational Status of the Respondents

(Number of farmers)

S. No	Occupational status	Virudhunagar District	Thoothukudi District	Tirunelveli District	Over all
1.	Agriculture only	46 (65.71)	40 (80.00)	23 (76.66)	109 (72.66)
2.	Agriculture+ others	24 (34.28)	10 (20.00)	7 (23.33)	41 (27.33)
Total		70 (100.00)	50 (100.00)	30 (100.00)	150 (100.00)

(Figures in parentheses indicate percentage to total)

The results revealed that 72.66 per cent of the farmers were doing agriculture alone followed by agriculture and other business (27.33 per cent). Thus agriculture was the major occupation for majority of the farmers in the study area.

1.4. Experience in Farming

Experience of farmers in farming activities would have significant role in allocation of area under crops and selection of hybrids to be used and also in the success of farm business. Hence details of the same were gathered, analyzed and the results are presented in Table 21.

Table 21. Experiences in Farming Activities

(Number of farmers)

S.No	Category	Virudhunagar District	Thoothukudi District	Tirunelveli District	Over all
1.	Up to 10	7 (10.00)	3 (6.00)	2 (6.66)	12 (8.00)
2.	10-20	8 (11.42)	9 (18.00)	5 (16.66)	22 (14.66)
3.	20-30	38 (54.28)	22 (44.00)	14 (46.66)	74 (49.33)
4.	Above 30	17 (24.28)	16 (32.00)	9 (30.00)	42 (28.00)
Total		70 (100.00)	50 (100.00)	30 (100.00)	150 (100.00)

(Figures in parentheses indicate percentage to total)

It could be observed from Table 21 that 49.33 per cent of farmers had an experience of 20-30 years followed by farmers in the category of more than 30 years of experience who constitute about 28 per cent. 14.66 per cent had an experience of 10-20 years. These figures showed that the farmers were well experienced in farming activities.

1.5. Size of Land Holding of the Sample Farmers

Size of holding of the farmers may influence the cropping pattern, farm mechanization and buying behavior of the farmers with respect to agricultural inputs. The sample respondents were categorized into four groups based on the size of holding. The details regarding size of holding of sample farmers are presented in Table 22.

Table 22. Size of Land Holding of the Sample Farmers

(Number of farmers)

S.No	Size of Holding (ha)	Virudhunagar	Thoothukudi	Tirunelveli	Overall
1.	Marginal (<1)	2 (2.85)	3 (6.00)	3 (10.00)	8 (5.33)
2.	Small (1-2)	6 (8.57)	7 (14.00)	3 (10.00)	16 (10.66)
3.	Medium (2 -4)	42 (60.00)	28 (56.00)	18 (60.00)	88 (58.66)
4.	Large (>4)	20 (28.57)	12 (24.00)	6 (20.00)	38 (25.33)
Total		70 (100.00)	50 (100.00)	30 (100.00)	150 (100.00)

(Figures in parentheses indicate percentage to total)

In the study area, 58.66 per cent and 25.33 per cent of the total sample respondents had a land holding of 2-4 ha and more than 4 ha respectively. Only 10 per cent of the respondents had an area of 1-2 ha. Where as the marginal farmers were minimum.

1.6. Land Holding Pattern

The land holding pattern of the farmers may influence the input use decisions such as use of hybrid seeds. The details were analyzed and presented in Table 23.

Table 23. Land Holding Pattern of the Sample Farmers

(in hectares)

S. No.	Land Holding Pattern (ha)	Virudhunagar District				Thoothukudi District				Tirunelveli District			
		Wet	**Garden**	**Dry**	**Overall**	**Wet**	**Garden**	**Dry**	**Overall**	**Wet**	**Garden**	**Dry**	**Overall**
1.	Owned land	-	24 (67.76)	202 (100.00)	226 (95.19)	-	15 (67.56)	184 (100.00)	199 (96.41)	-	9.5 (59.37)	73 (100.00)	82.5 (92.69)
2.	Leased in land	-	11.4 (32.20)	-	11.4 (4.80)	-	7.2 (32.43)	-	7.2 (3.49)	-	6.5 (40.62)	-	6.5 (7.30)
3.	Leased out land	-	-	-	-	-	-	-	-	-	-	-	-
Total		-	35.4 (100.00)	202 (100.00)	237.4 (100.00)	-	22.2 (100.00)	184 (100.00)	206.2 (100.00)	-	16 (100.00)	73 (100.00)	89 (100.00)

(Figures in parentheses indicate percentage to total)

In Virudhunagar district, the sample farmers had totally 237.4 ha out of which 226 ha (95.19 per cent) was owned land and remaining 11.4 ha (4.80 per cent) was leased in land. In Thoothukudi district, the sample farmers had totally 206.4 ha out of which 199 ha. (96.41 percent) was their owned land and remaining 7.2 ha (3.49 per cent) was leased. In Tirunelveli district, the sample farmers had totally 89 ha out of which 82.5 ha (92.69 per cent) was owned land and remaining 6.5ha (7.30 per cent) was leased in land. Thus majority of the farmers had owned land and it would facilitate them to take decisions that have long term implications, such as nurturing soil health etc.

1.7. Cropping Pattern of the Sample Farmers

Knowledge on cropping pattern followed in the sample farms will help the firm to know about the various crops cultivated in the study area. This would enable them to devise their marketing strategies.Various crops raised by the sample farmers are presented in Table 24.

