

# A STUDY OF MARKET SCENARIO OF AGRO-CHEMICAL COMPANIES IN VEGETABLE PRODUCTION IN VARANASI DISTRICT (U.P.)

काशी हिन्दू  
विश्वविद्यालय



BANARAS HINDU  
UNIVERSITY

**PROJECT REPORT**  
submitted in partial fulfilment of the  
requirements for the degree of

**Master of Agri-Business Management**

Supervisor  
*Dr. P.K.Singh*

Submitted by  
*ParagTamrakar*

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**Through: The Head, Department of Agricultural Economics,  
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Dear Sir,

This is to certify that the project report entitled “**A STUDY OF MARKET SCENARIO OF AGRO-CHEMICAL COMPANIES IN VEGETABLE PRODUCTION IN VARANASI DISTRICT**” submitted in partial fulfillment of the requirements for the degree of **MASTER OF AGRI-BUSINESS MANAGEMENT**, in the Department of Agricultural Economics, Institute of Agricultural Sciences, Banaras Hindu University, is a record of bonafide research carried out by **Mr. PARAG TAMRAKAR, ID. NO. ABM-15234**, under my supervision and no part of the Project report has been submitted for any other degree or diploma.

The assistance and help received during the course of this investigation and sources of literature have been duly acknowledged.

Thanking You.

Forwarded by

Yours faithfully

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(Dr. P.K. Singh)  
Chairman of Advisory Committee

# A STUDY OF MARKET SCENARIO OF AGRO-CHEMICAL COMPANIES IN VEGETABLE PRODUCTION IN VARANASI DISTRICT (U.P.)

By  
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**Date:** ...../...../.....



**Place:** Varanasi

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## Chapter I:

### *Introduction*

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#### **1.1 BACKGROUND OF STATEMENT**

Indian Agrochemical industry is valued at USD 4.25 billion in FY14 and is estimated to grow at a CAGR of 12% to reach USD 7.5 billion by FY19. Out of this, the domestic market is ~USD 2.25 billion in FY14. Almost 50% is constituted by exports, which is expected to grow by 16% CAGR to reach USD 4.2 billion by FY19, resulting in 60% market share in Agrochemical industry. On the other hand, domestic market will grow at ~8% CAGR to reach USD 3.3 billion by FY19. India is fourth largest producer of agrochemicals worldwide, after United States, Japan and China.

Vegetable comprises about 22 percent of the daily food intake of the Varanasi population. Consumers generally demand for better quality vegetables. Quality vegetable to them means healthy, succulent and fresh looking vegetables with no visible rashes or holes caused by pests or diseases. To satisfy this demand, farmers have to tackle pest and disease problems by all means. The use of agrochemicals including pesticides has been found to be the immediate and cheaper way to produce unblemished vegetables and increased farm productivity. Strategies identified base on these information were implemented beside the promotion of good cultivation practices. The vegetable industry in Varanasi is dominated by small farms (small holders) with only a few large-scale farms About eighty percent (80 %) of the sample vegetable farmers, on the average, cultivate two acres of vegetable farms. The current scenario has not differed very much from this observation. Commercial vegetable farms are usually much larger in size than the small- scale farm and are often with better irrigation facilities. Vegetable production in commercial farms is complimented with small machinery, and use high level of external inputs (fertilizers and pesticides). Most farms practice continuous mono-crop with poor field sanitation. This has created an environment conducive for build-up of pest and disease

incidence. The situation is further worsened with continuous application of chemical fertilizers and improper usage of pesticides.

Most farms are operated under a joint venture between financier and workers. The workers use whatever inputs given by the financier who does the marketing of farm produce. Profits are then shared according to agreed terms. Majority of the labour force are foreigners who have limited knowledge on proper use of pesticides. The labour they provide have high turn-over rates and some who have gathered enough experience will venture on their own to rent land from the locals or cultivate idle state land. Almost all the commercial vegetable farmers are using pesticides as the main resource to manage their vegetable pest's problems since they are easily available, simple and cheap to apply, less labour intensive and "highly" effective. Other methods of crop protection are not fully understood by the farmers. Pest management technique like Integrated Pest Management (IPM) and biological control are not being practice at the moment probably due to its complexity in implementation. To some extend cultural practice is now being practised to avoid incidence of vegetable diseases like cultivation under rain shelter. Very few progressive farmers have attempted to resolve the pest problems through adoption of other cultural practices such as organic farming, crop rotation, resistant varieties and net-house planting methods. The recent rapid growth of the agriculture sector within the State has created a greater demand for pesticides. More shops are involved in selling of pesticides and farmers have easy access to these chemicals. Pesticides are also available at weekly grounds and these are packed in different forms. However, there is no proper record of the actual volume of pesticide used in vegetable production. Department of Agriculture Varanasi has periodic survey on the pesticide farmers are using on vegetables.

Generally, pesticides like insecticides, fungicides, and weedicide are being used in all the commercial vegetable farms. Based on types of active ingredients the list (except weedicide) used in vegetables in 1996 revealed a total of 30 insecticides, 13 fungicides, 2 acaricide. These pesticides can be generally classified into four

main chemical groups: organophosphate (OP), organochlorines (OC), carbamates/dithiocarmates (EBDC), and synthetic pyrethroids. In addition, there is a biological group using bacteria, *Bacillus thuringensis* strains, as the active ingredient. Another biological agent encountered, but rarely used, is a group called 'naturalyte' using biologically produced antibiotics toxic to insect larvae (e.g. avermectin B1). This relatively new insecticide is rarely used as it was found to be very expensive. The common pesticide formulations encountered are the emulsifiable concentrates (EC), soluble concentrates (SC), flowable concentrates (FC), soluble powders (SP), and wettable powders (WP). The molluscicide, mercaptodimethur, is formulated as bait. Granular formulation is only encountered for carbofuran is not recommended at all for vegetables.

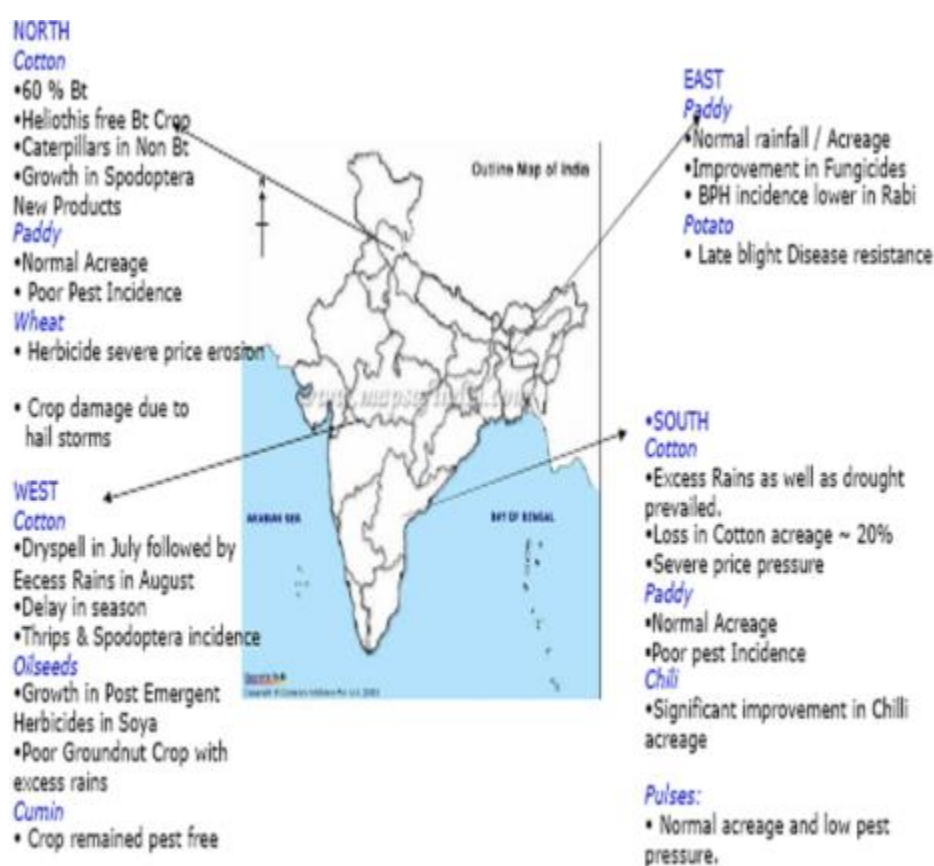
India is the 13th largest exporter of pesticides and disinfectants in the world and in terms of volume is the 12th largest producer of chemicals with a value of US\$ 0.6 billion. India produces about 90,000 metric tonnes of pesticides a year. With over 400 million acres under cultivation and over 60 % of the country's population dependent on agriculture, the country's economy depends on the agricultural sector to substantial extent. India loses nearly 30 % of its potential crop to insects, weeds and rodent attacks.

