Market Analysis of Fungicides for Major Horticulture Crops in Hanumangarh district of Rajasthan

राजस्थान के हनुमानगढ़ जिले में प्रमुख बागवानी फसलों के लिए कवकनाशी का बाजार विश्लेषण

Anurag Katiyar

PROJECT REPORT

Master of Business Administration
(Agri Business)

उत्तमा वृत्तिस्तु कृषिकर्मेव

2022

Institute of Agri Business Management
Swami Keshwanand Rajasthan Agricultural University,
Bikaner – 334006

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PROJECT REPORT

Submitted to the

Swami Keshwanand Rajasthan Agricultural University,

BikanerIn partial fulfillment of the requirement for the

degree of

Master of Business Administration

(Agri Business)

By

Anurag katiyar

2022

INSTITUTE OF AGRI BUSINESS MANAGEMENT

SWAMI KESHWANAND RAJASTHAN AGRICULTURAL UNIVERSITY, BIKANER

CERTIFICATE – I

Date:……

This is to certify that **Anurag katiyar** had successfully completed the Comprehensive Examination held on **25/04/2022** as required under the regulation for the degree of Master of Business Administration (Agri Business).

DIRECTOR, IABM

INSTITUTE OF AGRI BUSINESS MANAGEMENT

SWAMI KESHWANAND RAJASTHAN AGRICULTURAL UNIVERSITY, BIKANER

CERTIFICATE-II

Date: ……..

This is to certify that this project report entitled **"Market Analysis of Fungicides for Major Horticulture Crops in Hanumangarh district of Rajasthan"** submitted for the degree of Master of Business Administration (Agri Business) in the field of embodies bonafide project work carried out by **Anurag katiyar** under our guidance and supervision and that no part of this project report has been submitted for any other degree. The assistance and help received during the course of investigation have been fully acknowledged. The draft of this project report was also approved by the Advisory Committee on ***/ / 2022***

(Aditi Mathur)

Major Advisor

DIRECTOR, IABM

INSTITUTE OF AGRI BUSINESS MANAGEMENT

SWAMI KESHWANAND RAJASTHAN AGRICULTURAL UNIVERSITY, BIKANER

Date:……..

CERTIFICATE- III

(REPORT OF VIVA-VOCE ON PROJECT WORK)

This is to certify that project entitled **"Market Analysis of Fungicides for Major Horticulture Crops in Hanumangarh district of Rajasthan"** submitted by **Anurag katiyar** to the Swami Keshwanand Rajasthan Agricultural University, Bikaner in partial fulfilment of requirement for degree of MBA degree in the subject of 'Agri Business' was examined by the constituted committee.

The candidate was examined orally on his project report by the committee with following recommendations:

(1) The performance of the candidates has been found satisfactory. We recommend the acceptance of the project for the award of the degree.

(2) The performance of the candidate has been found unsatisfactory. The candidate beasked to reappear in the oral examination.

(Aditi Mathur)
Major Advisor

( )
External Examiner

(Satyveer Singh Meena)
Member

(Prasanlata Arya)
Member

(V.S.Acharya)
Dean PGS Nominee

Recommended for approval

DIRECTOR, IABM

Approved

Dean, Post Graduate Studies

INSTITUTE OF AGRI BUSINESS MANAGEMENT

SWAMI KESHWANAND RAJASTHAN AGRICULTURAL UNIVERSITY, BIKANER

CERTIFICATE – IV

Dated: ……

This is to certify that **Anurag katiyar** of the Institute of Agri Business Management,Bikaner has made all the corrections/modifications in his project report entitled **"Market Analysis of Fungicides for Major Horticulture Crops in Hanumangarh district of Rajasthan"**, which were suggested by the Advisory Committee in the oral examination held on…….. The final copies of the project report duly bound and corrected were submitted on……. and are enclosed herewith for approval.

Advisory Committee:

(Aditi Mathur)
Major Advisor

(Satyveer Singh Meena)	(Prasanlata Arya)	(V.S.Acharya)
Member	Member	Dean PGS Nominee

Recommended for approval

DIRECTOR, IABM

Approved

Dean,
Post Graduate Studies

INSTITUTE OF AGRI BUSINESS MANAGEMENT

SWAMI KESHWANAND RAJASTHAN AGRICULTURAL UNIVERSITY, BIKANER

CERTIFICATE-V

The under signed assigns to Swami Keshwanand Rajasthan Agricultural University, Bikaner all right under copyright that may exist in and for the thesis entitled **"Market Analysis of Fungicides for Major Horticulture Crops in Hanumangarh district of Rajasthan"** submitted by me to Swami Keshwanand Rajasthan Agricultural University, Bikaner for the award of the **Master of Business Administration** in **Agri Business.**

(Anurag Katiyar)

The following certificate will be submitted by the concerned HOD to the Dean, PGS.

S. K. RAJASTHAN AGRICULTURAL UNIVERSITY, BIKANER

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Director

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INSTITUTE OF AGRI BUSINESS MANAGEMENT

SWAMI KESHWANAD RAJASTHAN AGRICULTURAL UNIVERSITY, BIKANER

Dated: - ……..

This is to certify that the project entitled **"Market Analysis of Fungicides for Major Horticulture Crops in Hanumangarh district of Rajasthan"** submitted by **Anurag katiyar** to the Swami Keshwanand Rajasthan Agricultural University, Bikaner in partial fulfillment of the requirements for the Degree of **MBA (Agri Business)** in the field of **Agri Business** was examined by the constituted committee.

The candidate was examined orally on his / her project report by the committee withfollowing recommendations:

(1) The performance of the candidate has been found satisfactory. We recommend theAcceptance of the project for the award of the degree.

(2) The performance of the candidate has been found unsatisfactory. The candidate beAsked to reappear in the oral examination.

(Aditi Mathur) Major Advisor	(Satyveer Singh Meena) Member	(Prasanlata Arya) Member

(V.S.Acharya)
Dean, PGS Nominee

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Director, IABM

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Date:

Place: *(Anurag Katiyar)*

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LIST OF ABBREVIATIONS

CAGR	Compound Annual Growth Rate
USD	United States Dollar
EPA	Environmental Protection Agency
FY	Fiscal Year
MT	Million Tons
FICCI	Federation of Indian Chambers of commerce & Industry
MNC	Multi-National Companies
EU	European Union
et al.	And Others
RBQ	Rank Based Quotient

EXECUTIVE SUMMARY

The study was carried out to assess the market potential and farmers buying behaviour of fungicides for major horticultural crops in Hanumangarh district of Rajasthan.

The top 10 villages were selected according to their higher production of Horticulture crops and farmers will be selected on basis of their landholding and production (small, medium, and large farmers). 1 dealer was selected from each village based on business volume and the total number of dealers will be 10.

Data was collected from selected farmers with the help of interview schedules developed for the purpose.