Table 24. Cropping Pattern of the Sample Farmers

(in acres)

S.No	Crops	Virudunagar District		Thoothukudi District		Tirunelveli District	
		Area (ha)	Per cent	Area (ha)	Per cent	Area (ha)	Per cent
1.	Cotton	76.40	32.18	68.00	33.26	28.50	32.02
2.	Maize	128.00	53.91	102.40	50.09	51.00	57.30
3.	Black gram	11.50	4.84	14.00	6.84	4.00	4.49
4.	Green gram	4.00	1.68	7.00	3.42	-	-
5.	Cumbu	9.50	4.00	11.50	5.62	-	-
6.	Sunflower	-	-	2.50	1.22	5.50	6.17
7.	Chillies	8.00	3.36	2.00	0.97	-	-
Total		237.4	100.00	204.4	100.00	89.00	100.00

It could be observed from the Table 24 that in Virudhunagar district maize occupied 53.91 per cent of the gross cropped area. Cotton occupied the second place with 32.18 per cent. Black gram , Green gram ,cumbu and chillies are the other crops grown.

In Thoothukudi district, maize occupied the major area and formed 50 per cent of the gross cropped area. It was followed by cotton contributing to 33 per cent. In Tirunelveli district also maize and cotton were the two major crops occupying 57 and 32 per cent of the gross cropped area.

1.8. Trend in Bt cotton Cultivation by Sample Farmers

Bt cotton cultivated area from 2006 to 2009 in the three districts were analyzed and the results furnished in Table 25.

Table 25. Trend in Bt cotton Cultivation by Sample Farmers

S.No	Land Holding (ha)	Virudhunagar				Total	Thoothukudi				Total	Tirunelveli				Total
		2006	2007	2008	2009		2006	2007	2008	2009		2006	2007	2008	2009	
1.	<1	52	44	29	23	182	38	31	23	16	132	22	19	17	12	84
2.	1-2	18	25	38	43	216	12	19	23	25	137	8	11	13	16	79
3.	2-4	0	1	3	4	20	0	0	4	8	26	0	0	0	2	8
4.	>4	0	0	0	0	2	0	0	0	1	5	0	0	0	0	1
Total		70	70	70	70	420	50	50	50	50	300	30	30	30	30	180

It could be observed from the table 25, that farmers increased the cultivation of Bt cotton over years. From 2006 to 2009 Bt cotton was grown only in marginal area (<1 ha). After 2008, farmers increased the area under Bt cotton. It shows that the farmers were convinced about the benefits from Bt cotton in terms of higher income.

2. Buying Behavior of the Farmers

The buying behaviour of the farmers has got a significant bearing on the marketing strategy of any seed firm and hence the same was studied and the results are presented below.

2.1. Source of Information

Agricultural information reaches farmers through various sources such as agricultural department, mass media, peer groups, input dealers, company personnel etc. The details on source of information on Bt cotton seeds was analyzed and results are presented in Table 26.

Table 26. Source of Information

S.No.	Particulars	Garret Score	Rank
1	Dealers	72	I
2	Peer groups	66	II
3	Sales personnel	59	III
4	Field days	47	IV
5	Mass media	40	V
6	Agricultural department	37	VI
7	Farm magazines	32	VII

It could be seen from the Table 26, that dealers were the major source of information for the cotton growers. Peer groups became the second major source followed by sales personnel . The respondents gave sixth rank to the agricultural department to the source of information .

2.2. Source of Purchase of Seeds

The sources of purchase of Bt cotton seeds by the sample farmers were analyzed and the results are presented in Table 27.

Table 27. Source of Purchase of Seeds

S.No	Category	Total No of Respondents	Percentage
1.	Agricultural department	0	0
2.	Dealers	137	91.33
3.	Directly from seed companies	13	8.66
4.	Commission agents	0	0
Total		150	100.00

In the case of Bt seeds in the three districts private dealers were major source of purchase of seeds to the farmers, followed by seed companies. Hence the case firm has to encourage dealers through different packages for increasing the firm's sale volume.

2.3. Mode of Purchase

The mode of purchase refers to purchase of seeds required for the crop by cash payment or through credit. The details on the same are presented in Table 28.

Table 28. Mode of Purchase

S.No	Category	Total No of Respondents	Percentage
1.	Cash	124	82.66
2.	Credit	26	17.33
Total		150	100.00

It could be observed from the Table 28, that majority of the cotton growers in the study area purchased seeds by only cash payment (82.66 per cent) followed by credit purchase (17.33 per cent). The results can be used by the case firm to decide their strategy regarding giving credit to dealers.

2.4. Constraints in Purchase of Bt cotton Seeds

Knowledge on the various constraints faced by the growers in the purchase of Bt cotton seeds would be useful to the seed firm in planning their marketing strategies and hence the same was analyzed. The results are furnished in Table 29.

Table 29. Constraints in Purchase of Bt cotton Seeds

S.No	Particulars	Total No of Respondents	Percentage
1.	High cost of seeds	64	42.66
2.	Not available locally	31	20.66
3.	Not available in time	14	9.33
4.	No credit facility	30	20.00
5.	Lack of awareness about Bt cotton seeds	11	7.33
Total		150	100.00

It could be observed that 42.66 per cent of cotton growers felt high cost of hybrid seeds is the major constraint, followed by non availability in their location (20.66 per cent), no credit facility (20 per cent), non available in time (9.33 per cent) and lack of awareness about Bt cotton seeds (7.33 per cent) were the other constraints.

