Study of Acceptance of New Molecules Against Cotton Sucking Pest in Punjab

Project Report

Submitted to the

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CERTIFICATE

We, the undersigned members of the Project Advisory Committee of **Rajnish Kumar, Id. No. 42683** a candidate for the degree of Masters of Business Administration (Agri business), agree that the Project Report entitled "**Study of the Acceptance of New Molecules Against Cotton Sucking Pests in Punjab**" may be submitted in partial fulfillment of the requirement for the degree.

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EXECUTIVE SUMMARY

The present study revealed that Majority of the farmers irrespective of the place or education level were the users of pesticides in cotton crop. Insecticides were found to be most used pesticide products followed by herbicides and fungicides. Infestation level severity and brand choice are the important factors in influencing the purchasing behavior of farmers. It was also observed that the farmers choose the insecticides based on the parameters like product quality, efficacy, cheaper price and dealers advise.

Seeing is believing, so in order to increase the sales of new molecules (Ulala, Oberon and Dinitrofuran) awareness among the farmers has to be increased. This can be done by increasing the number of field demonstration trials of new molecules on the farmer's field. Polo has comparatively more awareness so trade promotions like volume discount will be effective in order to increase the sales.

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1. INTRODUCTION

1.1 Background

Cotton is a crop that exerts considerable influence on India's economy particularly textiles. It secures livelihood for about 60 million people engaged in various vocations related to farming trade and textile industry. One-third of India's export earnings come from textiles and 20% from cotton textiles alone. Strengthening of the raw material base by raising productivity and quality of cotton to match international standards is necessary to secure a prominent and sustainable global standing for Indian textiles.

It is an important fiber crop of global significance, which is cultivated in tropical and sub-tropical regions of more than seventy countries around the world. India has the largest acreage under cotton at global level and ranks second in production after China. In India Cotton is cultivated in three distinct agro-ecological regions (north, central and south) of the country. The Northern zone comprising Punjab, Haryana and parts of Rajasthan and UP, where in cotton is grown under irrigated conditions, on alluvial and sandy soils. Bt cotton has been commercially cultivated in India since 2002 with the expectations of reduction in number of pesticide application, increase in yield and reduction in farmers' exposure to the pesticides. The release of transgenic cotton for commercial cultivation has revived the cotton production. Due to large scale cultivation of Bt cotton in India there is a significant change in insect pest complex of Cotton. Major sucking pests such as Whitefly, Jassids, Mealy bugs, cotton Thrips and cotton Aphids are emerging as potential threat.

Cotton crop is infested by several pests right from germination to harvest and the pest spectrum of cotton is quite complex. As many as 1326 species of insect and mite pests have been reported to attack cotton at various stages of crop growth, across the globe. However, in India the number is limited to 130 species (Agarwal *et al*., 1984). Among them the boll worm viz., American boll worm, Helicoverpaarmigera (Hubner), Spotted boll worm, Eariasvittella (Fabricius), Spiny boll worm, Eariasinsulana (Boisduval) and Pink boll worm, Pectinophora gossypiella (Saunders) pose greater threat to cotton production. Besides, a complex of sucking pests viz., Green leaf hopper, Amrasca biguttula biguttula (Ishida), Thripstabaci (Linnman), aphid, Aphis gossypii (Glover) and whitefly, Bemisiatabaci (Gennadius), are known to have occupied major pest status (Gosh, 2001) and account for the yield loss of 22.85 per cent (Satpute *et al*., 1990).

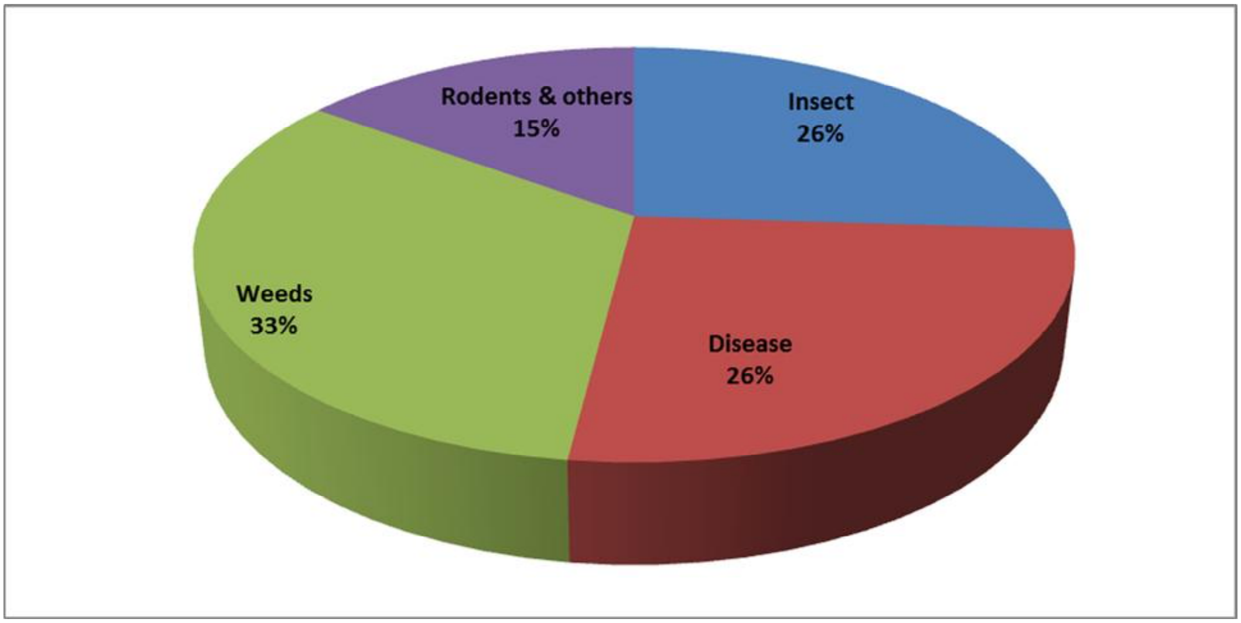
Indian agriculture grew at an impressive rate of 2.7% per annum during 50 years of independence. This growth rate can be attributed to the gain in crop productivity. The strategies adopted since independence and intensified after mid-sixties primarily focused on feeding the growing population and making the country self-sufficient in food production. The major factors that led to this enhanced productivity were use of synthetic fertilizers and pesticides, selective breeding, mechanization, developing irrigation infrastructure, and farm subsidies.

In shaping up the modern agriculture technology has played a vital component. Quality inputs such as seeds, chemicals, irrigation measures, fertilizers, pesticides and genetic engineering have played a major part in raising yields. Farmers now have a better access and wide range of these inputs. The farmers pass through a series of steps before making a purchase of these inputs. These steps include problem recognition, information search, alternative evaluation, purchase decision and post purchase evaluation.

The competition in agri-input market is increasing due to fairly large number of players in the business area. Keeping this in view, the input suppliers are offering a wide range of products to the farmers. This increased competition in this changing business environment has made the consumer so powerful as he is the one who is in position of being free to choose out one from many options. Thus business firms are now compelled to design and sell products that conform to the consumer’s needs and desires.

Need of Pesticides

In India about 142 million hectare under cultivation, 60% population is dependent on agriculture and to fulfill food requirement of such a big population, role of agriculture becomes very crucial. For supporting this pesticide emerge as a great tool.According to 37th Report of standing committee on Petroleum and Chemicals it is estimated that every year about 26 %crop loss occurs due to pest attack. Contribution of different pests is as follows:



Source: Directorate of Plant Protection Quarantine & Storage, Govt. of India

Exhibit 1.1- Share of crop loss due to different pests

Pests affect yield both qualitatively as well as quantitatively. Thus pests not only reduce our food stock it also affects farmers income adversely. It also puts a question mark on our food security. Except this, pest also acts as vectors of many diseases. Thus pest directly or indirectly cause threat to quality of living. So, it becomes necessary to use control measures.

Categories of Pesticides: Pesticides are often referred to according to the type of pest they control. In such a classification, pesticides are normally categorized in to the fallowing major categories:

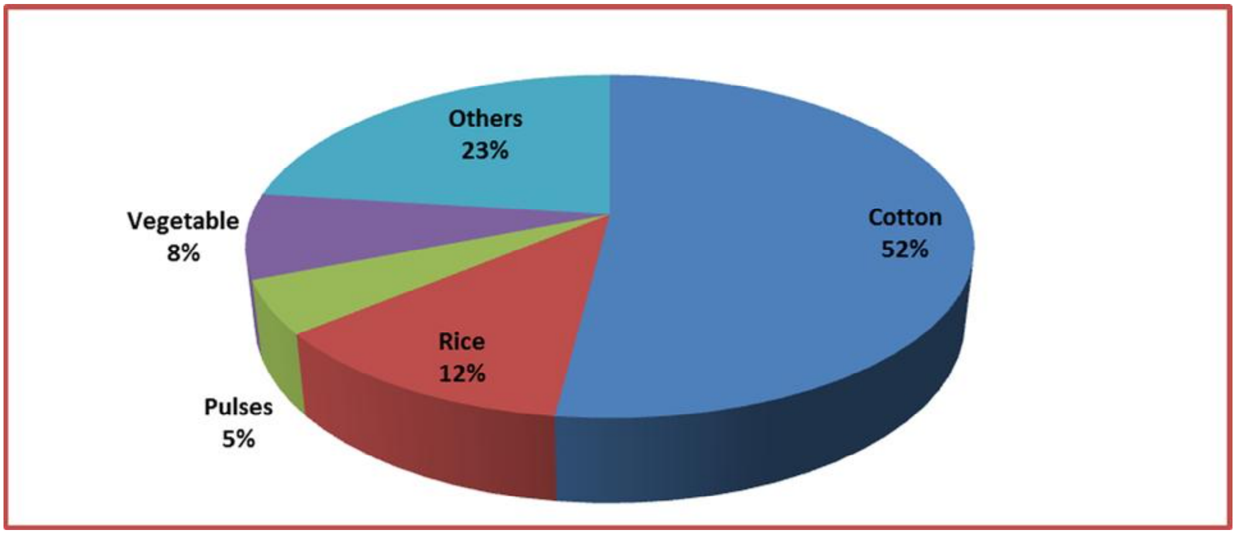
Insecticides act against which feed on crops, leaves, roots and other parts of plants.