The study was focused on the market potential of fungicide for major horticulture crops, assess farmer's buying behavior for fungicides and competitive analysis of fungicide for major horticulture crops in the study area.

It was depicted as result that overall market potential of the study area was 31,163.2 kg and market potential in terms value is ₹ 12.56 Lakh. Farmers buying behaviour patterns were more likely influenced various factors. Out of 5 factors like pricing, influenced by dealers, availability, efficiency of product and personal influence, most farmers were influenced by dealers' influencing. Most effective mode of promotion was demonstration of fungicides on the field followed by meetings with farmers and individual approach. When it comes to dealers' preferences while purchasing or stocking the fungicides, they were more attracted by dealers' margin followed by the brand image.

कार्यकारी सारांश

यह अध्ययन राजस्थान के हनुमानगढ़ जिले में प्रमुख बागवानी फसलों के लिए कवकनाशी की बाजार क्षमता और किसानों द्वारा खरीदने के व्यवहार का आकलन करने के लिए किया गया था।

बागवानी फसलों के उच्च उत्पादन के अनुसार शीर्ष 10 गांवों का चयन किया गया था और किसानों को उनकी भूमि जोत और उत्पादन (छोटे, मध्यम और बड़े किसानों) के आधार पर चुना जाएगा। व्यवसाय की मात्रा के आधार पर प्रत्येक गांव से 1 डीलर का चयन किया गया था और डीलरों की कुल संख्या 10 होगी।

इस उद्देश्य के लिए विकसित साक्षात्कार कार्यक्रमों की मदद से चयनित किसानों से डेटा एकत्र किया गया था।

अध्ययन प्रमुख बागवानी फसलों के लिए कवकनाशी की बाजार क्षमता पर केंद्रित था, कवकनाशी के लिए किसानों के खरीद व्यवहार का आकलन और अध्ययन क्षेत्र में प्रमुख बागवानी फसलों के लिए कवकनाशी के प्रतिस्पर्धी विश्लेषण का आकलन किया गया था।

इसके परिणामस्वरूप यह दर्शाया गया कि अध्ययन क्षेत्र की समग्र बाजार क्षमता 31,163.2 किग्रा थी और बाजार की संभावित इंटरम्स का मूल्य ₹ 12.56 लाख है। व्यवहार पैटर्न खरीदने वाले किसानों ने विभिन्न कारकों को प्रभावित करने की अधिक संभावना थी। मूल्य निर्धारण, डीलरों, उपलब्धता, उत्पाद की दक्षता और व्यक्तिगत प्रभाव से प्रभावित 5 कारकों में से, अधिकांश किसान डीलरों के प्रभाव से प्रभावित थे।

संवर्धन का सबसे प्रभावी तरीका खेत पर कवकनाशी का प्रदर्शन था जिसके बाद किसानों और व्यक्तिगत दृष्टिकोण के साथ बैठकें हुईं। जब कवकनाशी खरीदने या स्टॉक करने के दौरान डीलरों की प्राथमिकताओं की बात आती है, तो वे ब्रांड छवि के बाद डीलरों के मार्जिन से अधिक आकर्षित होते थे।

1. INTRODUCTION

1.1. Agro-chemicals

The phrase agrochemical, often known as agrichemical, refers to any chemical product or pesticide used in agriculture. Herbicides, fungicides, and insecticides are among them, as are synthetic fertilisers, hormones, and soil conditioners. Agrochemicals play a major part in current industrialised and intensive farming practises, allowing crops to flourish on previously uncultivated area and enhancing soil productivity.

Since the invention of synthetic fertilisers, agrochemicals have gone a long way, and the need to better understand and improve both the agrochemical manufacturing process and the formulation make-up of agrochemicals is becoming increasingly obvious.

Sumerian farmers used Sulphur (S) compounds to reduce bug populations and the risk of pest-related starvation around 2500 B.C., which is the oldest documented usage of agrochemicals. P]esticide methods have considerably improved as synthetic chemical manufacturing has progressed to meet the hugely rising worldwide population and the resulting increases in food consumption. Even with the proper use of pesticides, it is estimated that up to 40% of the world's crops are ruined by plant pests and diseases.

Types of Agrochemicals

A determined effort is being made to actively and conscientiously deploy a wide range of agrochemicals in order to securely manage and regulate the global food supply, ensuring consistently excellent quality for wider consumption. Agrochemicals include the following:

- Pesticides, or chemicals engineered to destroy insects and other organisms, weeds, and funguses that could spoil crop yields;

- Synthetic fertilizers, for example ammonium nitrate (NH_4NO_3), which is designed to encourage crop growth by saturating soils with nutrients;
- Acidifiers and liming agents, engineered to alter the pH levels of soils to suit the planting properties of given crops;
- Soil conditioners, for example gypsum ($CaSO_4 \cdot 2H_2O$), which is designed to condition soils with high sodium (Na) contents to improve planting conditions;
- Growth hormones, or synthetic chemicals designed to increase growth rates in animals and crops.

Engineering crops that are synthetically resistant to herbicides or that create their own insecticides are examples of new and developing agrochemical technologies.

1.2. Agro-Chemicals Scenario in India

India is the world's fifth largest producer and exporter of agrochemicals. In FY20, the Indian agrochemicals business was valued at roughly ₹ 42,000 crore, with domestic consumption accounting for around ₹ 20,000 crore and exports accounting for around ₹ 22,000 crore. Several growth drivers, such as expanding population, limited arable land, increasing demand for high-value agricultural goods, and increased efforts by the sector and the government to encourage awareness and technological penetration, are predicted to fuel the industry's growth through 2025. BASF, Bayer Crop Science, Syngenta, UPL, Dhanuka, Rallis India Limited, Crystal CropCare, PI Industries, KREPL, Indofil, Coromandel International Limited, and others are among the worldwide and Indian participants in the Indian agrochemical business. Companies operating in India are working on improving their supply chain strategies in order to expand their distribution and reach within the country as well

as cater to foreign markets. The Indian agrochemicals market is projected to register a CAGR of 8.5% during the forecast period (2022-2027).

COVID-19 has had an impact on the agrochemicals market's production and supply. The global pandemic has had an influence on the smooth operation of different businesses across the country, including the agrochemicals industry. In terms of supply, a short-term labour shortage combined with distribution obstacles resulted in a large difference between the number of employees necessary for agrochemical manufacturing and those available. Crop productivity also declined as a result of the lack of personnel in large-scale plantations, lowering need for agrochemicals during the epidemic.

Consumption patterns are shifting as the global population grows, accompanied by increased income. Not only must output be increased to satisfy demand, but also the nutritional demands of an increasingly wealthy population must be satisfied. Wastage results from shrinking arable area and crop losses owing to insect infestations, posing a serious threat to food and nutritional security. The agrochemical sector is a vital agriculture support industry that helps farmers produce more. These elements contribute to the market's expansion.