The firm should take necessary steps to justify the high cost of seeds and additional returns that farmers are likely to get over that of other varieties. Besides the companies should ensure that adequate quantity of seeds are available at appropriate time, so that the farmers can adopt Bt seeds.

3. Factors Influencing Purchase of Bt cotton Seeds

3.1. Reasons for Brand Preference

There are many factors which influence the farmers' preference of a particular technology, practice or a brand. The study aimed at analysing and ranking the factors that have influenced the farmers in purchase of the particular brand . The information regarding the factors that influenced the brand preference of farmers are furnished in Table 30.

Table 30. Reasons for Brand Preference

S.No	Reasons	Mean score	Rank
1.	Dealers influence	89.55	I
2.	Peer group influence	81.72	II
3.	Own experience	75.55	III
4.	Influence of progressive farmers	71.72	IV
5.	Product performance	60.77	V
6.	Staple length	60.05	VI
7.	Sales representative recommendation	50.05	VII
8.	Field visit experience	39.55	VIII
9.	Availability of seed	32.61	IX
10.	Company image	31.66	X
11.	Price	23.27	XI
12.	Credit	19.55	XII

Among the various factors identified, dealers' influence was the highest influencing factor for the purchase of particular brand followed by peer group influence and own experience. The farmers consult the dealers frequently before buying any brand of the seeds. Hence, it is concluded that promotional measures should be aimed at the dealers and the firm should highlight on the efficacy of the product by conducting field demonstrations and campaigns. Besides, dealers' motivational issues also need to be prioritized and implemented.

3.2. Reasons for Cultivating Bt cotton

The factors which influenced cultivation of Bt cotton are listed and the farmers were asked to rank these factors and the observations are presented in Table 31.

Table 31. Reasons for Cultivating Bt cotton

S.No	Particulars	Mean Score	Rank
1.	High yield	95.40	I
2.	Pest and disease resistance	93.40	II
3.	Better quality of cotton lint	62.25	III
4.	Field demonstration	61.70	IV
5.	More demand from purchasers than non Bt cotton	60.66	V
6.	Seed availability	45.62	VI
7.	Low labour requirement	32.29	VII
8.	Low water availability	28.66	VIII
9.	Contract farming	20.51	IX

Similar to the factors influencing brand preference for Bt cotton seeds, high yield plays a major role in influencing the farmers to buy Bt cotton seeds with a mean score of 95.40, followed by pest and disease resistance with a mean score of 93.40.These two are the main factors which influenced the cultivation Bt cotton.

3.3 Marketing of Bt cotton

The selling place of final produce by the sample farmers was analyzed and the results are presented in Table 32.

Table 32. Marketing of Bt cotton

S.No	Particulars	Total No of Respondents	Percentage
1.	Local traders	127	84.66
2.	Commission mundis	23	15.33
3.	Regulated market	0	0
4.	Contract Farming	0	0
Total		150	100.00

It could be observed from the above table that 84.66 per cent of cotton growers sold their produce to the local traders because of the availability of the traders in their home place followed by commission mundis (15.33 per cent). There were no contract farming among the sample farmers.

3.4. Farmers Willingness to Cultivate Bt cotton in Next Season

Farmers' willingness to cultivate Bt cotton in the next season were analyzed to understand whether they want to continue with Bt technology and the results are given in Table 33.

Table 33. Farmers Willingness to Cultivate Bt cotton in Next Season

S.No	Category	Total No of Respondents	Percentage
1.	Yes	136	90.66
2.	No	14	9.33
Total		150	100.00

It could be observed from the above table that most of the farmers nearly 90 per cent of the farmers were willing to cultivate Bt cotton in next season because of the benefits of it. 9.33 per cent farmers were not willing to cultivate Bt cotton and the reasons were furnished in the following table.

3.5. Reasons for Not Cultivating Bt cotton in Next Season

The factors which influenced for not cultivating Bt cotton in future were listed and the farmers were asked to rank these factors and the observations are presented in Table 34.

Table 34. Reasons for Not Cultivating Bt cotton in Next Season

S.No	Particulars	Mean score	Rank
1.	Inadequate labour	100.00	I
2.	Non availability of water	84.69	II
3.	Instability in cotton price	64.28	III
4.	Difficulty in marketing	54.08	IV
5.	Increased cost of cultivation	46.93	V
6.	Reduction in yield	35.71	VI

It could be observed from the above table that labour shortage is the main and serious problem to quit the cotton cultivation. All the farmers who are not opting Bt cotton in the next season mentioned that labour shortage was the major problem followed by non availability of water (84.69 per cent) and instability in cotton price (64.28 per cent).

3.6. Supply of Refugee Seeds

Refugee seeds are conventional cotton variety seeds which are supplied along with Bt cotton seeds. These refugee crops are susceptible to boll worms and if the boll worms feed on these refugee crops they will not develop resistance to Bt cotton. Hence growing refugee crops around Bt cotton crop is recommended.

Farmers opinion about the supply of refugee seeds were analyzed and the results are presented in the following table.

Table 35. Farmers Opinion about the Refugee Seeds

S.No	Category	Total No of Respondents	Percentage
1.	Yes	150	100.00
2.	No	0	0
Total		150	100.00

It could be observed from the table that all the farmers (100 per cent) got the refugee seeds and it is available in the same pocket of Bt cotton.

3.7. Growing of Refugee Crops

Farmers opinion about growing of refugee crops were analyzed and the results are presented in the following table.