Herbicides act against weeds or unwanted plants that compete with the main crop for nutrient, light, water and space.

Fungicides act against fungi, virus and mycoplasma which cause various diseases in plants.

1.2 Consumption of different categories of pesticides in India

The total area under cotton in India was 12.20 million hec that produces 34.10 million bales (One bales equivalent to 170 kg) of cotton (2011-12). The total pesticide consumption in India (technical grades) was 55.55 thousand tonnes (2010-11).Cotton is the crop that consumes maximum amount of pesticides (Exhibit 1.2).



Source: Directorate of Plant Protection Quarantine & Storage, Govt. of India

Exhibit 1.2 Crop wise Insecticides Usages Volume

The consumption pattern of different agrochemicals in India is Insecticides constituting 76 percent followed by Fungicides 13 percent and Herbicides 10 percent.

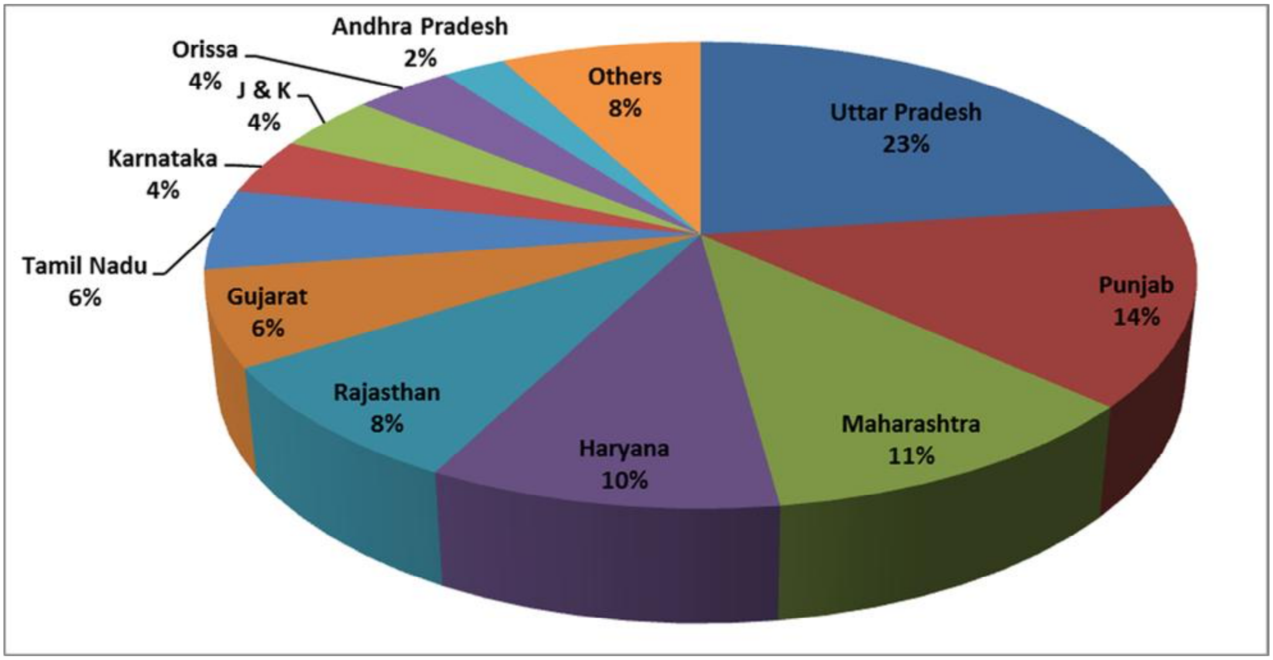
Table1.1Current Scenario of Cotton in India

State	2011-12			2010-11		
	Area (Lakh hec)	Production (Lakh bales)	Yield (Kg/hec)	Area (Lakh hec	Production (Lakh bales)	Yield (Kg/hec)
Punjab	5.6	19.50	592	5.30	18.50	593
Haryana	6.05	20.00	562	4.92	17.00	587
Rajasthan	5.30	17.10	540	3.35	10.10	513
Gujarat	30.23	120.00	675	26.33	106.20	686
Maharashtra	40.95	73.75	306	39.32	87.75	379
M.P.	7.06	17.70	426	6.50	17.70	463
A.P.	18.54	54.50	500	17.84	59.50	567
Karnataka	5.49	13.25	410	5.45	11.10	346
TamilNadu	1.21	7.20	1012	1.22	7.20	1003
Orissa	1.02	2.05	342	0.74	2.05	471

Source: Cotton Advisory Board, CAB(18thApril2012)

1.3 Status of pesticide consumption

From the exhibit 1.3 it is clear that Uttar Pradesh is the state which consumes maximum percentage pesticides (23 %) in India followed by Punjab (14 %) and Maharashtra (11 %).



Source: Directorate of Plant Protection Quarantine & Storage, Govt. of India

Exhibit No. 1.3Consumption of Pesticides in different states of India (2009-10)

1.3.1 Area of study

Among Major Cotton growing districts of the region, Fazilka & Sirsa district has been selected. The total area under cotton in different district is as follows:

Table 1.2 : Area of Cotton in different district of Punjab

S.No.	States	Districts	Cotton acreages (hec)
1.	Punjab	Bhatinda	142550
2.	Punjab	Rampura	55000
3.	Punjab	Ramsara	133000
4.	Punjab	Muktsar	143100
5.	Punjab	Faridkot	66660
6.	Punjab	Abohar	178101
7.	Punjab	Fazilka	90065
8.	Punjab	Malout	157903

Source: Union Director Cotton, Agriculture Department, Punjab

1.4 Work already done

Kakkar (1991) reported that pesticide used for cotton crop in Punjab was Rs.6.83 crores. The four district of Punjab Viz.,Barnala, Faridot and Sangrur accounted for Rs.6.21crores consumption of pesticides of the total supply; the remaining eight district consumed only of Rs.0.62 crores of the supply. In Barnala district, highest quality of pesticide was used followed by Faridkot district. The insecticides were the only category of pesticides used in cotton in Punjab. The small categories of holding used higher quantity of pesticide indicating inverse relationship between the total quantity used and land holding size, probably because of higher number of small farmers.

Krishna (1994) studied the effect of deal on knowledge of consumer purchase behavior. The author built a purchase quantity model to study the behavior of consumer who has knowledge of future price deals with that of those who do not. The result showed that the better and more accurate the information a consumer has the more consumer's behavior will differ from the one who has no awareness of future deals.

Sivakumar *et al.* (1994) analyzed buying behavior of farmers with respect to pesticides, considering the factor influencing loyalty of farmer towards dealer and brand. Friends, neighbors and relatives were the major source of information about dealers. In case of brands, it was extension personnel of the department of agriculture. The price, quality and promotional strategies of the brand contributed significantly to brand loyalty. Credit availability, advertisement and price of products available with dealer contributed significantly to dealer loyalty.

Patil *et al*. (2009) studied on the efficacy of new molecules on sucking pest in cotton in Dharwad and concluded that among different molecules studied Imidachlorpid, Acetamiprid, Fipronil 5% SC registered least number of sucking pest (thrips) and found to be on par with Acetamiprid 20 SP. Significantly highest seed cotton yield was harvested with higher dosage of Fipronil 5% SC respectively proving them to be on par with Acetamiprid 20 SP.

Belch *et al.* (2010) studied that sales promotion is an important tool in the marketer's communication armory. This includes marketing efforts designed to generate immediate interest in purchasing a product or service. Sales promotions are direct inducements that offer an extra value or incentive for the product to the sales force, distributors, or the ultimate customer with the primary objective of creating an immediate sale.

Muhammad and Anjum (2010) studied about the sucking pest complex in cotton in Punjab, Pakistan and concluded that Cotton jassid, whitefly and thrips are important sucking insect pests in their area. The seasonal dynamics of these pests were compared on transgenic Bt cotton line, with its parent non-transgenic cotton cultivar and concluded that there is no difference in transgenic Bt and non-Bt cotton for jassid, whitefly and thrips attack and application of suitable insecticide is required to theses pests on transgenic cotton.

Rudramuni *et al.* (2011) studied the bio-efficacy of new insecticidal molecules against insect-pests of cotton and concluded that among new molecules Methomyl (Lannate 40 SP), Thiodicarb (Larvin 75 WP), Triazophos (Hostathion 40 EC), Lamdacyhalothrin (Karate 40 EC) were found to be effective in controlling of sucking pest (aphid &thrips) in Hiriyur(Karnataka).

Kalyan *et al.* (2012) studied about bioefficacy of six molecules against Jassids and Whitefly in Cotton. Among the six molecules i.e. Acephate, Triazophos, Fipronil, Imidacloprid, Spinosad and Dimethoate all were evaluated in Rajasthan. Spinosad, Imidacloprid, Acephate and Fipronil effectively control the population of jassids and whiteflies and gave significantly higher seed cotton yield. The highest avoidable losses (52.65%) were recorded in Spinosad followed by Imidacloprid (42.38%), Acephate (31.47%), Fipronil (28.23%) and Dimethoate (28.12%).