Pesticides were among the most often used substances. In the agrochemical sector, price premiums and novel environmentally friendly manufacturing processes are progressively growing. There is a growing need to strike a balance between prudent use of the finest chemicals and minimising their impact.

1.3. Pesticide Industry Global Scenario

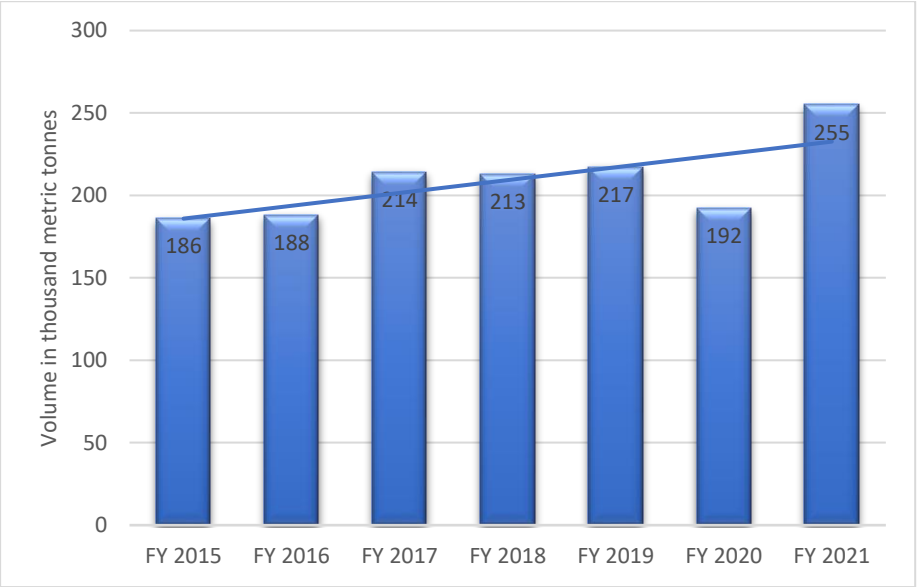
Pesticides are used by the majority of the 1.8 billion people who work in agriculture across the world to protect the food and commercial products they produce. Others use pesticides at work for public health and commercial objectives, and at home for lawn and garden applications. Pesticides are "chemical substances used to prevent, remove, repel, or neutralize any pest, including insects (insecticides), rodents (rodenticides), weeds (herbicides), and microorganisms (algicides, fungicides, or bactericides)," according to the EPA.

Pesticides are utilised in excess of 1 billion pounds per year in the United States (US), with 5.6 billion pounds globally. Many developing countries have ineffective or nonexistent exposure control systems. As a result, it is estimated that up to 25 million agricultural workers are poisoned unknowingly each year by pesticides. In the Agricultural Health Study, a large prospective study of pesticide users across the United States, 16% of the participants experienced at least one pesticide poisoning or extremely high pesticide exposure incident over their lifetime.

1.4. Pesticide Industry in India

India's pesticide sector is worth billions of dollars. Just in the financial year 2019, around 70 billion Indian rupees were invested. Pesticide use has increased in the country in order to boost agricultural productivity and fulfil the country's rising food demand. Pesticide usage per capita in India has increased in order to boost average agricultural output per hectare. Pesticide output has increased at a positive yearly rate in the country since the financial year 2014.

Figure No. 1 Volume of pesticides produced across India from financial year 2015 to 2021*(in 1,000 metric tons)*



https://www.statista.com/statistics/726938/india-pesticides-production-volume/

Pesticide output volume in India reached 101 thousand metric tonnes in the first half of fiscal year 2021. India's output has risen steadily throughout the years, from 186,000 metric tonnes in FY 2015 to 217,000 metric tonnes in FY 2019. (FICCI-2021). Pesticide production volume in India reached 255 thousand metric tonnes in fiscal year 2021. The country's chemical sector is quite diverse. The south Asian country was one of the world's largest chemical manufacturers, with over a thousand goods covered.

Table No. 1 Consumption of chemical pesticides in various states (Quantity in MT)

S. No.	States	2016-17	2017-18	2018-19	2019-20	2020-21
1	Andhra Pradesh	2015	1738	1689	1559	1559
2	Bihar	790	840	850	850	995
3	Chhattisgarh	1660	1685	1770	1672	1639
4	Goa*	22	24	25	30	30
5	Gujarat	1713	1692	1608	1784	1573
6	Haryana*	4050	4025	4015	4200	4050
7	Himachal Pradesh	341	467	322	881	56
8	Jharkhand	541	619	646	681	1161
9	Karnataka	1288	1502	1524	1568	1930
10	Kerala	895	1067	995	656	585
11	Madhya Pradesh	694	502	540	540	691
12	Maharashtra	13496	15568	11746	12783	13243
13	Orissa	1050	1633	1609	1115	1158
14	Punjab	5843	5835	5543	4995	5193
15	Rajasthan	2269	2307	2290	2088	2330

16	Tamil Nadu	2092	1929	1901	2225	1834
17	Telangana	3436	4866	4894	4915	4986
18	Uttar Pradesh	10614	10824	11049	12217	11557
19	Uttarakhand	198	210	195	224	135
20	West Bengal	2624	2982	3190	3630	3630

(Source: http://ppqs.gov.in/statistical-database)

1.5. Fungicides

With the continuing rise of the world population, agriculture development in the twenty-first century faces some unprecedented obstacles. India's population is predicted to exceed 1450 million people by 2025, necessitating intensive agriculture with judicious use of inputs such as fertilisers, pesticides, seeds, irrigation, and other agricultural inputs. Almost 60,000 species of insect pests and plant diseases attack crops in the field and grains in storage, while 8000 kinds of weeds compete with crops, resulting in a 40% loss of productivity. Despite the availability of numerous environmentally benign pest control options, farmers choose chemical pesticides due to their ease of application, quick and visible effect. Fungicides account for the majority of crop protection chemicals sold worldwide. Fungicide sales account for 6.0 billion dollars out of a total of 32.5 billion dollars in pesticide sales. Fungicides are used most frequently in Europe, accounting for 40% of all pesticide categories, followed by Japan (28%), and the United States (28%). (21 percent). The most fungicides are used on wheat, vines, and barley in Europe (87 percent of the total), whereas rice and fruits are used the most in Japan. Mancozeb, Copper compounds, Sulphur, Metalaxyl, Carbendazim, Propiconazole, and Iprodione are the most widely used fungicides in the world, according to sales. In India, fungicide use is lower than insecticide

and herbicide use. India consumed 10563 metric tonnes of fungicides, compared to 38788 metric tonnes of insecticides and 6040 metric tonnes of herbicides. Mancozeb (2828MT) is the most often used fungicide in India, followed by Sulphur compounds (2628MT), Copper oxy chlorides (1432MT), Copper sulphate (1314MT), Carbendazim (1812MT), and Thiram (420MT)

1.5.1 Fungicides importance:

Fungicides will continue to be an essential tool for controlling plant diseases in the future. Fungicide research has progressed from basic inorganic chemicals to today's organic molecules. Fungicides are mostly systemic.