Table 36. Growing of Refugee Crops

S.No	Category	Total No of Respondents	Percentage
1.	Yes	104	69.33
2.	No	46	30.66
Total		150	100.00

It could be observed from the Table 36, 69.33 per cent of the farmers have grown the refugee crop in the border of the field and 30.66 per cent of the farmers have not grown refugee crops.

4. Estimation of Market Potential for Bt cotton Seeds

Market potential is referred to as the quantitative estimate on the maximum sales opportunities for all sellers of a good or service during a stated period of time in a stated market. It is essential for a firm to know the market potential of its goods or services to plan and allocate the resources accordingly.

In this study, an attempt was made to estimate the market potential for Bt cotton seeds in Virudhunagar , Thoothukudi and Tirunelveli districts for the period from 2009-10 to 2010-11. Total market potential is the maximum amount of sales that might be available at all times in an industry during a given period under a given level of industry's marketing effort and given environment conditions.

The market potential was estimated with the following assumptions

i. The area under cotton will increase or decrease in the same trend, as it has been in the previous years. It was 1998-99 to 2008-2009 .

ii. All the farmers would be using only Bt cotton seeds (this would be good for estimating the total market potential). None of them prefer to use improved varieties.

iii. The farmers use an average seed rate.

In the present study the compound growth rates of area under cotton was estimated to be -9.75 in Virudhunagar, -10.31 in Thoothukudi and -9.76 in Tirunelveli.. It is also estimated that average seed rate would be used.

Table 37. Compound Growth Rate of Area of Cotton in Virudhunagar, Thoothukudi and Tirunelveli Districts

S. No	Districts	Area (hectares)		
		R^2	Coefficient	CGR
1	Virudhunagar	0.86	-0.10*** (7.23)	-9.75
2	Thoothukudi	0.94	-0.11*** (11.9)	-10.31
3	Tirunelveli	0.76	-0.10*** (5.16)	-9.76

(Figures in the parentheses indicates t-value of the respective Coefficient)

*** Significant at 1 per cent level.

It could seen from the table that Compound Growth Rate (CGR) of area of Virudhunagar district was negative and significant at 9.75 per cent. In Thoothukudi district and Tirunelveli district CGR was negative and significant at 10.31 per cent and 9.76 per cent respectively.

The estimated total market potential for Bt cotton seeds in the three districts, for the years 2009-10 to 2010-11 are furnished in Table 38.

Table 38. Total Market Potential for Bt cotton Seeds

Year	Total Projected Area (ha)		
	Virudhunagar	Thoothukudi	Tirunelveli
2009-10	7195.00	3290.37	2646.64
2010-11	6431.00	2951.25	2388.36

Year	Total Market Potential for Bt cotton Seeds (kgs)		
	Virudhunagar	Thoothukudi	Tirunelveli
2009-10	17987.50	8225.92	6616.60
2010-11	16077.50	7378.12	5970.90

The area under cotton would be 7195 ha in 2009-2010 in Virudunagar district and it is expected to decrease to 6431 ha in 2010-2011. Accordingly the total market potential for Bt cotton was estimated to be 17987 Kgs and 16077 Kgs for the years of projection in order. In the same Thoothukudi and Tirunelveli districts also the area is expected to decrease.

4.1.Economics of Bt cotton

The costs and returns of Bt cotton cultivation are provided in Table 39. The information provided in the table reveal that human labour was the major component of cost of inputs applied for cotton production. Its share in total costs was about 45 per cent. This is followed by fertilizers accounting for about 18 percent of the total cost of cotton cultivation. Cost of machinery used for field operations accounted for about 10 per cent. The actual expenditure on pesticides was Rs.2034. The share of pesticides in total cost was less compared to other expenditure.

Table 39. Cost and Returns of Bt cotton (Rs/ha)

S.No.	Particulars	Bt cotton			
		Irrigated	Percentage	Rain fed	Percentage
1	Human Labour	13636	42.52	12743	44.41
2	Bullock labour	175	0.54	278	0.96
3	Machine labour	3159	9.85	2980	10.38
4	Seeds	3645	11.36	3895	13.57
5	Manures	1648	5.13	1433	4.99
6	Fertilizer nutrients	6432	20.06	5326	18.56
7	Plant protection chemicals	2718	8.47	2034	7.08
8	Irrigation cost	650	2.02	0	0
9	Total cost (Rs)	32063	100	28689	100
10	Total yield (quintal)	31.25		17.5	
11	Price (Rs/ quintal)	2600		2600	
12	Gross return (Rs)	81250		45500	
13	Gross margin (Rs)	49187		16811	

DEALERS

5. General Characteristics of Dealers

General characteristics like age, educational status, experience in the field, type of ownership and product line dealt by the dealer are important in understanding the decision making process and sales performance. Therefore the details on the same were collected, analyzed and the results were presented and discussed in this section.

5.1. Age of Sample Dealers

The details on the age of the sample dealers were collected and presented in Table 40.

Table. 40 Age of Sample Dealers

S.No	Age (years)	Number of Dealers	Percentage
1.	Up to 30	4	8.00
2.	31-40	17	34.00
3.	41-50	19	38.00
4.	>50	10	20.00
Total		50	100.00

Among the 50 dealers contacted for the study, about 38 per cent of the sample dealers were in the age group of 41-50 years, while about 34 per cent belonged to the age group of 31-40 years and 20 per cent belonged to the group of above 50 years and the age group of up to 30 is only 4 per cent. Thus majority of dealers belonged to age group 41-50.