India food grain production has been static around 254 million tons as compared to China which has production around 450-475 million tons. To achieve production as China and to meet large population India has to use proper irrigation, high yielding seeds, balanced use of fertilizers, high quality plant protection education to farmers etc. The experience in the past shows that pesticide plays an important role as it save loses up to 30 % by vegetables from insect, pest and disease, thereby increasing the yield.

Farmers in many places of Varanasi (a part of eastern U.P) grow vegetable all the year round, rather than just growing them only when their field is empty from wheat and paddy cultivation. Vegetable growing serves a source of income for them as they sell the produce easily in the mandees. To have good value for their produce they need to have a quality and quantity production, as such they go for huge pesticide application in whatever cultivable land they have. Pesticides/Crop

Protection/Agrochemicals industry plays a crucial role in protecting crops from damage by weeds, pests, insects and fungus, both before and after harvest. Huge pesticide application provides a good market for different types of pesticides. As a result various national and multinational pesticide companies are flourishing day by day, thus the study of the consumption pattern of pesticide becomes relevant. To this effect the project focuses on the pesticide consumption pattern of the vegetable farmers in Varanasi belt of eastern U.P. and tries to bring various aspects of the pesticide market in the district.

## Pesticide Market Scenario



**It is estimated that overall Pesticides market has declined marginally**

Pesticide industry in India seems to be passing through a financial crisis. The focal causes for this are raising costs of inputs, governmental duties and taxes, and the cost of capital. There are also high rates of excise duty both on intermediates and finished products, and excise and sales taxes account for nearly 18 % of the cost of

pesticides. The industry is also constrained by regulatory norms. At present, there are high data generation costs for different crops and pests, and the systems and protocols needed for registration of new products are extremely stringent. Export formalities for insecticides and pesticides are particularly of orders and hence, of precious foreign exchange. There are also many spurious producers, who are cheating the Indian farmer at the cost of the plant protection industry. The industry finds it difficult to tackle these, as “Insecticide Act of 1968” is not strengthened in spite of several amendments that have been made. For example, there is no provision in the Act to deal with counterfeit pesticides, and the reputable companies, in whose name they are sold, have to prove to the satisfaction of the court that they have not manufactured and standard materials.

However per hectare consumption of pesticides in India is very low at 0.55 Kilograms when compared to developed countries, barely above that of Africa. Since the population in India is growing at a steady rate and the availability of cultivable land is limited, consumption in pesticides is expect to increase in the future, thus offering a good potential for the players both domestic and overseas in coming year. India is currently the largest manufacturer of pesticides and the second largest producer of agrochemicals in Asia.

**PESTICIDES CONSUMPTION IN DIFFERENT COUNTRIES**  
(ANNUAL AVERAGE)

| Country | Kg/ha. |
|---------|--------|
| Taiwan  | 19.0   |
| China   | 13     |
| Japan   | 12     |
| Europe  | 5      |
| France  | 5      |
| USA     | 7      |
| India   | 0.6    |

Source- [www.pesticide.org](http://www.pesticide.org) 2013

India is second largest producer of pesticides in Asia. The export of pesticide is about Rs 2000 crores, due to good reputation of the companies. India produces 16 % of the food grain and uses only 2% of the pesticides thus there is a huge potential market for the pesticides. Out of around 200 pesticides registered for use in India, 100 of technical grade are locally produced.

### **1.1.1 Leading Agro-chemical Companies–2016**

The crop protection industry includes products derived both from conventional chemical synthesis as well as products based on biological agents. In the last decade the introduction of transgenic or GM crops possessing herbicide tolerance and insect resistance has significantly expanded the overall scope of the biological based element of the industry. As a result for some companies their turnover includes conventional agrochemical products as well revenues from the sale or licensing of GM traits. In addition several of the industry participants have seed sales, which can be from GM seed as well as those derived from conventional seed breeding and distribution businesses.

The following table shows the fifteen leading agrochemical companies ranked by their conventional agrochemical sales in 2016 versus the 2015 performance.

**Table 1.1 Agro-Chemical Company Sales**

| <b>Agrochemical Company sales</b>  | <b>2015</b> | <b>2016</b> | <b>Percent change from 2015</b> | <b>Rank</b> |
|------------------------------------|-------------|-------------|---------------------------------|-------------|
| UPL Limited                        | 120,905     | 126,768     | + 4.9                           | 1           |
| Gharda Group                       | 17,970      | 17,070      | -5.0                            | 2           |
| Indofil Industries                 | 12,388      | 13,525      | +9.2                            | 3           |
| Coromandel International           | 13,600      | 12,040      | -11.4                           | 4           |
| Crystal Crop Protection            | 14,000      | 12,000      | -14.3                           | 5           |
| Rallis India                       | 12,234      | 11,232      | -8.2                            | 6           |
| Bharat Group                       | 10,370      | 10,850      | +4.6                            | 7           |
| PI Industries                      | 9,596       | 10,326      | +7.6                            | 8           |
| Sharda Cropchem Ltd.               | 8,725       | 10,265      | +17.7                           | 9           |
| Insecticides india                 | 9,642       | 9,882       | +2.5                            | 10          |
| Krishi rasayan Group               | 10,062      | 9,546       | -5.1                            | 11          |
| Excel Crop care                    | 9,950       | 8,810       | -11.6                           | 12          |
| Dhanuka Agritech                   | 7,902       | 8,288       | +4.9                            | 13          |
| GSP                                | 8,000       | 8,000       | -                               | 14          |
| Meghmani Group                     | 7,353       | 7,764       | +5.6                            | 15          |
| Willowood Chemicals                | 7,183       | 7,483       | +4.2                            | 16          |
| Nagarjuna Agrichem                 | 7,455       | 6,917       | -7.2                            | 17          |
| Punjab Chemicals & Crop Protection | 5,649       | 5,380       | -4.8                            | 18          |
| Heranba Industries Ltd.            | 5,450       | 5,300       | -2.8                            | 19          |
| HPM Chemicals & Fertilizers LTD.   | 5,000       | 5,215       | +4.3                            | 20          |

Source-www.indianindustry.com

### 1.1.2 Leading Agrochemical Companies - By Region

The table below presents summary information on the sales of the main crop protection companies split by the key product categories.

**Table 1.2 Excluding sales of GM and conventional seed and biotechnology fees**

| Company           | Herbicides | Insecticides | Fungicides | Other | Total |
|-------------------|------------|--------------|------------|-------|-------|
| Bayer             | 2800       | 3034         | 2100       | 230   | 7934  |
| Syngenta          | 3202       | 1900         | 2550       | 210   | 7262  |
| BASF              | 1950       | 1050         | 1550       | 130   | 4680  |
| Dow               | 2343       | 1050         | 640        | 230   | 4263  |
| DuPont            | 1750       | 550          | 430        | 130   | 2860  |
| MAI               | 1100       | 450          | 390        | 49    | 1989  |
| Sumitomo Chemical | 650        | 539          | 350        | 220   | 1759  |
| FMC               | 350        | 430          | 25         | 0     | 805   |
| UPL               | 230        | 340          | 230        | 61    | 861   |

Source-www.indianindustry.com

**Table 1.3 Leading Companies in Key Product sectors – 2016**

| Rank | Herbicides        | Insecticides        | Fungicides        |
|------|-------------------|---------------------|-------------------|
| 1    | Syngenta          | BASF                | Syngenta          |
| 2    | Bayer             | Bayer               | BASF              |
| 3    | UPL               | Dhanuka Agritech    | Dow               |
| 4    | Gharda chemical   | Dow Agro Sciences   | MAI               |
| 5    | Dupont            | Excel crop care ltd | Dupont            |
| 6    | Dow               | Gharda chemical     | UPL               |
| 7    | MAI               | Nagarjuna Agrichem  | Sumitomo chemical |
| 8    | Sumitomo chemical | PI industries ltd.  | FMC               |

Source-industry reports, analysis by tata strategic

In 2016 the Indian market for conventional agrochemical products increased by 2.0 percent to Rs. 29,982 m. On currency translation this equated to a rise of 4.8 percent to \$681 m. At this sales level the country is ranked in eleventh position in the global crop protection industry. Due to high margins and a multi step distribution system the end user level of the market is significantly higher.