1.5.2 Benefits of Using Fungicides:

Fungicides are used to prevent and treat fungal infections that have an impact on crop production and quality. Fungicides are essential for protecting agricultural output and quality by combating fungal infections, which are particularly prevalent in cereals, fruits, vegetables, and vines.

1.5.3 Crop wise consumption of Fungicides:

Potatoes (12.2 percent), paddy (12.0 percent), tea (9.4 percent), coffee (8.0 percent), chilies (7.6 percent), grapevine (6.9%), other fruits (5.9%), vegetables (4.6 percent), and other crops account for the remaining fungicide usage in India.

1.6. Horticultural Crops

Fruits, vegetables, medicinal, aromatic, and beautiful plants are all examples of horticultural crops. These plants are vital providers of nutrients, medications, and scent, as well as having major aesthetic value for humans. Horticulture adoption is also becoming increasingly important in order to supply the world's expanding demand for fruits, vegetables, and other horticultural goods.

1.6.1 Horticulture Production scesssnario in India

The Department of Agriculture and Farmers Welfare announced the 2020-21 (Third Advance Estimates) of horticulture crop area and output, which predicted 331.05 million tonnes. The data was generated using information from states, territories, and other government entities. According to Indian Minister of Agriculture and Farmers Welfare Narendra Singh Tomar, horticulture production in 2020-21 is expected to be a record 331.05 million tonnes, up 10.6 million tonnes (3.3 percent) from 2019-20, thanks to the government's farmer-friendly policies, farmers' tireless hard work, and scientific research.

1.6.2 Major Horticultural Crops in Rajasthan

Horticulture is a development engine for the agriculture industry and a tool for the state to achieve nutritional security. Rajasthan's population has risen from 5.65 million to 6.85 million in the recent decade, necessitating an increase in horticultural crop output to fulfil rising nutritional demands. Fruit and vegetable consumption is increasing as people become more aware of the need of a balanced diet and their purchasing power increases. This requires farmers to transition from traditional farming to commercial horticulture crop growing.

The diverse agroclimatic conditions encourage the development of a diverse range of Horticulture crops. Rajasthan's population boom and urbanisation has resulted in a reduction of cultivable land. As a result, effective use of limited land is required, and more efforts have been made to improve productivity.

Due to harsh temperatures in the winter and summer, sparse rainfall and high rates of penetration, the presence of high sand dunes, and the absence of biotic interferences, around 23946 ha of land, or 26.51 percent of the geographical area 970315, is under forest with very little flora. Khejri, Babool, Jal, Kikar, Pipal, pilu, Phog, Kheemp, Aak, Senia

Thor, Neem, Rohida, shisham, Lampla, Sawan are some of the towns in the district.

The climate in the district of Hanumangarh is ideal for desert horticulture growth. Kinnow, Ber, Grapes, Pomegranate, Guava, Malta, Mausmi, Lemon, and Potato are among the principal fruits and vegetables cultivated in the region. The 39664 hectares of fallow land can be used for horticulture and other tree crops. Horticulture Department has also built a number of private nurseries, specifically for "Citrus" plants. The district's climate is ideal for "Jojoba" planting. Jojoba plant seedlings are accessible locally at the nurseries of Nohar block. The district's Bhadra and Nohar blocks are ideal for "Sonamukhi" farming. Aside from the primary fruit crops, vegetables are cultivated on a reasonable amount of land. Surpluses of 5960 tonnes of Malta, Kinnu, and Mausmi can be used to build up two food processing plants in the district of Hanumangarh. Tomatoes are also widely farmed.

1.6.3 Production Strength

Rajasthan's climate permits the cultivation of a wide range of horticultural crops, particularly seed spices. Rajasthan holds a key place in the country's seed spice manufacturing. The following is the contribution of state horticultural crops to national production:

- 21 per cent of Country’s Coriander
- 40 per cent of Country’s Cumin
- 45 per cent of its Fenugreek
- 16 per cent of its Garlic
- 24 per cent of its Fennel
- 21 per cent of its Ajwain
- Almost all its Psyllium Husk (Isabgol)

- Almost all its Myrtle (Henna)

a. Fruits

Rajasthan is well-known for producing high-quality kinnow, mandarin, and Aonla. Export quality kinnow is grown in a dry, chilly climate and is quickly becoming a customer favourite. Rajasthani mandarins compete with the best on the market and are great for making squash, concentrate, and marmalade. Other fruits with high potential for growing in the hard environment of the State include guava, pomegranate, Beal, Ber, and Lehsua. The variety of climatic conditions in the state allows for the development of fruit crop belts.

- Mandarin- Jhalawar, Kota (Area 24632 Ha. Production 4.45 Lac MT)
- Kinnow- Sriganganagar, Hanumangarh (Area 11803 Ha. Production 1.74 Lac MT)
- Mango -Udaipur, Banswara, Chittorgarh, Dausa, Bhilwara (Area 5435 Ha. Production 0.93 Lac MT)
- Lime-Bharatpur, Pali, Sirohi, Jaipur (Area 3030 Ha. Production 0.22 Lac MT)
- Pomegranate- Barmer, Jalore, Chittorgarh, Jodhpur (Area 10842 Ha. Production 0.77 Lac MT)
- Guava-Sawai Madhopur, Bharatpur, Bundi, Kota (Area 7493 Ha. Production 0.47 Lac MT)
- Aonla- Ajmer, Jaipur, Chittorgarh, Nagaur (Area 1669 Ha. Production 0.13 Lac MT)
- Ber-Ganganagar, Bharatpur, Jodhpur, Hanumangarh, Bhilwara (Area 954 Ha. Production 0.09 Lac MT) New Initiative
- Date-palm- 577 Ha.

b. Vegetables

Throughout the year, the state produces a wide range of vegetables, including onion, tomato, pea, potato, and cucurbit crops such as watermelon, muskmelon, karela, and tinda. High-value and export-oriented vegetables such as capsicum, tomato, cucumber, and others are effectively cultivated in green houses and shade net houses using high-tech growing techniques. The following are the primary vegetable pockets:

- Onion - Jodhpur, Alwar, Sikar, Nagaur (Area 81794 Ha. Production 13.86 Lac MT)
- Tomato - Jaipur, Ajmer, Sirohi, Tonk, Pali (Area 20504 Ha. Production 2.33 Lac MT)
- Pea – Jaipur, Sikar, Nagaur, Ajmer (Area 11329 Ha. Production 0.28 Lac MT)
- Potato - Dholpur, Bharatpur, Hanumangarh (Area 13593 Ha. Production 2.56 Lac MT)
- Cucurbits - Tonk, Jaipur, Sikar, S. Madhopur
- Cauliflower - Ajmer, Jaipur, Rajsamand, Sikar (Area 9546 Ha. Production 0.47 Lac MT)
- Okra - Bundi, Jaipur, Ajmer, Jodhpur, Sirohi (Area 4278 Ha. Production .20 Lac MT)

c. Spices

Spices from Rajasthan are gaining popularity in Asia and Europe due to their scent and tart flavour. The Jodhpur chilli lends flavour and colour to European cuisine. With more than 22.69 percent of the country's land covered in seed spices and 10.65 percent of the country's production,

the state has a substantial stake. The spices state of India produces 21% coriander, 40% cumin, 45 percent fenugreek, and 24% fennel to national output. Aside from that, the state produces a lot of garlic, chilli, fennel, and ajwain.