5.2. Educational Status of Sample Dealers

Educational status of the dealers influence their decision making skills like choice of input companies, choice of the products and choice of promotional activities. The dealers were categorized by their educational status into 4 groups namely illiterate, primary school, higher secondary and collegiate. The data regarding educational status of the dealers were collected and furnished in Table 41.

Table 41. Educational Status of Sample Dealers

S.No	Educational levels	Number of Dealers	Percentage
1.	Illiterate	2	4.00
2.	Primary	11	22.00
3.	Higher secondary	23	46.00
4.	collegiate	14	28.00
Total		50	100.00

It could be observed from the Table 41 that among the sample dealers 46 per cent had higher secondary level education followed by 28 per cent of them with graduate education and 22 per cent with primary education .These figures indicate that all of the dealers have basic educational qualification to deal with input business.

5.3. Experience in Dealing Agri Inputs

The experience of the dealers in dealing with the agri inputs has a significant influence over their decision making process. The experienced dealers know their customers well and have a good rapport with them over years. Therefore, the experience of the respondent dealers in marketing of agri inputs was analyzed and the results are presented in Table 42.

Table 42. Experience in Dealing Agri Inputs

S.No	Experience (Years)	Number of Dealers	Percentage
1.	<10	18	36.00
2.	11-20	22	44.00
3.	21-30	8	16.00
4.	>30	2	4.00
Total		50	100.00

It was observed from the Table 42 that, among the sample dealers, 44 per cent of the dealers had 11-20 years of experience and 36 per cent of the respondents were with less than 10 years of experience. About 16 per cent of the respondents had an experience of 21-30 years followed by 4 percent of the respondents with more than 30 years of experience.

5.4. Type of Ownership

Type of ownership influences the decision making authority of the dealers. The details on ownership are given in Table 43.

Table 43. Type of Ownership

S.No	Ownership	Number of Dealers	Percentage
1.	Proprietorship	49	98.00
2.	Partnership	1	2.00
Total		50	100.00

It could be inferred from Table 43 that out of the 50 dealers contacted, 49 (98 per cent) of them belonged to the category of proprietorship and only 2 per cent fell under partnership, which shows the dominance of proprietorship among the dealers, that aid in quick decision making.

5.5. Product Line Dealt by the Dealers

The dealers generally deal with the marketing of inputs like seeds, insecticides, fertilizers and fungicides. An analysis was done to know how many dealers were involved in the marketing of various product line and the results are presented in Table 44.

Table 44. Product Line Dealt by the Dealers

S.No	Products in Number	No. of Dealers	Percentage
1	Seeds	6	12.00
2	Seeds+Pesticides	1	2.00
3	Seeds+Fertiliers+Pesticides	32	64.00
4	All	11	22.00
Total		50	100.00

All the 50 dealers dealt with the marketing of pesticides, fertilizers and majority (64 per cent) of the dealers were dealing with the major agro inputs viz., seeds, pesticide and fertilizers. About 22 per cent were dealing with pesticide, fertilizer, seeds and bio inputs .About 12 percent were dealing with seeds only. 2 per cent of dealer dealt with pesticides and seeds alone. Product mix is very common among dealers. When the farmers get all the inputs in a single shop and their services are good one can expect high loyalty towards the dealer. Thus, to sustain the competition and retain the customers, dealers always prefer good product mix.

6. Trend in the Sale of Bt cotton Seeds

6.1. Sales Volume of Bt cotton Seeds by Different Firms

The dealers were selling Bt cotton seeds of different companies. The firm's name and their sales volume were analyzed to understand the relative share of different companies in the Bt seed market. The results were given in Table 45.

Table 45. Sales Volume of Bt cotton Seeds by Different Firms

S.No.	Company	No of Pockets Sold					Total
		2006	2007	2008	2009	2010(Expected)	
1.	Rasi	570	3320	7442	12257	16775	40364
2.	Nuziveedu	480	840	1745	4300	6300	13665
3.	Mahyco	300	310	-	50	200	860
4.	Monsanto	-	50	1305	3395	5390	10140
5.	Northseeds	-	90	170	360	510	1130
6.	kaveri	-	100	330	540	570	1540
7.	Ajith	-	40	40	-	-	80
8.	Bioseeds	-	20	30	40	70	160
9.	Ankur	-	-	390	1030	1420	2840
10.	UPL	-	-	200	300	400	900
11.	Dhanya	-	-	20	-	-	20
12.	Bayer	-	-	100	700	1150	1950
13.	Viba	-	-	-	300	580	880
14.	Krishidhan	-	-	-	230	545	775
15.	Amar	-	-	-	100	100	200
16.	Chatrapathi	-	-	-	50	70	120
17.	Super	-	-	-	10	15	25
18.	Zuari	-	-	-	10	100	110
19.	Tulasi	-	-	-	-	50	50
Total		1350	4770	11772	23672	34245	

It could be observed from the above table that, Rasi seed company having the highest market share followed by Nuziveedu and Monsanto. Other firms having minimum share in the sale of Bt cotton seeds. And the sale of Bt cotton seeds increased from the year 2006 to 2010. So we could conclude that farmers were convinced by the properties of Bt cotton.

6.2. Competing Crops for Bt cotton

The competing crops of Bt cotton were identified and the reasons were noted in the Table 46.