1.5 Problem Statement

Cotton crop acreages' are growing steadily at rate of 9-11 % over past three years. Sucking pest complex also shown multiple growth. When Bt cotton was introduced in Punjab eight years ago, growers in this region, were able to tackle the bollworm menace and almost double their yields. However, the emergence of sucking pests such as white fly, Mealy bug and Jassids are posing threat to cotton crop not only in Punjab, but across the country. In the pre-Bt cotton days, the extensive pesticide sprays undertaken to control the bollworm had kept these sucking pests under check. The decline in pesticide usage in the post-Bt era has resulted in a flare-up of these sucking pests.New molecules such as Ulala, Dinitofuran are introduced in the market in recent years on sucking pests only, apart from Syngenta`s POLO and Rallis (Asataf, Tatamida, Manik, Applaud, Neon). On the other side, demand of cotton continues to rise year after year, spurred by global economic growth and increasingly seen driven by expanding usage in Asia led by China to fuel its cotton textile industry needs. So from benefit cost point of view it is very necessary to minimize the cost of cultivation by selecting appropriate agrochemicals and their effective use. In this regard the present study has been conducted with following objectives:-

1.6 Objectives of Study

1. To study buying behavior of farmer for cotton insecticide against sucking pest.
2. To study the effect on sales of established moleculesdue to new molecules.
3. To study distribution and promotion strategies for acceptance of new molecules.

2. INDUSTRY DESCRIPTION

India is the fourth largest producer of agrochemicals globally, after United States, Japan and China. The agrochemicals industry is a significant industry for the Indian economy. The Indian agrochemicals market grew at a rate of 11% from USD 1.22 billion in FY08 to an USD 1.36 billion in FY09. India's agrochemicals consumption is one of the lowest in the world with per hectare consumption of just 0.58 Kg compared to US (4.5 Kg/ha) and Japan (11 Kg/ha). In India, cotton accounts for the maximum share of pesticide consumption, followed by paddy. Indian population is increasing and the per capita size of land decreasing, the use of pesticides in India has to improve further. Besides increasing in domestic consumption, the exports by the Indian Agrochemicals Industry can be doubled in the next four years if proper strategies and sophisticated technologies are adopted by the industry.

2.1The Pesticide Industry in India

The production of pesticides started in India in 1952 with the establishment of a plant for the production of BHC (Benzene hexa chloride) near Calcutta. In India, there are about 125 technical grade manufacturers (10 multinationals), 800 formulators, over 145,000 distributors. Sixty technical grade pesticides are being manufactured indigenously. Technical grade manufacturers sell high purity chemicals in bulk (generally in drums of 200-250 Kg) to formulators. Formulators, in turn, prepare formulations by adding inert carriers, solvents, surface active agents, deodorants etc. These formulations are packed for retail sale and bought by the farmers. The Indian agrochemicals market is characterized by low capacity utilization. The total installed capacity in FY09 was 146,000 tons and total production was 85,000 tons leading to a low capacity utilization of 58%. The industry suffers from high inventory (owing to seasonal & irregular demand on account of monsoons) and long credit periods to farmers, thus making operations 'working capital' intensive.

India due to its inherent strength of low-cost manufacturing and qualified low-cost manpower is a net exporter of pesticides to countries such as USA and some European & African countries. Exports formed 50% of total industry turnover in FY08 and have achieved a Compounded Annual Growth Rate (CAGR) of 29% from FY04 to FY08.

2.2 Major Segments

Insecticides: In India Insecticides are mostly used among all pesticides unlike in other developed nation like United state and England where herbicides are mostly used. Consumption of insecticides for cotton has come down to 50% from 63% of total volume after introduction of BT cotton.

Fungicides: Fungicides are used to control disease attacks on crops. The growing horticulture market in India owing to the government support has given a boost to fungicide usage. The market share of fungicides has increased from 16 percent in 2004 to 20% in 2010.

Herbicides: Herbicides are the fastest growing segment of agrochemicals. Their main competition is cheap labor which is employed to manually pull out weeds. Sales are seasonal, owing to the fact that weeds flourish in damp, warm weather and die in cold spells.

Bio-pesticides: Bio-pesticides are pesticides derived from natural substances like animals, plants, bacteria and certain minerals. Currently a small segment, bio-pesticides market is expected to grow in the future owing to government support and increasing awareness about use of non-toxic, environment friendly pesticides.

Others: Plant growth regulators, Nematicides, Rodenticides, Fumigants etc. Rodenticides and plant growth regulators are the stars of this segment.

Forms of Pesticides: There are two forms of a pesticide.

1)Technical grade: This is the original form of a pesticide.

2)Formulation: This is made by using different fillers in technical grade so as to increase efficiency of the chemical.

There are different types of formulations –

I. EC (Emulsified concentrate),

II. WSC (Water soluble concentrate),

III. WP (Wettable Powder)

Toxicity Level: Toxicity level is mentioned in the packet or bottle of pesticide.These are denoted by different colors as

- Green – Slightly toxic
- Blue – Moderately toxic
- Yellow – Highly toxic
- Red – Extremely toxic

The Indian agrochemicals market is highly fragmented in nature with over 800 formulators. The competition is fierce with large number of organized sector players and significant share of spurious pesticides. The market has been witnessing mergers and acquisitions with large players buying out small manufacturers. Key market participants include United Phosphorus Ltd, Bayer Crop science Ltd, Rallis India Ltd, Gharda Chemicals Ltd, Syngenta India Ltd, BASF India Ltd, United Phosphorus Ltd etc. Top ten companies control almost 80% of the market share. The market share of large players depends primarily on product portfolio and introduction of new molecules. Strategic alliances with competitors are common to reduce risks and serve a wider customer base.

2.3 Market Trends

Focus on developing environmentally safe pesticides by the industry as well as the Government. The Department of Chemicals has initiated a nationwide programme for "Development and production of neem products as Environment Friendly Pesticides" with financial assistance from United Nations Development Programme (UNDP). Focus by larger companies on brand building by conducting awareness camps for farmers and providing complete solutions. Increase in strategic alliances among large players for greater market reach and acquisitions of smaller companies globally to diversify product portfolio. Like Rallis has a marketing alliance for key products with FMC, Dupont, Syngenta, Bayer and Nihon Nohayaku. In addition, UPL has had a series of small acquisitions globally to enter new geographies and gain product expertise. India's pesticide market, long stifled by various government controls and poor demand, is projected to more than double to $5 billion by 2017. India is the 13th largest exporter of pesticides and disinfectants in the world, and in terms of volume, is the 12th largest producer of chemicals.

Pesticides: spending more—and more (Estimated value in ₹ crore*)

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010
Insecticide use in Cotton	597.00	925.00	1032.00	649.00	579.00	733.00	790.61	833.65	880.40
Fungicide use in Cotton	3.37	7.76	5.96	8.45	11.14	24.77	31.50	52.23	66.86
Herbicide use in Cotton	0.52	3.38	3.88	7.75	11.82	21.53	26.10	45.47	86.85
Total Insecticide use in agriculture	1683.00	2146.00	2455.00	2086.00	2223.00	2880.00	3282.00	3909.00	4283.00
Total Pesticide use in agriculture.	**2622.30**	**3147.40**	**3581.38**	**2438.84**	**3395.99**	**4697.03**	**52933.0**	**6998.82**	**7683.60**

Quantities in litre or kg do not represent the real trends. New generation insecticides are used at 100-200 ml per hectare with 10-50 gm active ingredient in them as compared to conventional insecticides which were used at 3-5 litres per hectare with 500 gm to 2 kg active ingredient. Therefore, the net insecticide quantity would show significant reduction although farmers have spent more; Source: Central Institute for Cotton Research

Table:2.1 Total Pesticides used in Cotton (In Rs) in India

Pesticides are the last input in the agricultural process but are important for the sustainable development of agriculture. Despite the fact that judicious use of pesticides can prevent crop losses and provide economic benefits to the farmers, pesticide consumption in India is limited to about 25% of the arable land. This abysmally low penetration level is largely due to the lack of awareness among farmers regarding the benefits of use of pesticides, fragmented land holdings, together with farmers' financial inability to buy the requisite pesticide.

	2005-06	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Production (000 MT)	82	85	83	85	82	82
Consumption (000 MT)	39.77	41.51	43.63	43.86	41.82	55.54

Sources:- Department of Agriculture & Cooperation, New Delhi.

Table:2.2 Production and Consumption of Technical grade Pesticides in India

3. METHODOLOGY

Attempt has been made to attain the objectives of the study by using following methodology:

3.1Research Design

The descriptive research design was used with an objective to gather maximum possible information that will be helpful in designing distributional & promotional strategy for new molecules.

3.2Sources of Data

To fulfill the objectives of the study, both secondary as well as primary sources of data has been used.

3.2.1 Secondary data sources

The secondary data were collected from portals, journals and periodicals.

3.2.2 Primary data sources

Primary data were collected directly from the farmer, pesticide dealers and company persons.

3.3 Sampling Plan

The following sampling plan was followed to fulfill the requirement of the study Undertaken. A total of eight molecules was taken for the study among that Acephate, Confidor, Monocrotophos, and Acetamiprid were considered as establishedmolecules and Polo, Ulala, Dinitrofuran, Oberon were new molecules.

3.3.1 Area of Study

The study was conducted in major cotton growing district of Punjab region.

3.3.2 Sampling Units

The sampling unit was farmers, Dealers, and Company person of agrochemical in the Fazilka&Sirsa district.