- Cumin - Jodhpur, Barmer, Jalore, Nagaur, Jaisalmer (Area 609719 Ha. Production 3.19 Lac MT)
- Garlic - Jhalawar, Kota, Baran, Pratapgarh, Chittorgarh (Area 87663 Ha. Production 5.17 Lac MT)
- Coriander - Jhalawar, Kota, Baran, Chittor (Area 124286 Ha. Production 1.83 Lac MT)
- Fenugreek- Bikaner, Jodhpur, Sikar, Churu, Nagaur, Jhunjhunu, Pratapgarh (Area 90469 Ha. Production 1.09 Lac MT)
- Fennel-Nagaur, Sirohi, Pali, Jodhpur,S.Madhopur, Dausa (Area 30814Ha. Production 0.34 Lac MT)
- Ajwain - Chittor,Bhilwara,Kota,Rajsamand (Area 12475 Ha. Production 0.75Lac MT)
- Chilli - S.Madhopur, Jaipur, Jalore ,Jodhpur (Area 6603 Ha. Production 0.11 Lac MT)

d. Medicinal and Aromatic plants

Isabgol, Sonamukhi, Ashwagandha, and Mehndi are prominent crops among the medicinal and aromatic plants grown in Rajasthan. The state's climatic conditions promote the natural development of Sonamuhi and Aswagandha. National pride as the greatest producer of Isabgol and Henna, superior quality of Sonamukhi and Aswagandha, and high sennocide content in Sonamukhi produced in Rajasthan are some of the salient aspects of the medicinal and aromatic plants produced in Rajasthan.

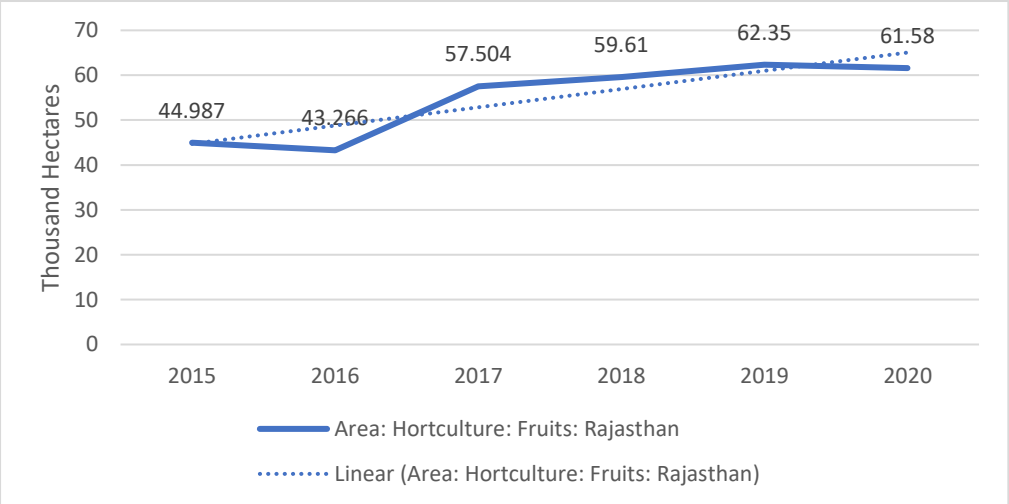
- Isabgol - Barmer, Jalore, Nagaur, Jaisalmer, Churu, Bikaner
- Mehandi - Pali, Jodhpur
- Sonamukhi - Jodhpur, Pali, Jaisalmer
- Kalaungi – Jhalawar, Pratapgarh
- Aloe vera - Churu, Bikaner

e. Flower

Ajmer, famous for Khwaja Moinuddin Chisti's Dargah, has also enchanted the world with the fragrance of its roses. Processable flower production of roses from Pushkar in Ajmer and Haldi Ghati in Chittorgarh opens up enormous opportunities for producing rose scent, rose water, gulkand, and dry petals for export. In addition, several important flowers, such as Gerbera and Dutch Roses, thrive in greenhouse environments.

- Rose - Ajmer, Jaipur, Nagaur, Bundi, Jodhpur,
- Marigold - Jaipur, Jodhpur, Ajmer

Figure No. 2 Area wise distribution of fruits' cultivation in Rajasthan (2015-20)



(Source: www.ceicdata.com Department of Agriculture and Cooperation)

Table 2: Production and Area of Major Horticultural Crops in Hanumangarh district of Rajasthan

S. No.	Name of Crops	Year 2019-20	
		Area in Hectares	**Production in MT**
1.	kinnow	1893	45000
2.	Anar	616.25	800
3.	Grapes	86.8	800
4.	Mausmi	80	2800
5.	Ber	62	744
6.	Guava	80	950
7.	Amla	27	405
8.	Lemon	36	60
9.	Others	8	1.6
	Total	2889.05	51560.6

S.No.	Name of Vegetables	Area in Hectares	Production in MT
1.	Potato	2700	72900
2.	Brinjal	150	4200
3.	Tomato	130	4680
4.	Carrot	220	5940

5.	Radish	260	7280
6.	Okra	310	6200
7.	pea	180	1620
8.	Spinach	60	360
9.	Onion	210	2520
Total		**4220**	**104080**

(Source: https://industries.rajasthan.gov.in/content/dam/industries/CI/pdf/2020-21/IPS_2019-20/IPS%20HANUMANGARH_19-20.pdf)

1.12. Objectives of Study

The main purpose of the study was to know the current status of fungicides used to protect major horticultural crops in the study area. It included all the major companies dealing in the production and marketing of fungicides for horticultural crops in the study area and to know the perception of usage of it by farmers.

1. To study the market potential of fungicide for major horticulture crops in the study area.
2. To assess farmer's buying behavior for fungicides in the study area.
3. To study the competitive analysis of fungicide for major horticulture crops in the study area.

2. REVIEW OF LITERATURE

The comprehensive review of literature is an essential part of any scientific investigation. As such, the attempt has been made to present brief and lucid details of the available literature relating to the present study. This literature will be helpful to identify which type of data will be collected to fulfill the need of the objectives and then how to analyze the data.