Table 46. Competing Crops for Bt cotton

S.No	Competing Crops	Reasons
1.	Maize	Shortage of labour Price variation
2.	Bajra	
3.	Jowar	

Maize, bajra, jowar were the competing crops for Bt cotton . The two main factors which make farmers to choose other crops are shortage of labour and cotton price variation. Though the introduction of National Rural Employment Guarantee Scheme (NREGA) labours were not available during peak periods of agricultural operations. And the price of cotton changing in every year. There is no stability in the price of cotton.

7. Perception of Dealer towards Bt cotton Seeds

The sample dealers were asked to rank the perception towards Bt cotton seeds in terms of timely supply, return of unsold stocks, credit facility, dealers margin and incentives are analyzed and presented in the Table 47.

Table 47. Perception of dealer towards Bt cotton Seeds

S.No	Statements	Mean Score	Rank
1.	Timely supply	4.54	I
2.	Dealers margin	4.34	II
3.	Credit facility	3.88	III
4.	Return of unsold stocks	3.26	IV
5.	Incentives	2.66	V

It could be seen from the above table that, most of the dealers were satisfied with timely supply with a mean score of 4.54 followed by their margin (4.34 mean score) and credit facility (3.88 mean score), whereas dealers were not satisfied with incentives and return of unsold stocks.

7.1. Promotional Support from the Company

Several promotional activities were undertaken by the seed firms to promote their brands to the dealers. The dealers were asked if they received promotional support from companies and the results were presented in Table 48.

Table 48. Promotional Support from the Company

S.No	Promotional Support	Number of dealers	Percentage
1.	Yes	48	96.00
2.	No	2	4.00
Total		50	100.00

From the above table it is clear that 96 percent of the dealers received promotional support from the company and 4 percent of the dealers did not receive any promotional support from the firm.

7.2. Types of Promotional Support Received by the Dealers

Promotional support from the company is very important in the sale of seeds and the type of promotional support received by the firm were presented in Table 49.

Table 49. Types of Promotional Support Received by the Dealers

S.No.	Promotional Support	No. of. Respondents	Percentage of Total
1	Campaign	21	42.00
2	Advertisement	12	24.00
3	Prizes	7	14.00
4	Offers	10	20.00
Total		50	100.00

Most companies (42 per cent) provided promotional support to the dealers in the form of campaigns. Advertisement is the next important form of promotional support , followed by offers and prizes.

7.3. Problems in Marketing of Bt cotton Seeds

Problems encountered in the marketing of Bt cotton seeds by the dealers were analyzed and the results were furnished given in Table 50.

Table 50. Problems in Marketing of Bt cotton Seeds

S.No	Problems	Score	Rank
1.	High cost	83.25	I
2.	Pest and disease problem	65.75	II
3.	Spurious seeds available directly to farmers	60.00	III
4.	Not receiving unsold stock	59.50	IV
5.	No credit	52.25	V
6.	Stocks not available in time	43.75	VI
7.	Less margin	43.00	VII
8.	Inadequate promotional effort by the firm	37.50	VIII

The main problem faced by the dealer was the high cost of the seeds. Though the seed companies were reduced the price from Rs.1250 to Rs.750 the dealers were of the opinion that the cost of the seed is the main problem to sell the seed. The seed companies introduced Bt cotton to reduce the pest problem. But Bt cotton was susceptible to sucking pests than non bt cotton. So some farmers were reluctant to purchase because of high cost coupled with sucking pest problems in Bt cotton.

CHAPTER VI
SUMMARY AND CONCLUSION

In this chapter, the summary of the research work undertaken, and the conclusions drawn based on the results obtained are furnished. The study was undertaken for Shri Ram Bioseeds and Genetics Ltd. The case firm was interested in analyzing the market potential and trend in the sale of Bt cotton seeds in Southern Tamil Nadu. The specific objectives of the study were;

- To analyze the buying behaviour of farmers towards Bt Cotton seeds,
- To estimate the market potential for Bt Cotton Seeds,
- To analyze the trend in the sale of Bt Cotton seeds ; and
- To analyze the dealers perception towards promotion of Bt Cotton seeds.

To address the above objectives three districts namely Virudhunagar, Thoothukudi and Tirunelveli were chosen. The districts were selected based on the higher proportion of area under cotton. From the selected districts, blocks were selected based on the area under cotton and from each block two villages were selected at random. From the selected villages 150 farmers were selected at random for data collection. Besides 50 dealers were also contacted for data collection. The data collected were subjected to statistical analysis and results were presented briefly here.

General Characteristics of the Sample Farmers

Majority of the sample farmers cultivating Bt cotton seeds (56 per cent) were in the age group of 30-50 years, followed by the age group of above 50 years (35 per cent).

38 per cent of the sample farmers had primary level education followed by the illiterate farmers (27 per cent), and twenty five percent of the farmers had higher secondary level of education. Of the total sample nine percent of them had collegiate education.

49 per cent of the farmers had experience of 20 to 30 years of cotton cultivation followed by above 30 years of experience which constituted 28 per cent which showed that the farmers were well experienced in cotton cultivation.

Most of the respondents (72 per cent) had agriculture as their primary occupation followed by farmers who are also involved in other business (27 per cent).

58 per cent of the sample farmers owned 2-4 hectares of land followed by 25 per cent of farmers who owned above 4 hectares and 10 per cent of the sample farmers owned 1-2 hectares of land, and only five percent of farmers had less than one hectare of land. Thus majority of the sample farmers were under the categories of medium and large scale farmers.