3.3.3Sampling Technique

Judgmental and convenience sampling techniques were used.

3.3.4Sample Size

Total sample of 120 farmers, 8 dealers and 4 company person were selected for this study.

3.4Research Instrument

Data was collected with the help of self developed questionnaire through personnel interview.

3.5Analytical Tools

Data obtained from the survey was analyzed using the concept of statisticalmethods and interpreted for meaningful inferences using tables and exhibits.

3.6 Duration of Study

Duration of the study was from April 20th to 05thJune 2013.

4. RESULTS

The present study was undertaken to understand the acceptance of new molecules against cotton sucking pest in Abohar&Sirsa region. The data collected from the survey was presented in tables and illustrated through figures. In this chapter an efforts has been made to interpret the results based on gathered information.

4.1 Educational level of farmers

The exhibit 4.1 reveals that out of 120farmers, majority of the farmers (94%) were literate while only six percent were illiterate. This may be attributed with more understanding of new molecules as farmers in this region are literate so printed literature can acts beneficial while planning for campaign of new molecules.

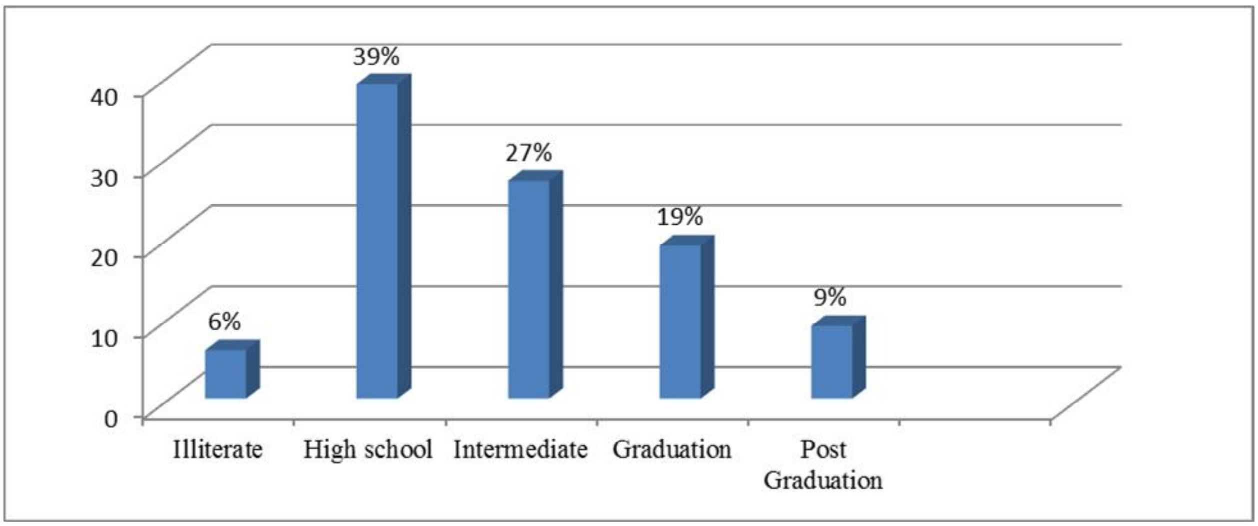


Exhibit No. 4.1 Educational Level of Farmers

4.2Buying behavior of farmers for Cotton Insecticides

Buying behavior of farmer depends upon several factors, in the present study attempts has been made to ascertain the main factors that directly or indirectly affects the decision of buying. The information collected from the government sources & distributors reveals that maximum pesticides consumption is in Abohar region, where sucking pest (White fly) infestation is severe than other places so farmers in these region regularly use pesticide. In Sirsa region the sucking pest infestation severity is relatively lesser than Abohar so in this region cotton farmers are using comparatively less quantity of pesticides.

Following points has been taken into consideration while accessing the buying behavior:

4.2.1 Infestation level of sucking pest

Secondary data collected from CCRI,(*Weekly advisory No. 3/2012*) shown that in case of sucking pests, the infestation of white fly has been observed above ETH(Economic Threshold) level while the infestation level of Jassid is still below ETH level in Fazilka district. At Fazilka, whitefly incidence continues to be high and farmers being advised to manage with the help of suitable pesticides. Whereas in Hisar, Fatehabad and Sirsa districts of Haryana, Whitefly and Jassid infestation was much below economic threshold level. This can also be judged with the following graph as the rating of white fly infestation in more than 4 (High) in Abohar.

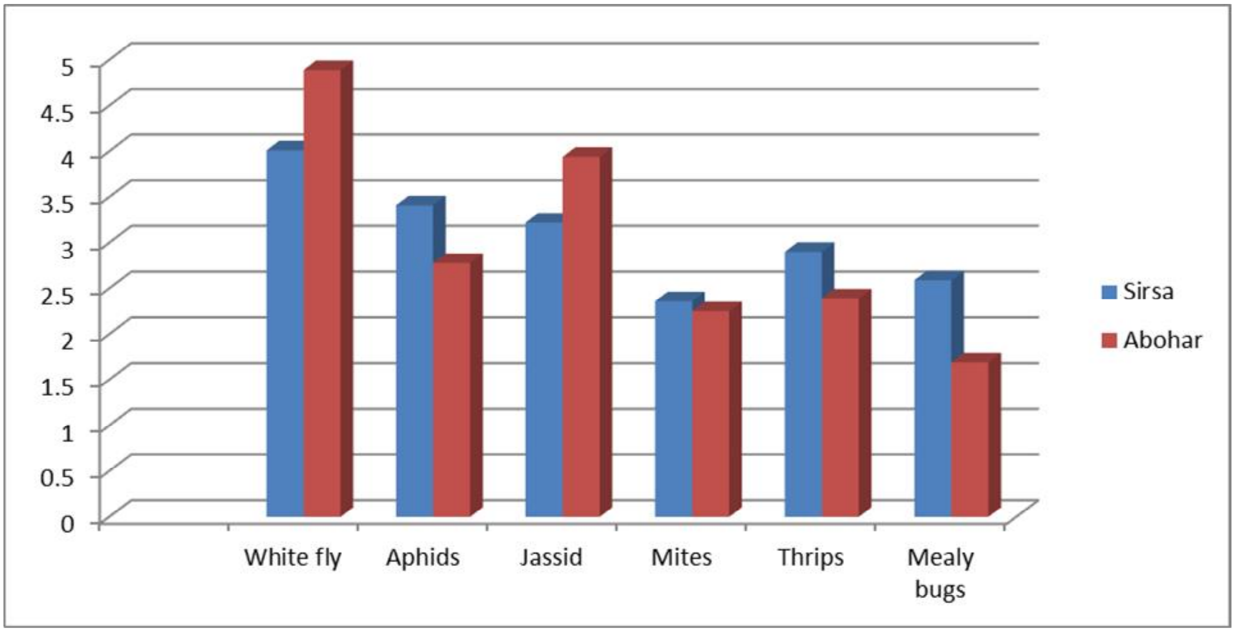


Exhibit No. 4.2 Rating of infestation level of sucking pest in cotton

(1-Very low, 2- Low, 3-Moderate, 4-High, 5-Very high)

4.2.2 Concern level of sucking pest

From above data it is clear that there is severity in infestation level of sucking pest in cotton in Punjab region. So there is directly concern between farmers buying behavior and infestation level in both the district. In Punjab there is more concern about the sucking pest complex than Haryana, this clearly indicted from the report (*Weekly advisory No. 3/2012*).

4.2.3 Current control practices

Data collected from both the district revealed that there is more concern level in Abohar as in current control practices farmers are spraying five to eight spray in whole duration of cotton crop. In Abohar majority of farmers spray up to eight sprays for controlling of sucking pest while this is not the trend in Sirsa due to severity of infestation level is less in this area. So in Abohar, farmers are more prone to new molecules because they are going upto 8-9 th spray in cotton for controlling of white fly. This can be judged by the exhibit no. 4.3.

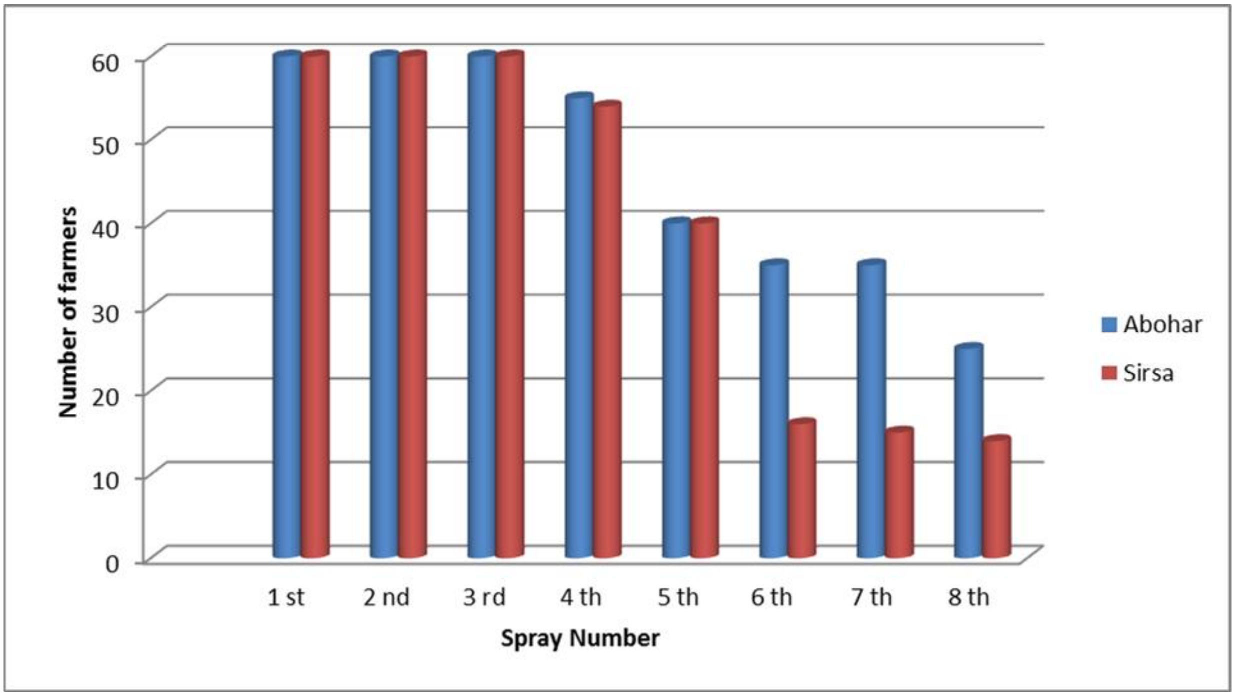


Exhibit No. 4.3 Total number of sprays practiced by the farmers in Abohar & Sirsa