Satija *et al.* (1987) inoculated soil with Rhizoctonia solani and R.bataticola was used to test 10 fungicides for protection of tomato and chilli seedlings. On both crops, none were found to be similarly effective. Brassicol and topsin M were the most effective treatments for tomato damping-off caused by R. solani, whereas dithane M-45 and thiram were the most effective treatments for chilli seeds. Macrophomina phaseolina damping-off on tomato and chilli was effectively controlled by thiophanate-methyl and bavistin, respectively.

Jayasekhar *et al*. (1987) colletotrichum capsici and Alternaria solani produced chilli fruit rot, which was mitigated by 11 fungicides tested. However, foltaf 0.2 percent (captafol) was the most effective control, followed by fytolan 0.25 percent (copper oxychloride) and bavistin (carbendazim) 0.1 percent, whereas fylotan 0.25 percent delivered the highest yield, followed by foltaf 0.2 percent and bavistin 0.1 percent.

Ben-Noon *et al.* (2001) Different fungicides, such as difenconazole, tebuconazole, chlorothalonil, mancozeb, propineb, lutrifol, copper hydroxide, and iprodione, were investigated in two field studies for the control of Alternaria leaf blight of carrot in two field trials. They discovered that while all fungicides decreased disease severity, there were considerable disparities in their effectiveness. Difenoconazole and chlorothalonil were the most effective; copper hydroxide, tebuconazole, and mancozeb were less effective; flutrifol, propineb, and iprodione were the least effective in our tests.

Abhinandan *et al.* (2004) Commercial fungicides (Dithane M-45) (Mancozeb) at 0.25 percent, Kavach @ 0.25 percent, Rovral (Iprodione) @ 0.20 percent, Copper oxychloride (Blitox) @ 0.25 percent, Antracol (Propineb) @ 0.15 percent, Propiconazole @ 0.05 percent, and Penconazole @ 0.05 percent) were all tested for their efficacy in controlling the disease. When compared to the untreated control, mancozeb and kavach (Chlorothalonil) were shown to be quite successful in managing the illness, with more than 50% disease control.

Singh (2012) The important factors impacting farmer brand selection in terms of quality, brand popularity, price, and timely pesticide supply in the market were investigated. About 80% of farmers chose the Coragen brand of insecticide, 86% liked Sectin brand of fungicide, and 47% selected Round up brand of weedicide. According to the survey, DuPont was the most aggressive in implementing promotional efforts such as farm demos, farmer training programmes, Jeep ads, and posturing for pesticide sales in the district, followed by Bayer Crop Science, BASF India, and Indofil Chemicals.

Solanki *et al,* (2013) Consumer purchase behaviour for agricultural inputs such as fertiliser, seeds, agrochemicals, oils and lubricants was investigated. The act of customers getting and consuming products and services, as well as the decision process that decides these activities, is referred to as buying behaviour. A buying decision is a collection of choices that may include a product, brand, style, quality, dealer, time, price, and payment method. When acquiring agricultural supplies, price is the most significant factor to consider, followed by packaging and branding. Fair billing and home delivery are deemed less important. An attempt was made to discover the challenges that farmers encounter, and this study will also aid in understanding the elements that influence farmers' purchasing behaviour for agricultural supplies.

Choudhary (2014) Market Share, Market Potential, and Farmer Perception of Fungicide on Chilies Crop in Khargone District, Madhya Pradesh, with Reference to Dhanuka Agritech Ltd. The average size of the sample respondents' holdings was 1.30 hectare for small farms, 3.36 hectare for medium farms, and 7.03 hectare for big farms, with an average of 3.90 hectare for all sizes combined. The sample farmers favoured Bayer and Syngenta fungicides over DuPont because of their strong reaction, simple accessibility, and inexpensive pricing. During the purchase of goods of various brands of fungicide, the sample farmers examined the price of different businesses' products, as well as the reaction to the rising of fungicide on sample farmers, as well as timely availability and other factors. Because of its superior quality and performance, the organisation has been able to establish itself as a brand in the study sector. Furthermore, thanks to activities such as dealer point display, bulk discount policy, diary, posters, and farmer meetings, the company's display and ads propel it to second place.

Subash *et.al* (2017) indicated that there are several difficulties that need to be addressed right now in order to enhance the domestic pesticide sector and ensure safe pesticide application. To begin, it is critical to regulate and promote the use of low-cost, ecologically friendly pesticides. For unfavorable effects to be avoided, standardization in testing processes (parameters, labs, actors, etc.) and deregistration of old, dangerous pesticides are required. Quality assurance at the point of sale and farmer protection procedures in the event of counterfeit products must be reinforced. This duty might also include the industry association. The promotion of safe application procedures and knowledge among farmers is the second key aspect. The third problem is the assessment of the pesticide industry's possible consequences of a tightened patent regime, notably on product costs. In this context, policies that promote competition should be implemented. Finally, there are certain gaps in pesticide manufacturing and consumption statistics.

Data on the usage of biocontrol agents, in particular, is scarce. The production, use, and trade data for chemical pesticides are difficult to reconcile from many sources, which must be addressed.

Devi *et al.* (2017) Pesticide use patterns in India were studied over a two-decade period, from 1991 to 2012. India's pesticide industry is increasingly export-oriented. However, the pace of increase in home pesticide consumption has varied greatly throughout the decades, while the general trend remains unfavorable (-2.48 percent). In 17 of India's 29 states and Union Territories (UTs), a positive growth trend in pesticide usage was recorded from 2000 to 2013. Jammu and Kashmir, the Andaman and Nicobar Islands, and Tripura have had the most beneficial growth. The states of Uttar Pradesh, Maharashtra, Andhra Pradesh, Punjab, and Haryana accounted for 70% of overall pesticide usage. Jammu and Kashmir has the greatest use-intensity, followed by Punjab and Haryana. Pesticide use in Punjab and Haryana, on the other hand, has been falling. On the other hand, Meghalaya, where pesticide application intensity is relatively modest, has seen an increase in pesticide usage. Except for states like Sikkim, Meghalaya, Tripura, Manipur, and Nagaland, the bulk of places in the NE region use low amounts of pesticides and are in a falling pattern of use (positive growth rate). The retail selling pattern of pesticides is also explored in the article. The study emphasizes the necessity for a rigorous examination of regulatory and governance gaps in the pesticide industry.

Matthew (2019) it was characterised the percentage of the crop protection market attributed to the largest markets (North America, the EU-15, and Japan) that are the primary focus of new active ingredient research and development (R&D) has decreased during the previous 20 years. Greater growth has been seen in developing markets, calling into question the existing R&D strategy's focus. The rate of new active ingredients entering research and being launched has decreased as R&D funds inside large firms have shifted away from agrochemicals and

toward genetically modified (GM) trait development. As a result, the business has become more reliant on older, off-patent chemistry, however re-registration procedures, notably in the EU, have limited the supply of older goods. Current criteria frequently prevent the registration of broad-spectrum agrochemicals, resulting in many new active ingredients being single-site active, which is thought to increase the risk of resistance development, especially in herbicides, though this is not always the case.