Maize, cotton, black gram, green gram, cumbu, and chillies were the major crops cultivated in the study area. Of the total area under cultivation during the year 2008-09, maize occupied major share of about 53 per cent followed by cotton (32 per cent).

Majority of farmers were cultivating Bt cotton in the last four years. The average area under Bt cotton cultivation among the sample farmers increased over the years.

Buying Behaviour of the Sample Farmers

Source of Information

In the three districts, the farmers expressed that dealer as the major source of information for Bt cotton cultivation followed by peer groups. Sales personnel were the third important source of information about Bt cotton seeds.

Source of Purchase of Seeds

In the case of purchase of seeds, private dealers were major source followed by seed companies. No farmers bought seeds from agricultural department. Hence the case firm has to encourage dealers through different packages for increasing the firm's sale volume.

Terms of Purchase

Majority of the farmers were purchased seeds on cash payment (82.66 per cent) followed by credit purchase (17.33 per cent). Because the high cost of seeds the dealers gave only on cash payment.

Constraints in Purchase of Bt cotton Seeds

42.66 per cent of the sample farmers felt high cost of the seeds as a major constraint, followed by non availability in their location (20.66 per cent), no credit facility (20.00 per

cent) and non availability in time (9.33 per cent). So the firm should take necessary steps to justify the high cost of seeds.

Factors Influencing Purchase of Bt cotton Seeds

Reasons for Brand Preference

Dealers were the highest influencing factor for the purchase of particular brand followed by peer group influence and own experience. The farmers consult the dealers frequently before buying any brand of the seeds. Hence, it is concluded that promotional measures should be aimed at the dealers and the firm should highlight on the efficacy of the product by conducting field demonstrations and campaigns.

Reasons for Cultivating Bt cotton

High yield of Bt cotton plays a major role in influencing the farmers to buy Bt cotton seeds with a mean score of 95.40, followed by pest and disease resistance with a mean score of 93.40.These two are the main factors which influenced the cultivation Bt cotton.

Marketing of Bt cotton

Majority (84.66 per cent) of cotton growers sold their produce to the local traders because of the availability of the traders in their home place followed by commission mundis (15.33 per cent). There were no contract farming among the sample farmers.

Farmers Willingness to Cultivate Bt cotton in Next Season

Most of the farmers, nearly 90 per cent, were willing to cultivate Bt cotton in next season because of the benefits of it. 9.33 per cent farmers were not willing to cultivate Bt cotton.

Reasons for not Cultivating Bt cotton in Next Season

Labour shortage was the main and serious problem to quit the cotton cultivation. All the farmers who were not opting Bt cotton in the next season mentioned that labour shortage was the major problem followed by non availability of water (84.69 per cent) and instability in cotton price (64.28 per cent).

Supply of Refugee Seeds

Refugee seeds are conventional cotton variety seeds which are supplied along with Bt cotton seeds. These refugee crops are susceptible to boll worms and if the boll worms feed on these refugee crops they will not develop resistance to Bt cotton. All the farmers (100 per cent) got the refugee seeds and it is available in the same pocket of Bt cotton.

Growing of Refugee Crops

Majority of the farmers (69.33 per cent) have grown refugee crop in the border of the field and 30.66 per cent of the farmers have not grown refugee crops. Because they did not know the importance of refugee crops and many of the farmers grow the refugee crops in between Bt cotton crops.

Estimation of Market Potential for Bt cotton Seeds

The area under Bt cotton would be 7195 ha in Virudhunagar district in 2009-10 and it is expected to decrease to 6431 ha in 2010-11. Accordingly the total market potential for Bt cotton seeds was estimated to be 17988 kg, 16078 kg for the years 2009-10 and 2010-11. In a similar way the area under Bt cotton in Thoothukudi and Tirunelveli were estimated and the total market potentials were estimated. The projected market potential was found to decrease in both the districts.

Economics of Bt cotton

Human labour was the major component in cost of inputs applied for cotton production. Its share in total costs was about 45 per cent. This is followed by fertilizers accounting for about 18 percent of the total cost of cotton cultivation. Cost of machinery used for field operations accounted for about 10 per cent. The actual expenditure on pesticides was Rs.2034. The share of pesticides in total cost was less compared to other expenditure.

General Characteristics of Dealers

Majority of the sample dealers (38 per cent) were in the age group of 41-50 years, while about 34 per cent belonged to the age group of 31-40 years.

46 per cent of the sample dealers had higher secondary level education and 28 per cent of them had graduate education. About 22 per cent had primary education and only 4 per cent of them were illiterates.

Majority of the dealers (44 per cent) had experience in marketing of agri inputs for 11-20 years while 36 per cent of dealers had experience of less than 10 years.

Majority (98 per cent) of the sample dealers had run their business on a sole proprietorship basis. Only 2 per cent of them were partnership firms.

64 per cent of the dealers dealt with marketing of fertilizers, pesticides and seeds and 22 per cent of the dealers dealt with all inputs including bio inputs. Only a small portion of dealers (12 per cent) were exclusively dealing with seeds.

Market Share of Bt cotton Seed

Rasi seed company had the highest market share followed by Nuziveedu and Monsanto. Other firms had minimum share in the sale of Bt cotton seeds. And the sale of Bt cotton seeds increased from the year 2006 to 2010. So we could conclude that farmers were convinced by the properties of Bt cotton.