Agriculture is an important component both economically and socially in India. Over half of the population is rural and the vast majority of these people are dependent to some degree or other on agriculture. Although India has a large arable area available for crop production, crop yields on an area basis are generally low in comparison with other countries. Two main factors contribute to this, namely a lack of adequate water supply for crops and a poor rural infrastructure. Although crop irrigation is increasing in India the majority of crop areas are still heavily dependant on rainfall for their water supply. The timing and strength of the monsoon is critical. Although much of the population is rural, growers in India have to contend with low crop prices and limited access to finance. Transport is another problem for many growers often resulting in crops having to be sold locally at unfavorable market prices. As a result farmers' income is generally very low and while several governments have initiated programmes aimed at increasing rural investment, crop production fails to meet the considerable potential that exists. The key food crops grown in India are cereals and rice; however oilseed crops, fruit and vegetable production and cotton are also important.

### 1.1.3 Indian Crop Protection Sales Growth

**Table 1.4 Average Annual sales Growth (\$ terms) Percent per annum \$ Terms**

| <b>ITEM</b>      | <b>2000/2010</b> | <b>2011/2016</b> |
|------------------|------------------|------------------|
| India            | 7.5              | 12               |
| Industry Average | 2.5              | 8                |

Source- [www.ficci.com](http://www.ficci.com)

### 1.1.4 Company Involvement

Domestic production of agrochemical products in India is well advanced with over twenty companies active in product manufacture. The dominance of the local companies in the agrochemical market can be traced back to previous governments which imposed high tariffs on imported material, this resulted in the development

of a local industry which, although commodity product orientated, also gained a reputation for the manufacture of relatively high quality products using low cost process technology. As the Indian industry developed and import/export barriers were reduced, many Indian companies have looked to export markets for sales opportunities. This has resulted in the level of exports of agrochemicals from India increasing in recent years and in 2005 overall exports of crop protection products by Indian companies totalled \$598 million, up from \$186m in 1986. However due to competition from low cost products from China, agrochemical exports from India need to be subsidized to be competitive in many markets. Local manufacturers are however likely to come under increased regulation, now that the country is part of the WTO and has passed intellectual property legislation that will preclude the manufacture and sale of any product patented after 1996, without the permission of the patent holder. Also tariff reduction on advanced intermediates has reportedly led to increasing importation of such products for final coupling in India, to the detriment of complete manufacture in the country. In addition to the activities of the local companies, most of the agrochemical multinationals is active in the market, either directly or via local distribution agreements.

**Table 1.5 Overall the leading companies in the market in 2015 were:**

| <b>RANK</b> | <b>COMPANY</b> | <b>MARKET SHARE(%)</b> |
|-------------|----------------|------------------------|
| 1.          | Bayer          | 11                     |
| 2.          | Syngenta       | 7                      |
| 3.          | Rallis         | 6                      |
| 4.          | BASF           | 6                      |
| 5.          | UPL            | 7                      |
| 6.          | Makhteshim     | 5                      |
| 7.          | Dupont         | 5                      |
| 8.          | Crystal        | 5                      |
| 9.          | PI Industries  | 5                      |
| 10.         | Dhanuka        | 5                      |

Source- [indiachemgujarat.com](http://indiachemgujarat.com)

### 1.1.5 State wise agrochemical consumption

Andhra Pradesh , Maharashtra and Punjab are top three states contributing to 45% of pesticide consumption in India. Erstwhile Andhra Pradesh is the leading consumer with 21% share. The top seven states together account for more than 70% of crop protection chemicals usage in India.

**Table 1.6 Consumption of agrochemical state**

| <b>RANK</b> | <b>STATE</b>   | <b>MARKET SHARE(%)</b> |
|-------------|----------------|------------------------|
| <b>1.</b>   | Andhra Pradesh | 24                     |
| <b>2.</b>   | Maharashtra    | 13                     |
| <b>3.</b>   | Punjab         | 11                     |
| <b>4.</b>   | MP             | 8                      |
| <b>5.</b>   | Karnataka      | 7                      |
| <b>6.</b>   | Gujarat        | 7                      |
| <b>7.</b>   | Tamil Nadu     | 5                      |
| <b>8.</b>   | Harayana       | 5                      |

Source-www.indiachemgujarat.com

**Table 1.7 Crop Protection Markets 2016**

|                     |     |
|---------------------|-----|
| <b>Insecticides</b> | 60% |
| <b>Herbicides</b>   | 16% |
| <b>Fungicides</b>   | 18% |
| <b>Other</b>        | 3%  |

Source- www.pesticideinfo.com

## 1.2 JUSTIFICATION OF PROBLEM

Agriculture is the main occupation of Indian population. Around 70 percent of the population engaged directly or indirectly in this field. The technological improvement changed the traditional system and pattern of agriculture. Now better

technologies, use of agro-chemicals improved farm machineries, accountable varieties of all the important crops, flexible credit facilities and specialist advices are available for Indian farmer that creates the tremendous increment in vegetable production and export potential. Instead of these entire achievements farmer still facing a lots of constraints and problems in every step of agriculture production which affects the pace of socioeconomic development of farmer and his sustainability and livelihood. In recent years, tremendous attention has been paid to increasing vegetable production in India. As a result the country has emerged as the largest producer of vegetables; India's share in the world's total vegetable production is 13.60 percent. In the last decade, the country's overall productivity of vegetables multiplied one and half times. Tamil Nadu leads in vegetable production, followed by Kerala and Uttar Pradesh. Productivity of some of the states like Delhi, Rajasthan and most of the states comprising the north-eastern hill region, is less than 10 tonnes per hectare. Hence, there is an urgent need to recast the vegetable production strategy in these areas. To meet the increasing demand, vegetable production in India needs to touch 25 tones/ha by 2009.

### **1.3 OBJECTIVES**

- (i) To Study the market shares of different Agro-chemical Company in Varanasi district.
- (ii) To study the awareness and source of information about pesticide companies among the farmers.
- (iii) To study the constraints faced by the farmers, retailer and agro-chemical manufactures in the study area.

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## Chapter II:

### *Review of Literature*

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**Jinius et al. (2001)** stated that Sabah vegetable production industry is dominated (80%) by small farms (< 2 acres) with two categories of vegetables, namely lowland and highland types. Vegetable farming have previously expanded steadily but took a dive last year, with estimated area in 1990 (3,311 ha), 1996 (4,278 ha) and 1999 (4003 ha) but down 2,012 ha for year 2000. The main vegetable growing areas are within the West Coast and Interior divisions with Kundasang accounting for about 45% of the total area. So far a total of 870 farmers have registered with the Department. There are more than 10 types of leafy vegetables and 9 types of fruit vegetables grown in the lowland and not less than 20 types of temperate vegetables. The volume and values of Sabah selected vegetable export from 1997 to 2000 is highlighted. The cultivation practices currently adopted by local farmers are described as small-scale mixed farming system and larger commercial-scale system. In pest management the farmers are highly dependent and rampantly using pesticides to check pests and diseases. Type of pesticides and application methods; the major pests and diseases are all identified and listed. Department of Agriculture Sabah has monitored the level of pesticide residues in vegetables in general sampling and special sampling programmes are tabulated and discussed. Pesticide residues in vegetables is detected and factors on why it occurred has been postulated while various measures to address it undertaken by DOA Sabah is shown. Issues on persistent occurrence of contamination have been identified and a list of recommendation on further approach is proposed.

**Srivastava (2001)** reported that the growth of the pesticides industry, changes in the product mix, market concentration, flow of materials, problems of various constituents and the emerging marketing scenario. The Pesticides Industry has grown by 7.6% during the last 20 years. It has also undergone structural changes from low value products to high value specialty products. The use of pesticides is concentrated in selected districts of a few states like Andhra Pradesh, Karnataka,

Gujarat and Punjab. It was observed that bulks of the pesticides used in agriculture were accounted for by crops like cotton and paddy. The major constituents of pesticides industry are technical grade material manufacturers, formulators and dealers. About 84.5% of the total production of technical pesticides is concentrated with 16 companies only. Of these 16 companies, 13 have the bulk of the market share of the products group dealt by them. There is vast scope for accelerating consumption of pesticides by diversifying to hitherto untapped regions and crops. This calls for a major market developments effort on the part of industry. The industry is presently dependent on distributors and dealers to push their products. The industry will have to generate guidelines for economical use of pesticides to crops grown in disadvantaged regions.