Reddy (2020) Because of their unique compositions, the pricing of global corporations' products is higher than those of domestic and local ones. The pricing range for all domestic firm items is the same. Because local businesses strive to enter the market with low pricing, their prices are quite low. and farmers' perceptions of various agrochemicals, competitive analysis of various market participants and market share of various local players, and major player where the large MNC has covered the majority of the market share, around 70%, and other by a few local companies Farmers' purchasing decisions are heavily influenced by credit.

3. RESEARCH METHODOLOGY

Research methodology is the systematic way to do research. It is a science of staying and how research is to be carried further. Essentially, the procedures by which research go forward for their work of describing, explaining and predicting phenomena. This chapter explicates the research design of the study, introduces factor and variables included, sample size and statistical tools which are used for analysis in the study. The important areas covered sre as follows: -

- Data collection method and sources.
- Method of analysis.
- Selection of study area.

3.1. Collection of Data

As per the study's goal, required data was collected from respondents using a basic survey approach and a schedule (which included both open and closed ended questions). Primary and secondary data has been collected from the following sources.

- **Primary data:** Primary data has been collected from the respondents through personal interview with the help of schedule.
- **Secondary data:** Secondary data has been collected from Internet, Research papers, Reports, Journals, Government data bases and Sub-District Office.

3.2. Research Instrument

For this research a pre-structured schedule was prepared which contain both open and close-ended questions.

3.3. Study Approach

The research approach was descriptive in nature. The research instrument was consisting of the questions which will help to fulfill the researcher objective. The interview schedule will be used as an instrument for collecting information. The objective was to collect preliminary information that has helped to define problems and to reach conclusion.

3.4. Sampling unit

- Farmers
- Dealers of Agro-chemicals

3.5. Sample method

A multistage sampling was adopted for the study. The top 10 villages were selected according to their higher production of Horticulture crops and farmers will be selected on basis of their landholding and production (small, medium, and large farmers). 1 dealer was selected from each village based on business volume and the total number of dealers will be 10.

Table No. 3 Sampling unit, size and criteria

Sampling unit	Sample Size	Selection Criteria
District	1 (Hanumangarh)	Convenience sampling

Villages	10	Judgemental sampling (On basis of area and production)
Farmers	100	Convenience sampling (On basis of large, medium and small farmers)
Dealers	10	Judgemental sampling (On the basis of business volume)

Table No. 4 Villages under study

Tehsil	**Village**
Hanumangarh	3 KSP
	Rorawali
	Nawan
	Chistitan
	Makassar
	Manuka
	Jandawali
	C Block

	14 JDW
	9 MZW

3.6. Analytical Framework

Data was collected from selected farmers with the help of interview schedules developed for the purpose.

Objective: - 1. To study the market potential of fungicide for major horticulture crops in the study area

The objective is to study the various fungicide that is used in agriculture crops for their major diseases and also to study the market share of major agrochemicals working on the given region for identification of the key players in the market, for this, structured schedule will be prepared for Farmers in each place of the district as mentioned.

Objective: -2. To assess farmer's buying behavior for fungicides in the study area.

The objective is to analyse the various factor that governs the buying decision of the farmer and the perception of farmers towards various fungicide.

Various factors influencing the buying behaviour was identified for further analysis.

Objective: -3. To study the competitive analysis of fungicide for major horticulture crops in the study area

The objective is to study the various fungicide in the market and their attributes that govern their performance in the market. Information about major players and their offerings along with their market share. Pre-structured schedule was prepared for collection of data.

The data were analysed using simple statistical tools, Various analytical tools were used such as:

RBQ: The farmers were asked to rank the different problems based on frequency of occurrence and degree of severity and based on following formula ranks were given.

R.B.Q = Rank Based Quotient (RBQ) as given by Sabarathnam (1988)

Where: $$RBQ = \frac{\Sigma f_i (n + 1 - i) \times 100}{N \times n}$$

fi = Number of farmers reporting a particular company under its rank

N = Number of farmers

n = Numbers of company identified

Weighted average is a mean calculated by giving values in a data set more influence according to some attribute of the data. It is an average in which each quantity to be average is assigned a weight, and these weightings determine the relative importance of each quantity on the average. Weightings are the equivalent of having that may like items with the same value involved in the average. The results have been presented using tables, bar graph and pie charts.

3.7. Area of Study

On 12.7.1994, the Hanumangarh district was created from the former Ganganagar district as Rajasthan's 31st district. Seven tehsils of Ganganagar districts of Bikaner division viz. Sangaria, Tibi, Hanumangarh, Pilibanga, Rawatsar, Nohar and Bhadra were included into the newly created district of Hanumangarh.

The study was confined to the Hanumangarh district of Rajasthan. This district was conveniently selected as study area in order to assess the

Market Analysis of Fungicides for Major Horticulture Crops in Hanumangarh district of Rajasthan

• Area - Hanumangarh

• Tehsils - 7

• Villages – 1905

Table No. 5 Land Utilisation Pattern in the District of Hanumangarh (in ha)

S No.	Particulars	Area (ha.)
1.	Total Geographical area	9,70,315
2.	Area under forest	18,261
3.	Non-Agriculture land	56,526
4.	Uncultivated land (excluding fellow land)	8,127
6.	Fallow land	94,555
7.	Cultivated land	7,92,846
8.	Cultivable land (ha.) (Uncultivated land (excluding fellow land) + Fellow land + Cultivated land)	8,95,528
9.	Irrigated area	4,73,451
10.	Un-irrigated area	4,22,077
11.	Net sown area	8,19,300
12.	Area sown more than once	4,14,700
13.	Gross sown area	12,34,000

(Source: Krishi Vigyan Kendra, Hanumangarh - I (kvk2.in)

The study was confined to Hanumangarh district of Rajasthan.

- First Stage- Selection of district
- Second Stage- Selection of Village
- Third Stage- Selection of Respondents

3.7.1. Selection of District: Out of 33 districts of Rajasthan State, Hanumangarh district was selected purposively for the study.

3.7.2. Selection of villages: A complete list of villages was prepared. Out of 405 villages, 10 villages were selected on the basis of high productivity for the study near Hanumangarh Junction and Hanumangarh town.

3.7.3. Selection of the Respondent: Farmers was selected on basis of their landholding and production (small, medium, and large farmers). 1 dealer was selected from each village based on business volume and the total number of dealers were 10.

Figure No. 3: Map of the area of study

(Source:https://www.mapsofindia.com/maps/rajasthan/tehsil/hanumangarh.html)

3.8. Limitations of the study

In every study there are some limitations for the research in the study area. For this project work, limitations have been:

a. There were only few farmers cultivating horticultural crops.
b. Data which has been collected is mainly primary but not provided exact data. So, results may not be that much reliable.
c. During calculation of market potential of the area, many difficulties have been faced because of lack of exact data provided by dealers and farmers.