Competing Crops for Bt cotton

Maize, Bajra, Jowar were the competing crops for Bt cotton . The two main factors which make farmers to choose other crops were shortage of labour and cotton price variation. Though the introduction of National Rural Employment Guarantee Scheme (NREGA) labours were not available during peak periods of agricultural operations. And the price of cotton was varying over years. There was no stability in the price of cotton.

Perception of Dealer towards Bt cotton Seeds

Most of the dealers were satisfied with timely supply of seeds with mean score of 4.54 followed by their margin (4.34 mean score) and credit facility (3.88 mean score), whereas dealers were not satisfied with incentives and return of unsold stocks.

Promotional Support from the Company

96 percent of the dealers received the promotional support from the company whereas 4 percent of the dealers did not receive any promotional support from the firm.

Types of Promotional Support Received by the Dealers

Most companies (42 per cent) provided promotional support to the dealers in the form of campaigns. Advertisement was the next important form of promotional support, followed by offers and prizes.

Problems in Marketing of Bt cotton Seeds

The main problem faced by the dealer was the high cost of the seeds. Though the seed companies were reduced the price from Rs.1250 to Rs.750 the dealers were of the opinion that the cost of the seed was the main problem to sell the seed. The seed companies were introduced Bt cotton to reduce the pest problem. But Bt cotton was susceptible to sucking pests than non Bt cotton. So some farmers were reluctant to purchase because of high cost coupled with sucking pest problems in Bt cotton.

Suggestions for the Case Firm

- Bt cotton was introduced to reduce the pest problem in cotton especially for boll worms. But it did not control the sucking pests. Now a day sucking pests are the major problem to Bt cotton. So the case firm should popularize low cost IPM measures to control sucking pests in Bt cotton.
- Though Bt cotton reduce the pest problem and increase the yield, it faces competition from other competing crops. So affordable price and attractive credit policy may be formulated to encourage both the farmers and dealers. Reasonable margin should be given to dealers based on their sales volume of the seeds.
- Proximity is one of the important factors for successful marketing. Bt cotton cultivators are scattered in the remote village. Seed firms should see that Bt seeds are available at reasonable distance from the villages. Delivering seeds at the nearest possible retail outlets during the beginning of the season may be very crucial marketing strategy for seed companies. The firm has to have a proper network of distribution, which includes distributors and dealers with good support from the company's sales force.
- The results revealed that private dealers were the major sales outlet for Bt cotton seeds. The special packages like campaign, advertisement, offers and prices have

to be given to dealers. There should be good relationship between the dealers and the company executives and it should be a long term relation. The dealers should be educated on cultivation technologies to provide technical guidelines to the farmers. The company executives should establish frequent contact with the farmers to build up long term relation with them.

- Some of the farmers were unaware of Bt cotton and its benefits till now. Hence the case firm had to go for more promotional activities namely more field trials, personal meetings by company personnels and organization of farmers meetings as the farmers have to be clearly explained about the cultivation practices of Bt cotton and its benefits.

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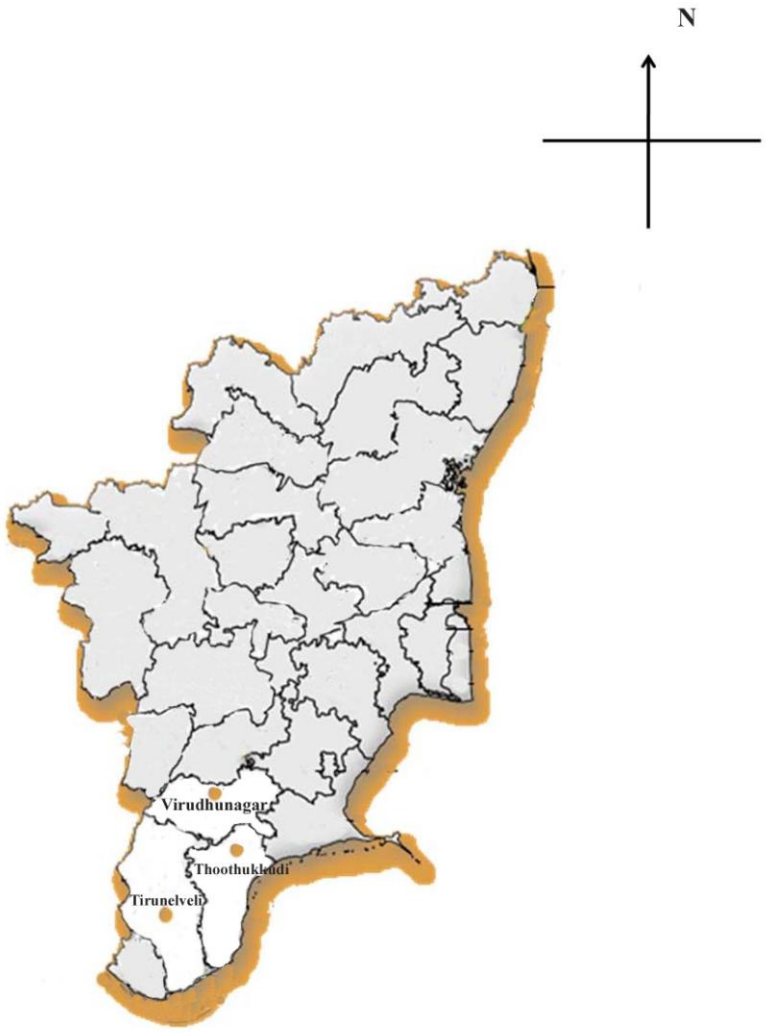

Figure.1 Selected Study Areas in Tamil Nadu