4.2.4 Expenditure levels on buying behavior

Data collected from both the states shows that in the case of severe infestation farmers are willing to pay 2-3 times more, on control practices as there is no any single molecule that controls the white fly population in the later stage of crop growth. As about 30-40 % farmers said that they have used around Rs 6000-8000 /Acr of cotton for pesticides only in Abohar than Rs 4000- 5000/Acr in Sirsa.

4.2.5 Pest & chemical choices

Data collected from Abohar&Sirsa district revealed that white fly and Jassid are major concern in Abohar while jassid in Sirsa. In view of infestation level the available new molecules like Polo, Ulala and Dinitrofuran has good market potential. According to farmers opinion Polo is presently market leader in controlling white fly, but acceptance level is low compare to traditional product like Confidor&Acephate.

4.2.6 Brand choice

In the Abohar about 60-70 percent farmers were able to recall the brand in the case of white fly but due to costly and unable to control 100 percent pest population they were unsatisfied, so they are willing to try the new molecules for the effective control of well known brand. In Sirsa about 30-40 percent farmers were able to recall the brand and their responses was that Polo and Acetamiprid are the effective molecules for white fly control.

4.2.7 Spraying behavior

In the spraying pattern data revealed that in both the district farmers are using tank mixed spray for normal sucking pest while solo for specific pest. But in Abohar farmers are using more than recommended dose and more number of sprays than Sirsa. Data also revealed that in Abohar about 25 % farmers are using precautionary spray to avoid the pest attack.

From first objective of study it can be concluded that buying behavior mainly depends upon the severity of infestation level & expenditure levels of farmer.

4.3 Effect on sales of established molecules

A total of eight molecules were analyzed in both Abohar&Sirsa in which four were old (Acephate, Confidor, Monocrotophos&Acetamiprid) and four were New (Polo, Ulala, Dintrofuran& Oberon) to ascertain the effect on sales of established molecules.

4.3.1 Product preference level Information collected through interviewing the farmers showed that old molecules has about 80 percent awareness level while new molecules has (20- 70) percent awareness level. Among new molecules Polo of Syngenta has maximum of 70 percent awareness while that of Dinitrofuran& Oberon was around 20 percent. Ulala has shown that 30 percent of farmers were aware about the molecule.

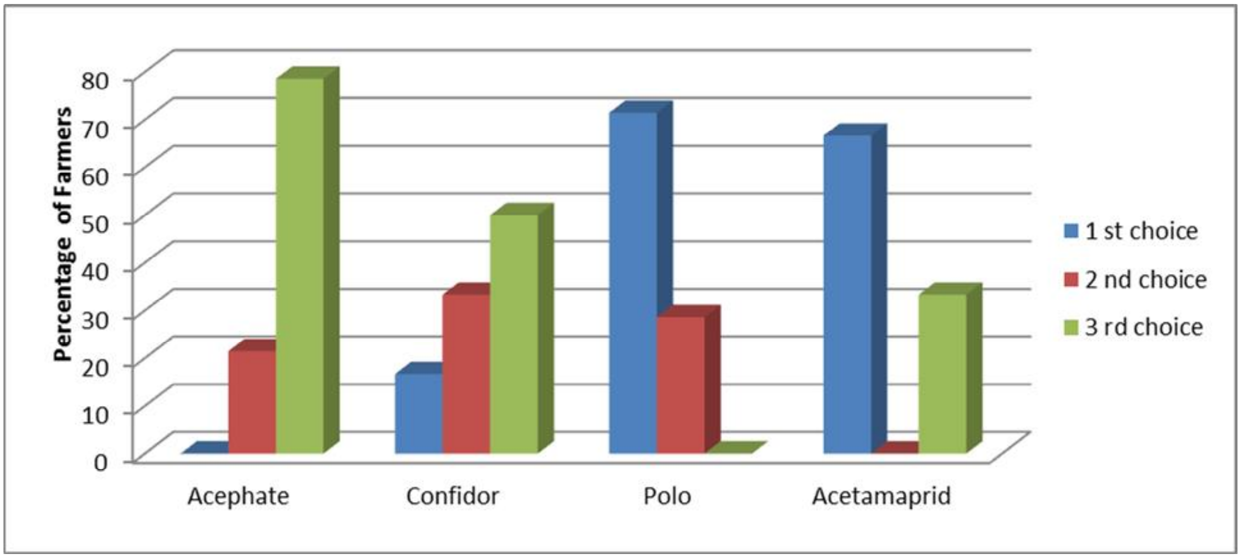


Exhibit No. 4.4 Product preference level of farmers of Abohar for different molecules

4.3.2 Purchasing frequency: In Abohar region farmers willing to purchase the old & trusted brand more compare to new molecules. Farmers are using Confidor and Acephate of trusted brand 100 percent every year in cotton for control of sucking pest. In the newer molecule only Polo has shown the deeper reach among farmer than other product, Ulala, Dintrofuran& Oberon depends on the dealer recommendation and company person suggestion

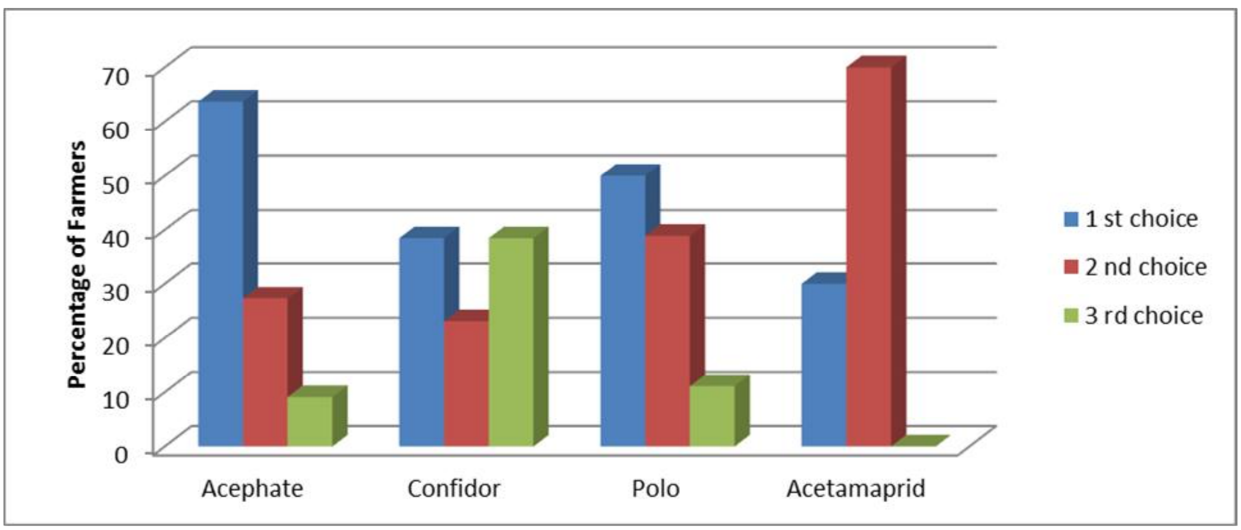


Exhibit No. 4.5 Product preference level of farmers of Sirsa for different molecules

4.3.3 Product loyalty: In Abohar region about 60 percent farmers said that they want to change the change the product because that doesn't fulfill their expectation and around 30 percent said that they are happy with the product result while in Sirsa around 70-80 percent farmers were satisfied with the product but they complained about higher cost.

4.3.4 Effect on sales: Among the eight products, about 75-80 percent farmers answered that they will continue the product like Confidor&Acephate due to cost effective, greening effect and suitable for sucking pest at initial stages in both the states (Exhibit No. 4.6 & 4.7). In the case of Acetamiprid they replied that product result is good but its effect is for lesser period. Among the newer molecules Polo has shown good acceptance level than rest of other product and about 60-65 percent farmers want to continue with product but they complained about higher price (Exhibit No. 4.8). Ulala, Dinitrofuran& Oberon, the responses of farmers were poor, they replied that they have not seen their result so how they can believe on effectiveness on controlling the sucking pest in cotton.