**Catharina et al. (2002)** attempt to examine that pesticide use in agriculture has been promoted as an important tool for development for decades despite being an extremely hazardous technology for health and the environment. At the same time that a number of industrialized countries are undertaking significant steps to reduce pesticide use, developing countries are becoming a more important marketing target, and pesticide use is increasing in many developing regions. For the last 20 years, international agencies, in collaboration with local governments, have used primarily 'safe use' approaches to reduce the risks of pesticide use in developing countries, the most important being the International Code of Conduct of the United Nations' Food and Agriculture Organization (FAO) and the "Safe Use Initiative" of the Global Crop Protection Federation (GCPF, formerly GIFAP, International Group of National Associations of Agrochemical Manufacturers; name recently changed to CropLife International). The main presumptions have been that pesticides are indispensable and, if properly handled, will not cause unreasonable harm. 2 and 32, 3 Collateral damage of pesticide use has been attributed primarily to insufficient regulation and the ignorance of pesticide users in developing countries, and it has been assumed that strengthening of regulations and education to users would lead to an acceptable level of pesticide safety.

**Rahman (2003)** studied that Farmers' awareness of beneficial and harmful effects of pesticides and factors determining use of pesticides were analyzed using

survey data from 21 villages in three agro-ecological regions of Bangladesh. Pesticide cost accounts for about 7.7 percent of the gross value of output in cotton, 3.6 percent in vegetables, 2.5 Percent in potato, 1.8 percent in modern rice, 1.6 percent in spices and less than 1 percent in other cereal and non-cereal crops. About 77% of farmers (highest 94% in Comilla) used pesticides at least once (37% applied once and 31% applied twice, and the rest applied for 3–5 times) in a crop season. Cultivation of traditional and modern rice varieties, potatoes, spices, vegetables and cotton are the prime determinants of pesticide use. Farmers seem to treat pesticides as substitutes for fertilizers, indicated by the positive influence of fertilizer prices on pesticide use. Also, increases in pulse and jute prices increase pesticide use. Among the socio-economic variables, land ownership and agricultural credit are positively related to pesticide usage. Pesticide use is higher in underdeveloped regions. Sharp regional variations also exist in pesticide usage. Major policy thrusts for devising pesticide regulation and effective implementation, increasing farmers' awareness of the effects of pesticide use, and expansion of IPM practices are suggested to safeguard poor farmers in their pursuit of agricultural livelihoods.

**Kessuda (2005)** studied the marketing communication strategic of sales promotion for the rice-pesticide substances in Singburi province, the behaviors in exposing to information of the farmers in Singburi, and the motives in buying rice pesticide substances of the farmers in Singburi. Data collection was done by interviewing four sample groups they are sales promotion policy makers, salespersons or marketing communication officers of manufacturing, distributing companies and 12 selling agents of rice-pesticide in the province. It was focus groups and questionnaires of 60 farmers were also carried out. The study found that the manufacturing and distributing companies had sales promotion that directed at the merchant middlemen. The favorite techniques were product education, special discounts, touring incentives, bonus in forms of gold ornaments or electric appliances. They also use joint special promotional activities with selling stores, such as meetings, point-of-purchase displays, and etc. The most communication channels were personal contacts through popular salespersons or Marketing communication officers. The preferred sales promotion techniques directed at consumers were product education,

demonstration fields, free gifts, meeting arrangements along with special-priced sales, and lucky draws. These were made through personal communication channels like salespersons and/or marketing communication officers, including selling agents.

**Tijani et al. (2006)** this study investigates pesticides in common use in cocoa agriculture, dangers associated with their use and established regulatory incentive (if any) that protect farmers and farm workers against pesticide risk. The study was conducted in Idanre local government area of Ondo state, Nigeria. A total of fifty farmers, fifty farm workers and thirty two pesticide marketing agents were interviewed using structured questionnaire. The commonly used pesticides identified are Gammalin 20, Aldrex 20, Perenox, Cacaobre Sandoz, and copper sulphate, Basudin, Thionex and Uden. Result reveals that most of these pesticides are classified as ‘highly’ or ‘moderately’ hazardous by the world Health Organization and have been banned or restricted in many economically advanced countries. Contrary to this most of the marketers claimed that the pesticides are registered in Nigeria and do not present acute health hazards to users, by standards, livestock, wild-life, and environment in general. Analysis shows that farmers are not taking the necessary precautions to prevent hazards associated with their use. Farmers and farm workers suffer from discomforts ranging from headaches, tiredness, vomiting and nausea to skin problems such as skin burn and itching after using these pesticides. Although the Federal government of Nigeria through the Federal Environmental Protection Agency recognizes the problems of pesticides use and has put in place legal and administrative procedures to protect users as well as the nation’s environment from the adverse effects of pesticides, work on effective monitoring, enforcement or implementation of their procedures and mechanisms isnot being pursued with the seriousness required.

**Benjamin et al. (2006)** studied that “Market Share Liability Shouldn’t Die: Proposed Application to Agricultural Pesticides and the Need to Refine the Apportionment of Liability.” My thesis is: Courts have been reluctant to extend market share liability beyond injuries derived from DES drug exposure, due to the lack of uniformity in the products. The jurisprudence of market share liability ought to be extended to include injuries derived from agricultural pesticides. These pesticides are sufficiently similar and create exposure settings in which a

plaintiff's only theory of recovery may be that of market share liability. In applying market share liability, the courts' analysis has been inconsistent with the theory's original intent. By enhancing their market share jurisprudence with my proposed profit share factoring, the court will achieve the goal of focusing on the party who can best absorb the cost of the plaintiff's injury. Courts have struggled with the definition and application of market share liability, often coming to diametrically opposing outcomes. A profit share factoring component would equalize these jurisdictional swings, rendering more fair and just outcomes. Under a profit share factoring analysis, market share percentage would be used as a baseline with the ability to adjust liability up or down according to a defendant's profits gained from the product. Any party to the action can seek adjustment, but the adjustment must be supported by evidence based on their profit margins from the injurious product.

**Hundal et al. (2006)** revealed that India ranks 10th in the world in pesticide consumption as its total consumption amounts to about 500 million tonnes. India is presently the largest manufacturer of basic pesticides among the South Asian and African countries, with the exception of Japan. The Indian pesticides market is the 12th largest in the world with a value of US\$ 0.6 billion, which is 1.6% of the global market pie. India is one of the most dynamic generic pesticide industries in the world, having a total installed capacity of technical grade pesticides consisting of large and medium scale and 400 pesticide formulators (of all sectors) spread all over the country for use in agriculture, public health, household and plant protection. Overall, it can be said that there is a bright future for agro-chemical companies in India in the post-patent era. This paper focuses on the opportunities arising for companies dealing in pesticides because of the agrarian nature of the Indian economy. Besides, it presents a conceptual framework of the situation prevailing in the marketing of pesticides in India with special reference to Punjab.

**Hicks et al. (2006)** stated the companies, products and strategies of the global generic agrochemical industry. Generic pesticides companies are of greatest importance in emerging markets, accounting for more than 60% of the total agrochemical market in China, but only around 10% in Germany, Canada and USA.

The report analyses the most important national markets for generic pesticides (including Argentina, China, France, Germany, India, Italy, Japan, Korea, Spain, Taiwan, UK and USA), presenting profiles of the leading companies and market share tables. The report presents rankings for the top 20 agrochemical companies and the 14 largest generics companies and lists the leading generic herbicides, plant growth regulators, fungicides and insecticides and their estimated annual sales at user level in volume and value terms. Recent additions to the ranges of generic pesticide companies are listed by company, as well as the future product plans of the leading producers. Active ingredients that will come off patent in the near future are identified through lists of the herbicides, fungicides and insecticides that were reported and commercialised in the 1980s. Three chapters discuss the origins of generic pesticide companies, the business strategies adopted by leading RandD-based crop protection companies and the role of special interest groups such as the European Crop Protection Association (which includes RandD and generic companies) and the European Crop Care Association (ECCA). The latter represents the interests of generic companies and is particularly concerned with the EU's pesticide re-registration process and the sharing of the costs thereof. Patent protection is a key issue for the generics industry and the report discusses the use of new formulations and production technologies to gain competitive advantage. Strategies available to generic pesticide companies include those used by governments to stimulate their domestic industries (such as tariff barriers to trade and less strict patent protection), and those adopted by the companies themselves. These include leveraging manufacturing strengths, contract manufacturing and licensing agreements with RandD companies.

**Phil (2007)** stated that World use of pesticides in 1999 was an estimated \$28 billion at the user level, an increase of 1% from 1994. The market for herbicide-tolerant and insect-tolerant crops expanded to over \$2 billion in 1999, representing a total crop protection market of over \$30 billion. This increase was mainly a result of market expansions in the United States, Europe, parts of Asia, and Latin America. By 2004, world pesticide sales will decline to \$27 billion annually. This represents a real decline in worldwide use of pesticides (in terms of 1999 dollars) at an average rate of 1% per year. The decline in pesticide usage will

likely be offset by increases in pest- and pesticide-tolerant crops. The 1999 sales of pesticides are estimated at 2 million metric tons active ingredient, including user level sales and exports. Volumes are expected to decrease about 1.0-1.5% per year to 2004, while inflation and higher-unit-value products could add a 2-3% rate of growth per year to the dollar value of the industry over this period. With the greatest sales volume and total sales values, the herbicides sector is the leader in U.S. pesticide sales. Because planted crops and treated acres have not grown substantially in the last few years, retail price competition continues at a high level. The introduction of herbicide-tolerant crops has resulted in a significant change in the mix of herbicide products used by farmers. This has pressured margins at all levels in the distribution chain as manufacturers are pursuing market share strategies more strongly in the contracted major markets. Exports are a major factor in the market for U.S.-produced pesticides, with the 1999 volume reaching an estimated 310 thousand metric tons of active ingredient. Non-U.S. markets currently represent about 30% of total U.S. pesticide production. Imports in 1999 amounted to 82 thousand metric tons of active ingredient.

**Zhifeng *et al.* (2007)** find the key factors of web site which influence customer value. Through literature review, we find the role of web site from a marketing perspective is a medium of marketing, enhancing the marketing mix and endowing the marketing mix with new features; we also find that customer value is a comparison of benefit and cost, having both psychic value and utility value and covering the whole customer activity. On base of these, we identify eight factors of web site which, we hypothesize, influence customer value: Attractiveness, Ease of use, Accuracy, Customization, Responsiveness, Community, Comparison and Assurance. Then a survey with questionnaire method was employed. As to the design and analysis of the questionnaire, the Kano model was used. The result of our survey showed that seven factors of web site - Assurance, Ease of use, Accuracy, Responsiveness, Customization, Attractiveness and Comparison, have positive influence to customer value while Factor of Community, has little influence to customer value.

**Gandhi (2008)**, the pesticide industry is the most dynamic agricultural input industry in India, being substantially in private hands. Yet the pesticide use levels in India are among the lowest in the world. This paper presents an overview analysis of the pesticide scenario in India. It develops a framework of the market environment

within which the growth of pesticide use takes place in developing countries. It then uses this framework to study the growth and patterns of pesticide use in India. It finds that pesticide use in India is highly concentrated by crop and geographic area, and is therefore showing declining growth rates. A major reason appears to be very limited market development efforts by the firms leading to poor conversion of a large potential into effective demand. Output markets/prices, input prices, high yielding varieties and wage rates play important roles in determining use. However, many non-price factors are also very important. Pesticides are also seen as insurance by the farmers and therefore higher than optimum use is frequently reported. The new economic environment in India will offer ample opportunities for growth. However, the industry will need to look at the market environment more comprehensively and will need to play a proactive role in market development.

**Udaya (2010)** in his study on pesticides marketing in Uttar Pradesh found that, the factors contributing to pesticide promotion activities were spot demonstration, farmers meeting and fair participation were ranked first, second and third respectively and radio stood at fourth from the effectiveness point of view. Wall paintings, theatres, distribution of literature, calendars were less effective.

**Flocks *et al.* (2012)** attempt to examine that community-based social marketing project working to reduce the adverse health effects of pesticide exposure among fernery and nursery workers in Florida. In 3 years, the collaboration between university and community researchers has embodied many of the principles of community-based research while completing multiple stages of formative data collection required for a social marketing project. This hybrid approach to developing a health intervention for a minority community has been successful in its early stages because the community partners are organized, empowered, and motivated to execute research activities with the assistance of academic partners. However, this work has also been labour intensive and costly. This article describes the lessons learned by project partners and considers the limitations of this approach for agricultural health research.

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## Chapter III:

### *Research Methodology*

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#### 3.1 SAMPLING TECHNIQUE

Varanasi district is the major vegetable growing district of the eastern UP and also it is a constituency of prime minister of India. That's why Varanasi district was purposively selected for the study.

#### 3.2 SAMPLE UNIT

The study was conducted to get an insight of the Pesticides market in Varanasi. The study includes three vegetable markets of Varanasi district.

**Table 3.1: Target respondents for the project**

| Name of the market | Location | Farmers | Retailer |
|--------------------|----------|---------|----------|
| Sunderpur          | Varanasi | 15      | 04       |
| Pahariya mandi     | Varanasi | 10      | 06       |
| Shivpur mandi      | Varanasi | 10      | 05       |

#### 3.3 DATA ANALYSIS

Data is analyzed by using bar diagram, pie diagram, doughnut chart, etc.

#### 3.4 DATA COLLECTION

Primary data collected from the farmers and vegetable market of Varanasi through farmers meeting, personal interview, observation method and the required secondary data wise collected with the help of books and internet.. The research study was performed using a literature search of various vegetable books, surveying farmers, vegetable market dealers and distributors about their experiences, focus group study. A questionnaire consisting of structured, semi-structured and unstructured items was designed based on published literature on the subject as well

as experiences of the authors in the field. Data was collected through a farm survey by face-to-face interviews with farmers/farm workers during farming activities. The data collected included the bio-data such as name, sex, date of birth, contact address; source of income from the farm and other sources; duration in farming; crops and production per season; pest problems; pesticides used and source; pesticide purchase and transportation costs; characteristics of pesticide stores and storage costs; type and cost of spray equipment; spares and repair, pesticide activities, pesticide exposure and cost, knowledge on impact of pesticide to environment; disposal of pesticides containers; application techniques; pesticide resistance; trends in pesticide use; symptoms due to exposure to pesticides. Data were recorded in 2016- 2017. Statements made on open-ended questions that were not coded were also used to substantiate the numerical data.

### **3.5 LIMITATIONS**

As this project was concerned with the farming community, some difficulties had been arisen during the research and these difficulties are the major limitation of the project:

- The lack of proper and inefficient channel became hindrance in imparting complete knowledge about the topic.
- They always talk in their own direction not accordingly what the other intended to know as not much aware about the project.

#### **3.5.1 General study design and information**

The study entitled “A study of market scenario of Agro-chemical Companies in Vegetable Production in Varanasi district” was conducted in June 2017 in Varanasi. The study included developing robust, valid and reliable methodologies for assessing exposure, market share. The study also gathered descriptive policy data and preliminary pesticide poisoning prevalence and incidence estimates.

#### **3.5.2 Period of study**

The study was conducted in 2016-2017. It consisted of interviews with farmers and farm workers and Pesticides retailer in rural areas in

Varanasi where vegetables crops were mostly cultivated using farm inputs, particularly pesticides. The sample farmers from whom information was collected comprised small-scale farmers selected from rural districts. The sites were selected based on crops grown (vegetable crops), pesticide usage, cooperation from local leaders and willingness of farmers/farm workers to participate.

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## Chapter IV:

## *Results and Discussion*

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### 4.1 RESULTS

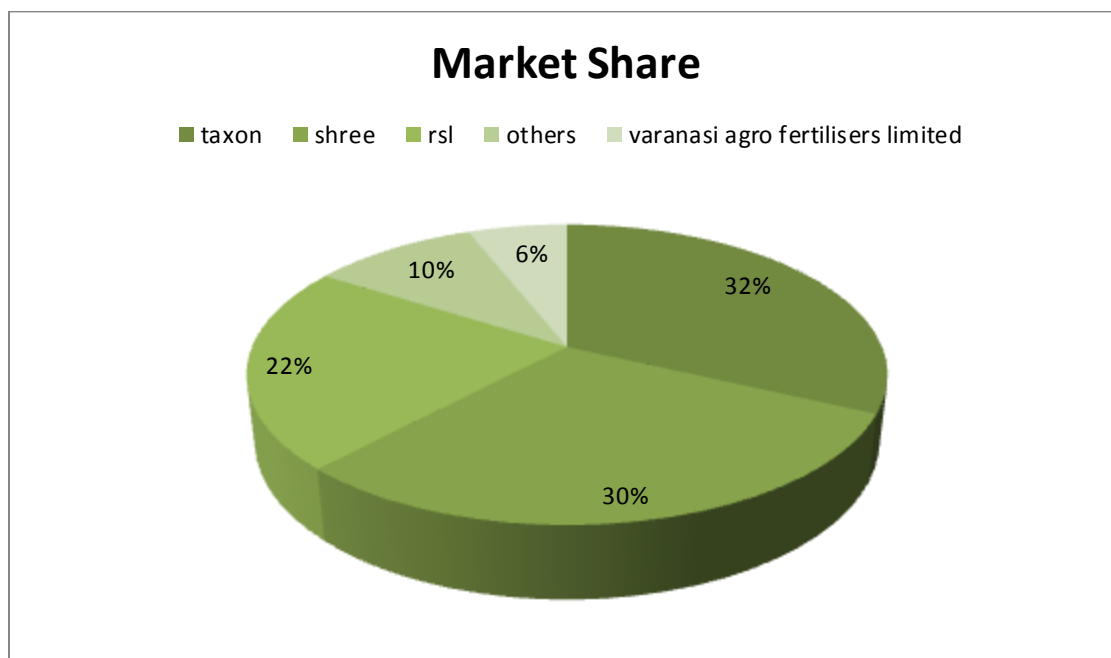
#### 4.1.1 Market shares of different Agro-chemical Company in Varanasi district.