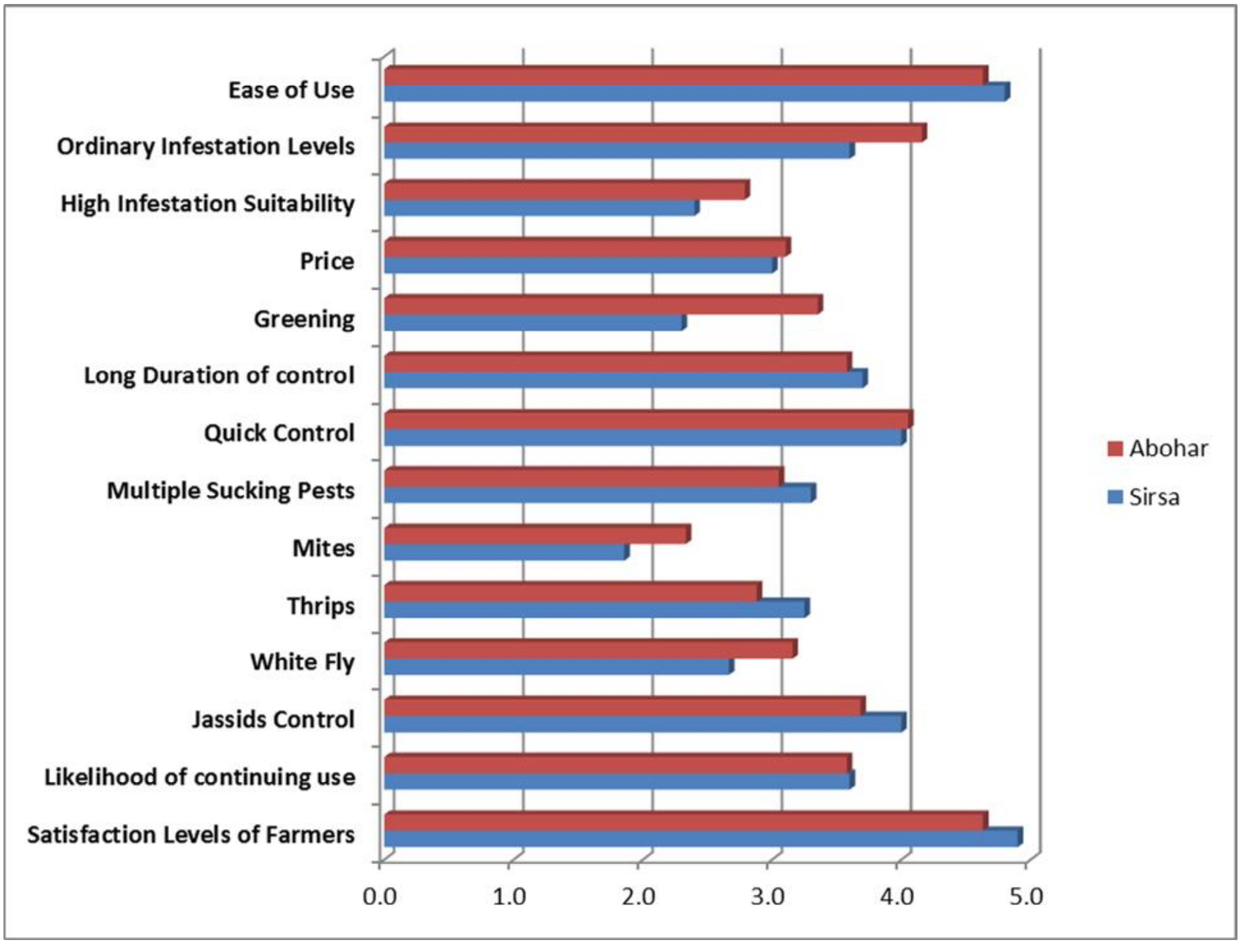


Exhibit No. 4.6 Farmers assessment about the Molecule (Confidor) in Abohar&Sirsa

Rating (1-Very low, 2- Low, 3-Moderate, 4-High, 5-Very high)

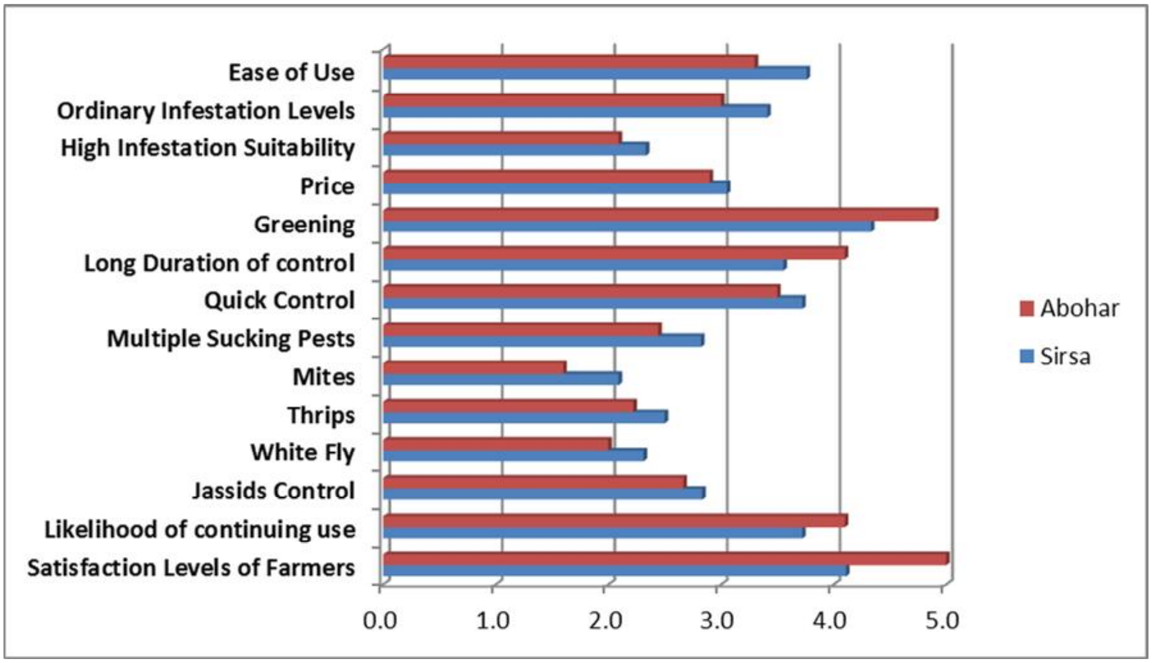


Exhibit No. 4.7 Farmers assessment about the Molecules (Acephate) in Abohar&Sirsa

Rating (1-Very low, 2- Low, 3-Moderate, 4-High, 5-Very high)

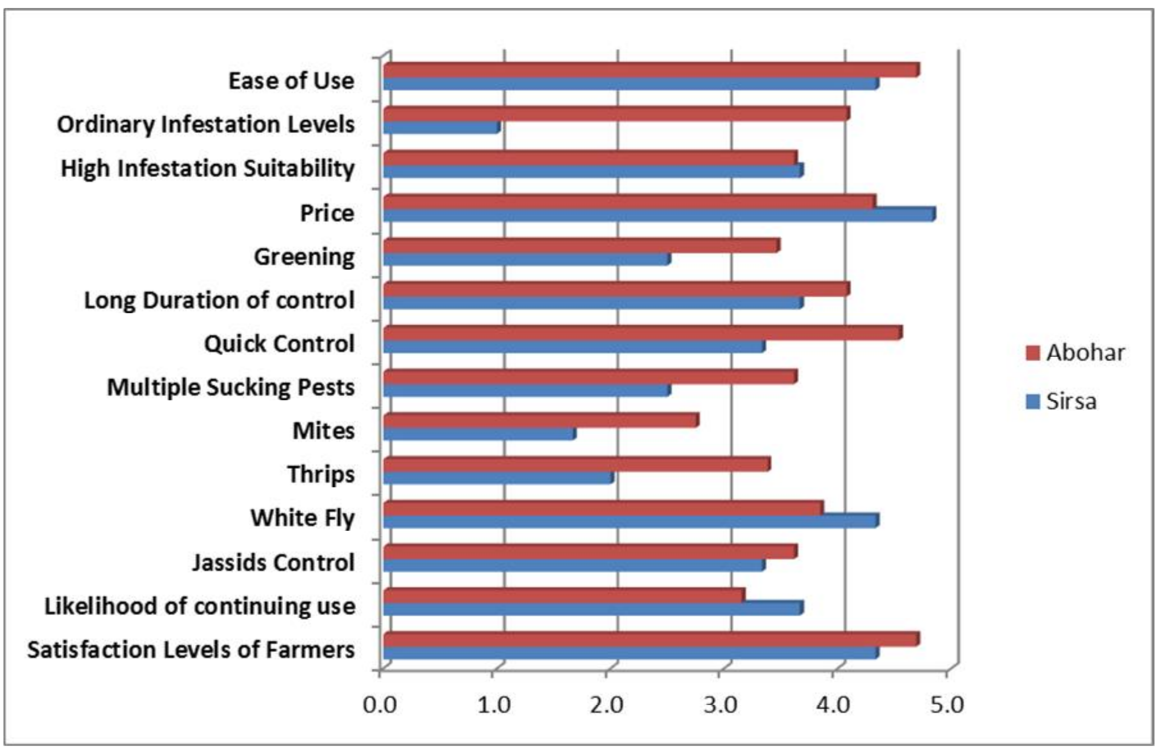


Exhibit No. 4.8 Farmers assessment about the Molecules (Polo) in Abohar&Sirsa

Rating (1-Very low, 2- Low, 3-Moderate, 4-High, 5-Very high)

From the Second objective of study it can be concluded that among the old molecules (Acephate and Confidor) that has shown quick control, greening effect with cost efficient has good perception among farmers where as long duration of control and greening effect have important parameters in deciding the choice of new molecule (Polo).