**Table 4.1:** Market shares of different Agro-chemical Company

| Company name                            | Turnover in Cr. | Market share(%) |
|---|-----------------|-----------------|
| Taxon Seeds and Agro Chemicals Pvt. Ltd | 12              | 32              |
| Shree Biotech Pesticides Ltd.           | 11.25           | 30              |
| Varanasi Agro Fertilizers Limited       | 8.24            | 22              |
| RSL Agro Chemicals Pvt. Ltd.            | 3.75            | 10              |
| Others                                  | 2.25            | 06              |

From the table 4.1.1 it has been found that Taxon Seeds and Agro Chemicals Pvt. Ltd. has the maximum market share with 32% whereas other companies has market share of less than 30%. Shree Biotech Pesticides Ltd. has market share of 30%, it was also represent by figure 4.1.

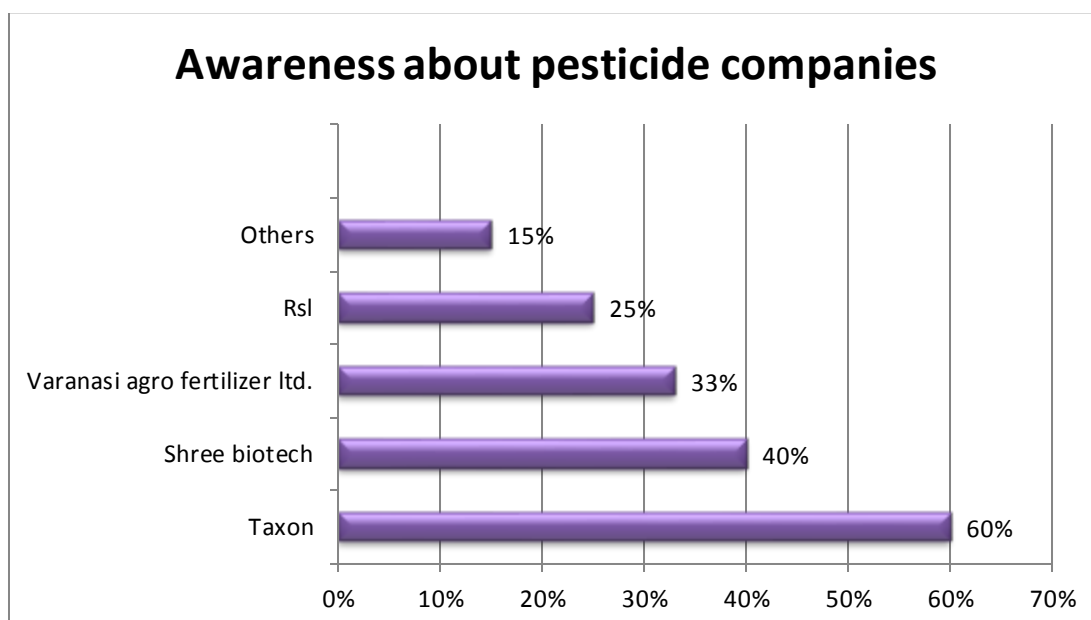
Figure-4.1



#### 4.1.2 Awareness and Source of Information about Pesticide Companies among the Farmers

Table 4.2 Awareness about Pesticide Companies

| Company Name                            | Awareness |
|---|-----------|
| Taxon Seeds and Agro Chemicals Pvt. Ltd | 60%       |
| Shree Biotech Pesticides Ltd.           | 40%       |
| Varanasi Agro Fertilizers Limited       | 33%       |
| RSL Agro Chemicals Pvt. Ltd.            | 25%       |
| Others                                  | 15%       |

**Figure- 4.2 Awareness about pesticide companies**

The survey revealed that brands of famous company are known to farmers with their special products and well planned and frequently organized promotional programs. Taxon is known by Marathan and Boom plus similarly phosphate solubilizing of Shree Biotech. Others include United Pesticide Limited, Pesticide India, Chambal Fertilizers and Syngenta etc. are known to some extent.

The region of Varanasi is one of the area of eastern U.P were vegetable cultivation goes all the year round and pesticide consumption is on very high scale. Following finding were revealed during the survey work:

In the case of Varanasi district most of the Vegetable growers having very small land holdings (<3 acre.) because of increase in family size thus reducing land holding per member and vegetable land diminishing due to more urbanization around the city. One of the biggest problems in vegetable cultivation is hard working; crop of vegetable need much care in comparison to food grains. Problems of insects and pest are also very high needs lots of investment on agrochemicals.

Normally pesticide consumption varies according to the stages of the plant growth. It can be figured out that pesticides are consumed at all the stages as diseases and pest infestation is from nursery to ripening stage. At the nursery stage consumption is primarily for preventing damping off disease.

During the vegetative stage pest and disease infestation start building up, as the vegetables become host for them. Fruiting stage is highly infested by pest like fruit flies, borers, worms and diseases like mosaic and viral attacks thus they consume more pesticide. Ripening stage has also some consumption.

Farmers not regularly go for seed treatment due to cost involve and focuses on quality seeds instead. They mainly go for treatment at fruiting stages when infestation has occurred thus is curative in nature than being preventive. Seed molecule used were phosphate solubilizing, Trichoderma rate being 20-35gm/Kg or Litre the general practices being soaking the seed. Maximum number of farmers are not fully aware about pesticide application, thus primary source of information remains the retailer whom they meets while returning from mandies after selling their produce. Some of farmers have got good knowledge due to their past experience.

Need for pesticides remains on a larger basis to prevent vegetables from damage, therefore farmers buy pesticide in large quantity and on regular basis but Cash is available only after they sell their produce thus, farmers can't afford to pay all the year and go for credit. Pesticide market being a potent market for retailers due to all the year round vegetable cultivation, it makes them buy and sell on cash and credit basis.

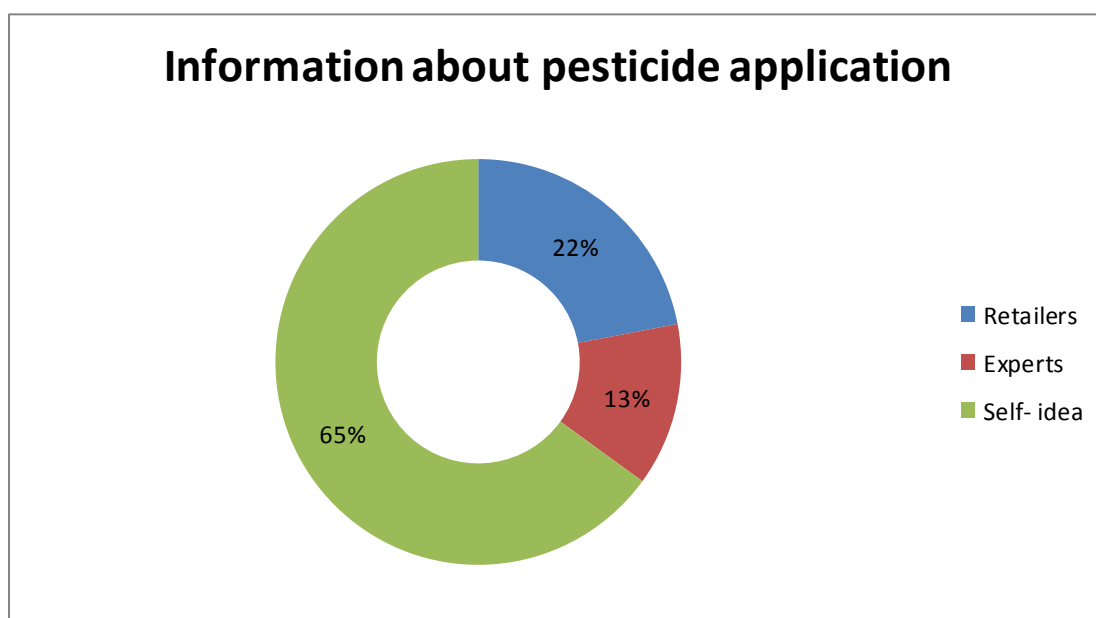
Pesticide companies followed the same and common medium of promotion that include Kisan Gosthi, retailer and dealers meeting, field surveys etc. Very few companies have adopted new means like Chambal has adopted to make farmers member and giving them benefits. A key note was that maximum new companies follows the extension work regularly so as to have a base while established one rarely do extension works.

Brands of famous company are known to farmers with their special products and well planned and frequently organized promotional programs. Taxon is known by Marathan and Boom plus, similarly phosphate solubilizing of Shree Biotech. Others include United Pesticide limited, Pesticide India, Chamber fertilizers and Syngenta etc. are known to some extent.

**Table 4.3: Source of information about pesticide application to the farmers**

|           |     |
|-----------|-----|
| Retailers | 27% |
| Experts   | 13% |
| Self-idea | 65% |

**Figure 4.3 Source of information about pesticide application to the farmers**



With the reference to the survey it was revealed that maximum number of farmers are not fully aware about pesticide application, thus primary source of

information remains the retailer whom they meet while returning from mandies after selling their produce.

Some of farmers have got good knowledge due to their past experience. Many at times happen that some new problem arises that hampers plant growth, for this farmer visit the Indian Institute of Vegetable Research (IIVR), Varanasi to meet experts and take their recommendations.

#### **4.1.3 Constraints faced by the farmers, retailer and agro-chemical manufactures in the study area.**

##### **Problems Faced by Farmers**

The major problems faced by the farmers are as follows:

- The sub-standard quality of products of local formulators.
- Non-availability of credit. Dealers do not give credit to all farmers as there is no guarantee of repayment. Only a few well-to-do farmers get credit.
- The period of credit is one month in peak and three months in off season. But from the farmers' point of view, the period of credit should be six months.
- Most of the farmers are illiterate to read the expiry date on the label. Quite often, dealers sell outdated stocks.
- The smaller packing size is comparatively costlier than the large sizes. Most farmers are small farmers and their requirement of pesticides is also small at a time. So, small farmers have to pay more in relative terms.
- There is confusion about the type and quantity of pesticides to control pests. This is because, for the same pest attack on the same crop, some pesticides which are recommended by the companies are not recommended by the agricultural universities and research institutions. Further, there is also significant variation between the dosages recommended by the manufacturers and the in situations.

##### **Problems faced by retailers:**

1. Irregularity in supply of the products.
2. Lack of cash in hand.
3. Small margins are set by the retailers because of more negotiation by the buyers.

4. Fluctuation in market price. Due to lack of information.
5. Lack of storage facilities like godown.
6. Lack of available cash to retailers.
7. The number of retailers in study area.
8. Seasonal selling.
9. Many cases of RATE CUTTING by smaller dealers came into light as they are misusing the credit period liberty. They sell take the product from the company at credit, sell it at lower prices in the market, get cash, invest it in other more profitable activity, earn from there and pay back to the company's loan. This causes major loss to the dealers who are selling the product at the prescribed price.

**Problems faced by Agrochemical manufactures:**

1. Different types of permission from government department
2. Policy changes by governments.
3. In availability of technical experts.
4. Registration procedure is lengthy and costly.
5. The pesticide industry is highly risk prone. Risks arise because of:  
(i) Failure of monsoon and hence of crops; (ii) product obsolescence and perishability; and (iii) obsolescence following development of new and more effective pesticides.
6. Demand for pesticides is highly seasonal and hence capacity utilization is low.
7. Excise duty on intermediate products which are produced and used by the company itself is imposed without any transaction taking place.
8. Import duty on intermediate products (inputs for technical grade pesticides) is very high.
9. Data on technical grade pesticides generated by the company for registration purposes do not enjoy any protection.

**4.2 DISCUSSION**

The pesticides industry has grown rapidly during the last two decades. It has also undergone a structural change from producing low value products to one producing high value specialty products. Despite this, the use of pesticides is

concentrated in selected districts of a few states. The pesticides use pattern is very similar to that of fertilizers which also display geographical and crop concentrations. This is understandable because marketers usually tap first those markets with more potential and easier access. This pattern, however, has to undergo a change during the next decade of agricultural development. This scenario opens up new opportunities and challenges for the pesticides industry. To promote sales of pesticides, the industry will have to generate guidelines for economical use of pesticides for crops grown in disadvantaged regions. This has to be supplemented with development of crop specific products and pricing and promotion of these products in relation to crop profitability. Market development efforts are time consuming and costly. As the industry is presently dependent on distributors and dealers to push their products, the challenge may not be automatically taken up because the turnover per outlet in disadvantaged regions is going to be much smaller than what is obtained now. Similarly, the promotional cost is also going to be high. Perhaps the pesticides industry is in need of governmental support for market development. The above analysis indicates the magnitude of problems faced by various constituents of the industry. These have to be resolved by various constituents of the industry itself so that the challenge can be met by the industry.

### **4.3 DEALERS**

The end users of pesticides are farmers and households but, except in a few cases, formulated products are not sold directly to them but through wholesalers/distributors and retailers. Many local formulators sell their products to distributors and also to retailers. Such formulators pass on a small percentage of their profits from direct sales to retailers to the concerned area distributors. Retailing of pesticides is done by the state departments, cooperatives, and private dealers.

- Almost all distributors of pesticides also operate retail outlets.
- In Varanasi, about 30 percent of the dealers are exclusively dealing in pesticides.

- One litre packing size is in high demand.
- Variation in the selling price of pesticides per litre between two extreme packing sizes ranges from 15 to 60 percent. Part of this variation is justified because of difference in cost of packing. On per litre basis, smaller size packing cost more than large sizes.
- The rate of commission received by the distributors on the purchase of pesticides varies from 5 to 23 percent and the rate of commission given by distributors to dealers varies from 2.5 to 18 percent. Generally, distributors pass on 5 percent less commission to dealers in Varanasi. They believe that profit should be increased by increasing the volume of business.
- The rate of return on the investment for working capital is about 29.7 percent in the case of the Varanasi dealers.

Almost all technical grade material manufacturers deal directly with formulators. Thus, there is a direct marketing channel for technical grade pesticides. They have depots from where supply of technical grade pesticides is made. Most of the depots are located in those cities where the excise duty is nil or minimum. Market development and sales promotion efforts are needed for formulated pesticides. The formulators can be grouped in four categories on the basis of their product range and area of market:

- Producing more (above 6) products and marketing at all India level.
  - Producing few (less than 7) products and marketing at all India level.
  - Producing more (above 6) products and marketing at regional or state level.
  - Producing few (less than 7) products and marketing at regional or state level.
- The different strategies for market development and sales promotion adopted by the four categories of formulators are as follows:
- Major product promotion efforts are undertaken by the first two groups of formulators. Others tag along their products with the leaders and compete in the market on the basis of prices and commission.
  - Generally, formulators of the first three categories market their products through distributors/stockists. But the formulators of the last category sell their

products to distributors and retailers. Sometimes, they also deal with big farmers to increase their sales.

- The rate of commission given by the formulators of the first two categories (maximum 15 percent) is lower than that of the last two categories (maximum 22 percent). The formulators of the last two categories feel that the small formulators can compete with the big formulators by giving higher rates of commission to distributors and retailers.
- The price of the products of the formulators of first two categories is comparatively higher (by about 5 percent) than that of the last two categories.
- To increase the sales of the pesticides, the formulators of the first two categories have area offices in the country. Each area office has one area officer, one or two sales officers, some sales representatives, one field officer, and some field assistants. But the formulators belonging to the last two have only sales representatives.
- A few formulators of the last two categories give some percentage of their sales of pesticides to the regulatory machinery at the grass root level to force the dealers to increase the sales of their products.
- The media for sales promotion adopted by the formulators of the first two categories are newspaper advertisements, pamphlets, leaflets, wall printing, posters, audio cassettes, cinema slides, etc. But the media of sales promotion adopted by the formulators of the last two categories are limited to newspaper advertisements, pamphlets and leaflets.
- Credit provided by the formulators of the first two categories is for 30 days. But the formulators of the last two categories provide credit for 30 to 90 days to compete with the formulators of the first two categories.