4.4 Distribution & Promotion strategy:

4.4.1 Distribution strategy:

The study of related literature and observations made during the process of this project revealed existence of numerous distribution channels. The companies in trade/market were not found patronizing any single distribution channel alone. Though majority of the companies were limited to the traditional distribution channel (discussed below), some companies were found using one additional distribution channel. In addition to these, the companies with their manufacturing bases outside India or the companies which happen to be importing molecules from foreign manufacturer have a different type of distribution channel. Therefore, for the purpose of convenience and easy comprehension these channels have been put under three broad classes. These are:

I. Traditional distribution channel:

This class contains group of those distribution channels that are most prominent and practiced invariably by majority of the companies which are selling pesticides/insecticides to farmers. These channels are normally similar in nature, but for minor variations. These variants of traditional distribution channels have been elaborated below with the help of flow diagram/exhibits.

I (a) Variant-I or 5 step distribution channel: In this type of channel products/molecules movement starts from the manufacturer to C & F agent where depending upon catchment area basis products are supplied to the agents and distributor. If the market size is significantly larger than other competitor then products supplied to sub distributor followed by dealers and retailers to end user farmers. Bayer Crop Science, Syngenta etc. are the corporate houses using this specific type of distribution channel.

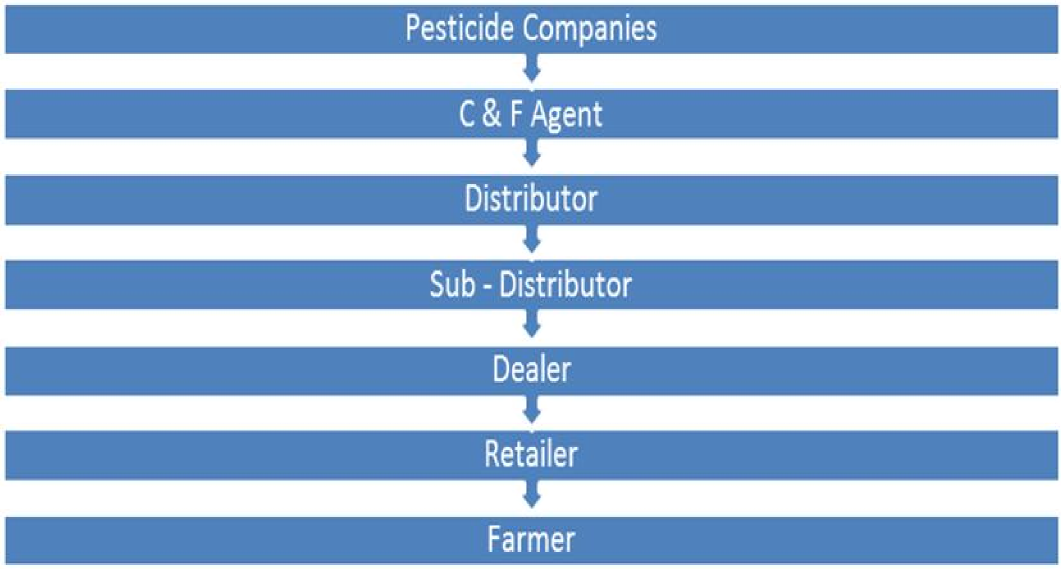


Exhibit 4.9 Traditional Distribution channel: Variant-I

I (b) Variant-II or 4 step distribution channel: This variant of traditional channel comprises five steps between company and the farmers. The products/molecules movement starts from the manufacturer to C & F (Carrying & Forwarding) agent where depending upon catchment area basis products are supplied to them. Then the products are supplied to distributors to dealers to retailers and finally end user, the farmers. UPL, Tata Rallis etc. are the corporate houses using this specific type of distribution channel.

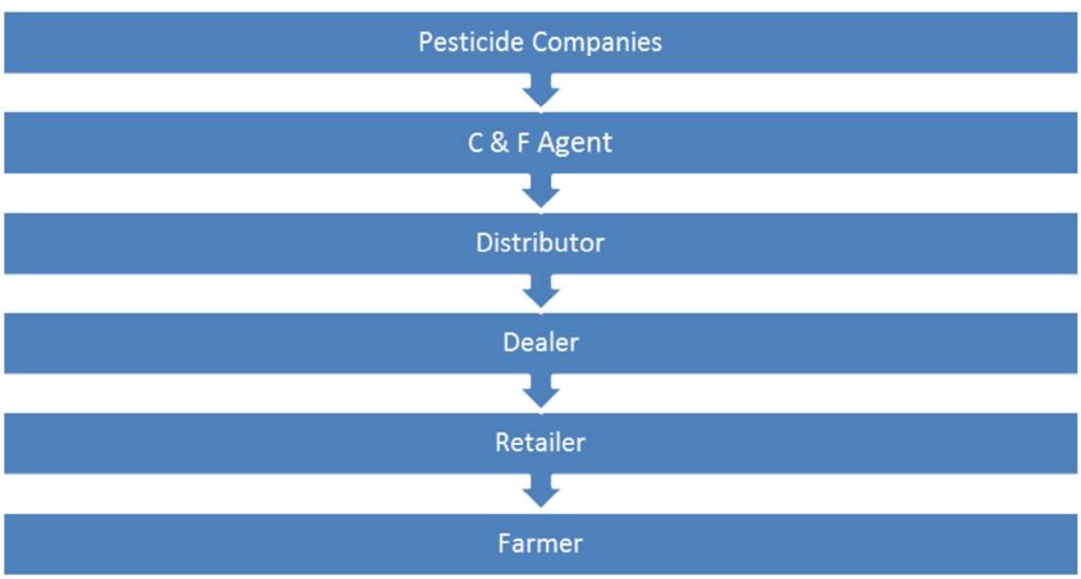


Exhibit 4.10 Traditional Distribution channel: Variant-II

I (c) Variant-III or 3 step Distribution channel: In this type of channel products/molecules movement starts from the manufacturer to C & F agent. Then products are supplied to wholesaler followed by retailers to end user i.e. farmer. Dhanuka, Montari Industries Ltd, Atul Ltd *etc*. are the corporate houses using this specific type of distribution channel.

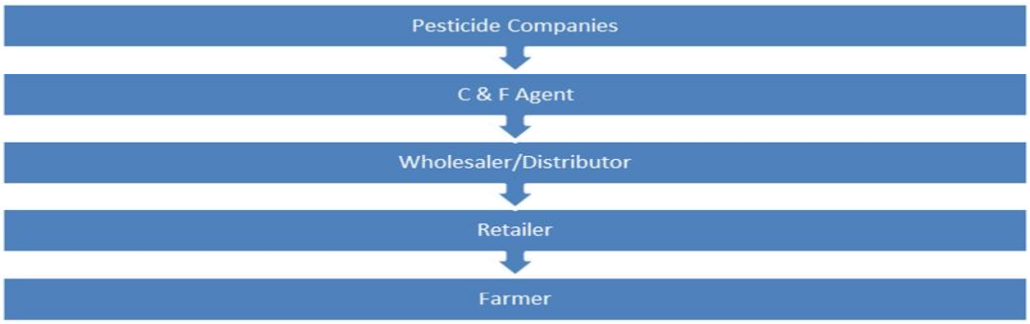


Exhibit 4.11 Traditional Distribution channel: Variant-III

II. Distribution channel adopted by companies importing the molecules/product:

This model has been pictorially depicted in exhibit 4.12 and used by many companies when it is importing the new generic molecules and wants to sale that in the new territory in home country. It helps in establishing effective network in the new markets between company and distributors. Sumitomo Chemical Co. Ltd, Monsanto Ltd. *etc* are the corporate houses using this specific type of distribution channel.

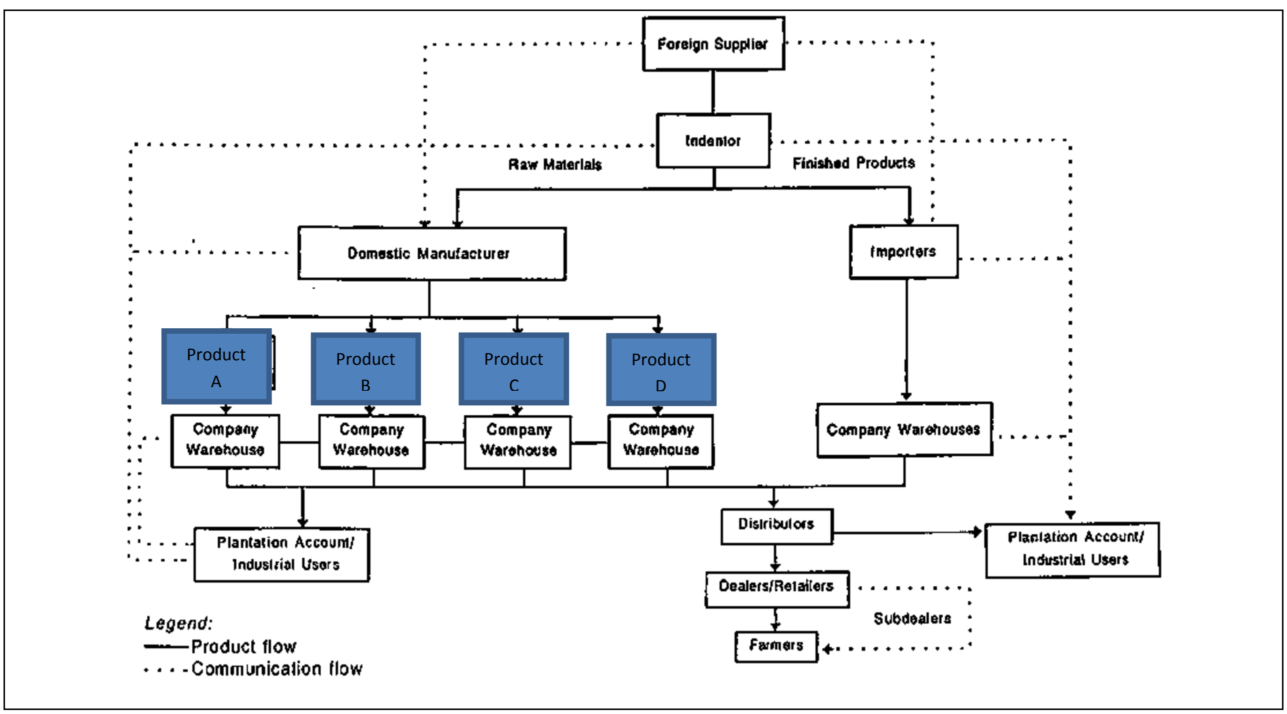


Exhibit 4.12 Distribution channel adopted by companies importing the molecules/product

III. ICT Integrated Distribution channel:

It is a two way channel. Through this model company has connected farmers to the supplier so that farmers get automatically connected and exposed to the world for price and product comparison. On the other side any new information about the product can also be available. ITC Ltd. & Coromandel International Ltd. are among the corporate houses using it.