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## Chapter V:

### *Summary and Conclusion*

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Vegetable comprises about 22 percent of the daily food intake of the Varanasi population. Consumers generally demand for better quality vegetables. Quality vegetable to them means healthy, succulent and fresh looking vegetables with no visible rashes or holes caused by pests or diseases. To satisfy this demand, farmers have to tackle pest and disease problems by all means. The use of agrochemicals including pesticides has been found to be the immediate and cheaper way to produce unblemished vegetables and increased farm productivity. Strategies identified base on these information were implemented beside the promotion of good cultivation practices. The vegetable industry in Varanasi is dominated by small farms (small holders) with only a few large-scale farms (source-[www.indianindustry.com](http://www.indianindustry.com)). About eighty percent (80 %) of the sample vegetable farmers, on the average, cultivate two acres of vegetable farms.

#### **Objectives**

- (i) To Study the market shares of different Agro-chemical Companies in Varanasi district.
- (ii) To study the awareness and source of information about pesticide companies among the farmers.
- (iii) To study the constraints faced by the farmers, retailers and agro-chemical manufactures in the study area.

The study was conducted to get an insight of the pesticides market in Varanasi.

The study includes three vegetable markets of Varanasi district.

As this project was concerned with the farming community. Some difficulties had been arisen during the research and these difficulties are the major limitation of the project: “A study of market scenario of Agro-chemical Companies in Vegetable Production in Varanasi district” was conducted and various results are drawn regarding the performance of such Agro-chemicals industry.

## 5.1 FINDINGS

- **Market shares of different Agro-chemical Company :** It has been found that Taxon seeds and agro chemicals pvt.ltd has the maximum market share with 32% whereas other companies has market share of less than 30%.Shree biotech pesticides ltd has market share of 30%. The reasons behind Taxon's better performance in market is its product quality and offers given .
- **Awareness and source of information about pesticide companies among the farmers:** The survey revealed that brands of famous company are known to farmers with their special products and well planned and frequently organized promotional programs. taxon is known by Marathan & Boom plus similarly phosphate solubilizing of Shree biotech. Others include United pesticide limited, Pesticide India, Chambal fertilizers & Syngenta etc. are known to some extent.

**Information about pesticide application to the farmers:** With the reference to the survey it was revealed that maximum number of farmers are not fully aware about pesticide application, thus primary source of information remains the retailer whom they meets while returning from mandies after selling their produce. Some of farmers have got good knowledge due to their past experience. Many at times happen that some new problem arises that hampers plant growth, for this farmer visit the Indian Institute of Vegetable Research (IIVR), Varanasi to meet experts and take their recommendations.

- **Constraints faced by the farmers, retailer and agro-chemical manufactures in the study area:** The sub-standard quality of products and poor credit facilities faced by the farmers. Irregularity in supply of the products, lack of cash in hand, small margins are set by the retailers because of more negotiation by the buyers, and fluctuation in market price due to lack of information etc are the major problems faced by the retailers. Different types of permission from government department, policy changes by governments, in availability of technical experts are the major problems faced by manufacturers.

## **5.2 SUGGESTIONS**

1. The Government should sanction and motivate special loans for farmers to improve agriculture.
2. Farmers should follow the instructions to obtain more yields.
3. Improvement in productivity, profitability and sustainability of the farming system will go a long way to ensure the all sound sustainability in small farm management.
4. There is need to encourage the traditional technologies in their field. Company must provide the awareness programme to farmers especially for farmers using pesticides.
5. Retailers and manufacturers should improve their marketing.
6. Promotional programme must be improve so that farmers can be benefitted and company to achieve its target.

## **5.3 CONCLUSION**

The pesticides industry has grown rapidly during the last two decades. It has also undergone a structural change from producing low value products to one producing high value speciality products. Despite this, the use of pesticides is concentrated in selected districts of a few states.

The pesticides industry in India has undergone a rapid growth and structural change in the product mix. This paper attempts to analyse the growth of the production of pesticides over a time and changes in the structure of the product mix, product dominance and flow of materials. The profile of this industry including the technical grade material manufacturers, farmers and retailers is briefly examined. The usage of the pesticides for vegetable cultivation is analysed. The spatial distribution of pesticides consumption is also presented. The issues facing the industry are studied for technical grade material manufactures, retailers and farmers. This paper also analyses the problems faced by the farmers in buying and using pesticides. High R&D costs leads such companies typically not focused on developing newer molecules and will face challenges in building these capabilities, while continuing to remain cost

competitive. Since, the number of end users is large and widespread, effective distribution via retailers is essential to ensure product availability. Lately, companies have been directly dealing with retailers by cutting the distributor from the value chain thereby reducing distribution costs, educating retailers on product usage and offering competitive prices to farmers. Indian population is increasing and the per capita size of land decreasing, the use of pesticides in India has to improve further. Currently a small segment, biopesticides market is expected to grow in the future owing to government support and increasing awareness about use of non-toxic, environment friendly pesticides. 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.

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- [www.pesticideinfo.org](http://www.pesticideinfo.org)
- [www.ficci.com](http://www.ficci.com)

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*Appendix*

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**Title:- A Study of market scenario of Agro-chemical companies in vegetable production in Varanasi District**

**Questionnaire for retailers and dealer**

**Name of Retailer/Dealer**.....

**Shop name**.....

**Address**.....

➤ Ratio of cash and credit purchase and sale.....?

➤ Company of which pesticides are sold?

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

➤ Different molecules applied to the vegetable?

| Vegetable | Molecule | Pest | Dose/acre | Time of application | Remark |
|-----------|----------|------|-----------|---------------------|--------|
|           |          |      |           |                     |        |
|           |          |      |           |                     |        |
|           |          |      |           |                     |        |
|           |          |      |           |                     |        |
|           |          |      |           |                     |        |

➤ How do you rate Rallis as a company?

(a)Very good

(b) Good

(c) Average

➤ Share of Rallis products in total sale?

(a) Rallis sale.....

(b) Total sale.....

➤ Extension work done by different companies?

| Company | Type | Efficacy |
|---------|------|----------|
|         |      |          |
|         |      |          |
|         |      |          |

➤ Pesticide consuming intensive vegetables?

| Vegetable | Intensity | Cost/acre |
|-----------|-----------|-----------|
|           | High      |           |
|           | Medium    |           |
|           | Low       |           |

➤ Ratio of different formulation used on vegetables?

Dust.....

Liquid.....

Granules.....

➤ Ratio of pesticide used on vegetables?

Fungicide.....

Insecticide.....

Growth nutrients.....

- Ratio of insecticide used for the pest/disease?

Sucking pest.....

Fruit borers.....

Leaf eaters.....

Others.....

- Stage consumption of pesticide?

Nursery.....

Vegetative.....

Fruiting.....

Ripe stage.....

- Product for vegetables?

| Products | Used for | Result |
|----------|----------|--------|
|          |          |        |
|          |          |        |
|          |          |        |

- Different schemes offered by the companies to the retailers?

.....

**Questionnaire for farmers**

**Name**.....

**Village**.....

**Land holding**.....

**Total acreages of vegetables**.....

1. Proportionate acreages of the following vegetables

- a. Chilli.....
- b. Bringal.....
- c. Okra.....
- d. Tomato.....
- e. Beans.....
- f. Cucurbits.....
- g. Others.....

2. What is the purpose of vegetable cultivation?

- (a) Self consumption
- (b) Market
- (c) Self consumption +excess produce for sale.

3. How do you take decision regarding crop protection?

- (a) Self idea
- (b) Experts
- (c) Retailers

4. What is the frequency of pesticide application?

- (a) According to need
- (b) Often
- (c) Regular

5. Do you know any name of Pesticide Company? (a)Yes (b) No

If yes name them.....

6. How do you apply pesticides?

- (a) Insecticide only
- (b) Insecticide+fungicide
- (c) Insecticide+herbicide
- (d) Growth nutrients

7. What are damages caused by different pest/diseases?

| Vegetables | Pest/disease | Damage |
|------------|--------------|--------|
|            |              |        |
|            |              |        |
|            |              |        |

8. Against which pest maximum pesticides sale occur?

.....

9. In which season do you grow maximum vegetables?

(a) Kharif      (b) Rabi      (c) Zayad

10. Seed treatment done or not?

Regular

Occasional

Not done

11. Frequencies of pesticide spray in different vegetables?

| <b>Vegetable</b> | <b>No. of spray</b> | <b>Cost of Spray</b> | <b>Type of spray</b> |
|------------------|---------------------|----------------------|----------------------|
|                  |                     |                      |                      |
|                  |                     |                      |                      |
|                  |                     |                      |                      |