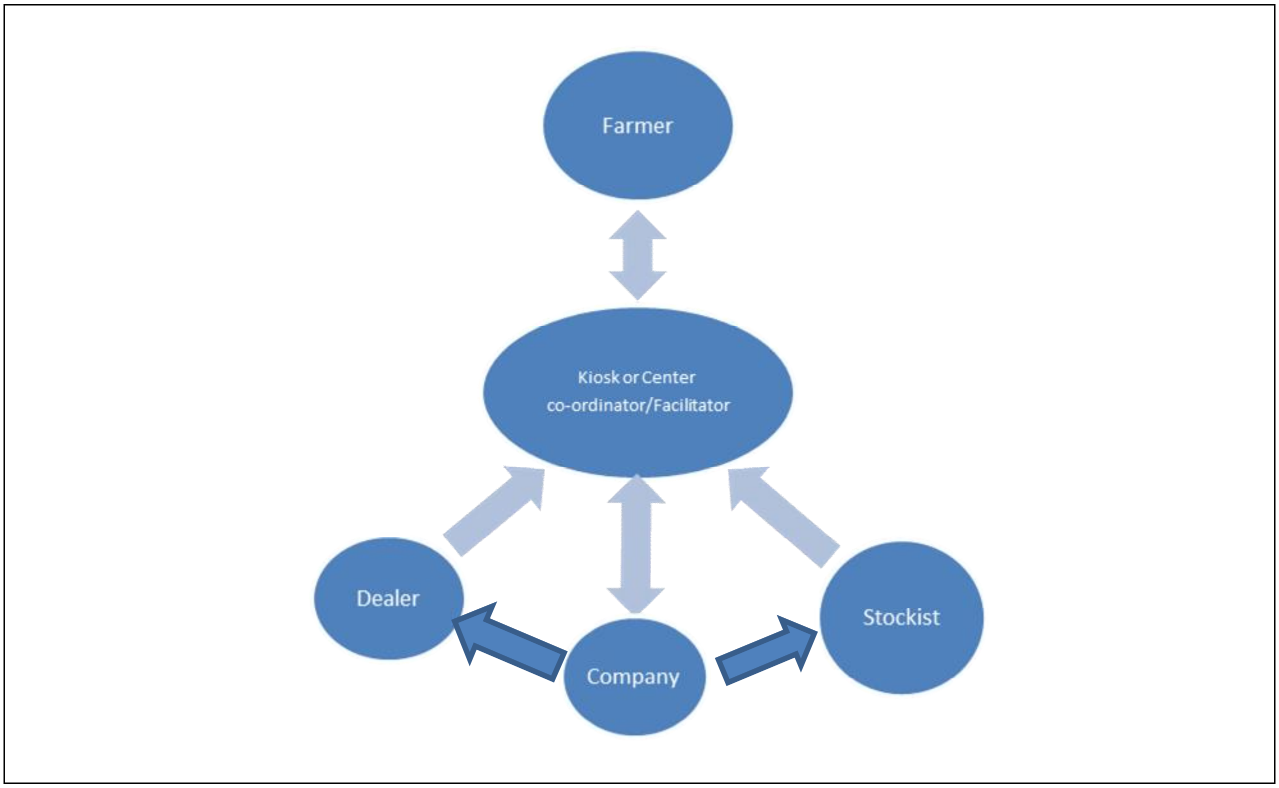


Exhibit: 4.13 ICT Integrated Distribution Channel

In this type of channel products/molecules movement starts from the company to dealers or stockiest and then through center coordinator it reaches to farmers. This is not the only channel for distribution of products besides this other channels are also present.

4.4.2 Promotional strategy:

Resolving the strategic component of the promotion plan begins with a careful analysis of the target consumers. For creating attention of farmers promotional strategy is important. There is no standard strategy that is universally acceptable for promotion of pesticides products. Companies broadly defined at their disposal a large and ever growing number of promotional vehicles. These tools also differ in the demands they put on a firm in terms of financial commitment and development of specific competencies.

Discussion with distributor and company person revealed that there was trade promotion and consumer sales promotion for popularizing the pesticides products.

Sales Promotions: Mostly pesticides products are sold through independent channels. These channel partners play a key role in influencing the farmer's buying process. Channel does not alone fulfill demand, but also assists in demand generation, offer and provide market feedback that is indispensable for promotion strategy. This can be achieved by two types: consumer promotions and trade promotions.

Consumer sales Promotions: Study revealed that major pesticides companies adopting promotional instruments tactics like product trial, new packaging or different package size, discounts coupons, free samples, etc. in order to promote the sales their products to farmers.

Trade promotions: These are financial incentives provided to the channel partner like distributor, dealer etc. Type of instruments/tactics used for trade promotion by the companies could be named, for illustration, as price discount, cash discount, coupons, volume discount.

4.4.3 Advertising:

Since promotional tools & techniques are sub set of the advertising, therefore some discussion on it also seems pertinent. The companies were found using tools which are used by majority of companies, to promote their products and establish their brand in the rural and semi-urban markets. These tools, techniques and media are not limited to companies in agri-input industry alone, but are also being used by companies in fast moving consumer goods industry, slow moving consumer good industry or consumer durables industry and many more industries, when it comes to selling in rural and semi-urban markets. These tools, techniques and media happens to be much in number, therefore for illustrative purposes, these are named as jeep campaign, newspaper & television add, banner & posters, wall painting, leaf let distribution and many more of the similar kind.

5. RECOMMENDATIONS FOR ACTION

1. Farmers meetings & field demonstrations can be best promotional strategies so Company should conduct regular farmers meetings and field demonstrations as per Product wise and area wise.
2. Company should appoint more number of technical field staffs to ensure proper field activities on the farmer's field.

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ANNEXURE I

Questionnaire for Farmers& Dealers and Company persons

1. Personal details:

Name:

Address:

Education:

a. Illiterate:
b. High school
c. Intermediate
d. Graduation
e. Post graduation

2. Crops grown:

	Crop (s) grown		
Kharif			
Rabi			

3. Can you tell us the extent of problem you are having with different sucking pests.(1-5)
Rating (1-Very low, 2- Low, 3-Moderate, 4-High, 5-Very high)

Sucking Pest	**Rating**	**Comments-** increase or decrease since last 2/3 yrs
White fly		
Aphids		
Jassid		
Mites		
Thrips		
Mealy bugs		
Other:		

4. **Can you give us the details of all sprays you do on cotton last 2 seasons (all details per acre)**

Spray No	**When** (days from sowing)	**What sprayed- names of chem.(s)**	**Dose**	**Cost**	**Target Pest/s**
1					
2					
3					
4					
5					
6					
7					

5. Please tell us the average amount spent for plant protection in your area.		
	No. of Sprays	**Amount**
i) Pesticide		
ii) Fungicide		
iii) Herbicide		
iv) Micronutrients		
TOTAL		

6. **Can you describe how each of the major sucking pest is controlled?**

Rating (1-Very low, 2- Low, 3-Moderate, 4-High, 5-Very high)

Pest Name	**Difficulty of Controlling(1-5)**	**Top Chemicals Used**			
		Rank 1	**Rank 2**	**Rank 3**	**Rank 4**

7. How will you rate these products for each of the aspects in cotton? Rating (1-Very low, 2- Low, 3-Moderate, 4-High, 5-Very high)								
	Acephate	Confidor	Mono	Acetamiprid	Polo	Ulala	Dinitrofuran	Oberon
Satisfaction Levels of Farmers								
Effectiveness								
Likelihood of continuing use								
Jassids Control								
White Fly								
Thrips								
Mites								
Multiple Sucking Pests								
Quick Control								
Long Duration of control								
Greening								
Price								
High Infestation Suitability								
Ordinary Infestation Levels								
Ease of Use								

VITA

Rajnish kumar, the author of this manuscript was born on o4th Oct 1982 in Nalanda district of Bihar. He has completed his intermediate examination from Bihar board. Further he took admission in the prestigious U.A.S Dharwad, through ICAR exam and obtained B.Sc Agriculture degree in 2005. Then he has taken admission in C.S.K.H.P.K.V Palampur through ICAR for Masters in Plant Breeding & Genetics in 2006. There after he got selected for MBA (Agribusiness) through CAT exam and taken admission at CABM (GBPUA&T, Pantnagar) in 2011. During campus placement he was selected by Dupont Pioneer.

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