4. FINDINGS AND ANALYSIS

This chapter is dedicated to the presentation and interpretation of the findings from data analysis. The result has been presented via tables, charts and figures in order to fulfil the objectives.

4.1. Market potential of fungicide for major horticulture crops in the study area

4.2. Farmer's buying behavior for fungicides in the study area

4.3. Competitive analysis of fungicide for major horticulture crops in the study area

Demographic profile of respondent: Before discussing the main results, profile of the farmers is being discussed. Information regarding age, education, types of farmers from whom the data was collected.

Table No. 6 Profile of farmers on the basis of Age

Age	**Number of farmers**	**Percentage (%) n=100**
< 25 Years	7	7
25 – 40 Years	29	29
40 – 60 Years	52	52
> 60 Years	12	12

Source: Researcher's computation from field data

Table 6 described about profiling of farmers on the basis of their ages which shows that under 25 years were 7% of the total respondents. Highest number of farmers belonged to group 40-60 age with 52% of the total respondents. More the 60 years were 12% of the total respondents.

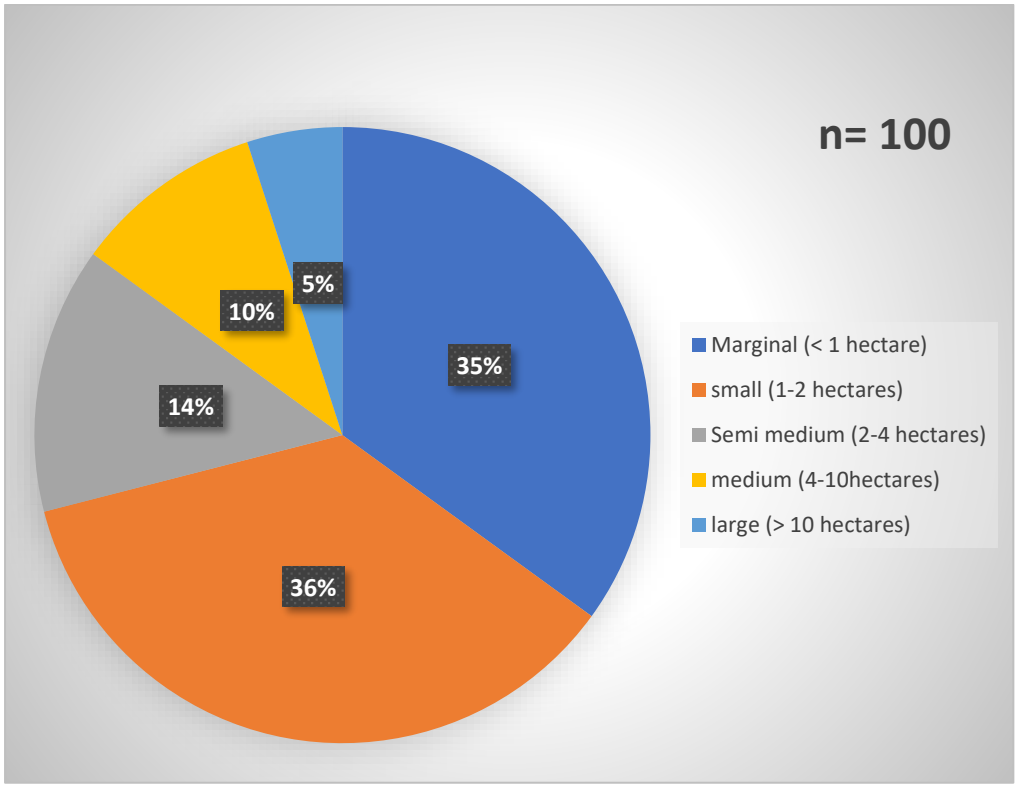
Table No. 7 Profile of respondents' educational profile

Level of Education	Number of Farmers	Percentage
Primary	45	45
Secondary	20	20
Higher studies	20	20
Illiterate	15	15

Source: Researcher's computation from field data

Table 7 described the profile of farmers as 45% of the total farmers belong to the primary education group as they belong to the village. Illiterate group includes 15% of the total number of farmers. Secondary and higher studies include 20% each of total number of farmers.

Figure No. 4 Classification of farmers on the basis of land holdings.



Source: Researcher's computation from field data

As shown in the figure 4, farmers cultivating horticultural crops in field is being classified in 5 groups in which 36% belongs to medium farmers following with 35% Marginal farmers and 14% comes under Semi-medium farmers and small and large includes 10% and 5% respectively of the total number of farmers.

Table No. 8 Profile of respondent on the basis of farming experience.

Farming exp.	Number of farmers	Percentage
< 5	35	35
5-15	47	47
More than 15	18	18

Source: Researcher's computation from field data

As table 8 described the profiling of the farmers on the basis of their experience of cultivating horticultural crops. 35% of the total farmers started their cultivation practices before 5 years and 47% belongs to 5-15 years of experience group. 18% of the total farmers have high level of experience i.e., more 15 years.

4.1. Market potential of fungicide for major horticulture crops in the study area.

Market potential belongs to the market size of the particular product. As a mean of usage, fungicides for horticultural crops being used by farmers in small amount as compared to the agricultural crops such as wheat, bajra, etc.

Mainly sales volume of the product gives information regarding the market potential of the particular product. Market research needed to know the potential of product in the market.

To find out the market potential in fungicides in the study area, following formula has been used:

Market Potential (Kg) = Dose x No. of Spray x Total cultivable land

Table No. 9 Market potential of fungicides products in the study area.

Name of the product	**Ridomil Gold (Syngenta)**	**Saaf (UPL)**	**Delma (Swal Corporation)**	**Conika (Dhanuka Agritech)**
Chemical Composition	Metalaxyl-4% Mancozeb-64%	Carbendazim-12% Mancozeb-63%	Azoxystrobin-8.3% Mancozeb-66.7%	Kasugamycin-5% Copper Oxychloride-45%
Dose per Hectare	2.5 kg/ha	0.75kg/ha	1.5kg/ha	0.75kg/ha
No. of Spray	3	1	1	1
Total Cultivable Land				45.83 Ha
Market Potential (kg)	343.7	34.37	68.7	34.37

Cost of Product (/Kg)	Rs. 1800	Rs. 600	Rs. 1410	Rs. 2500
Sales Volume	**618660**	**178734**	**96867**	**85930**

Source: Researchers computation from field data

Table 9 shows the market potential of different fungicides products in the study area. Volume term describing market potential was 31,163.2 Kg and value term describing market potential was Rs. 12.56 Lakh.

4.2. Farmer's buying behavior for fungicides in the study area.

Different farmers acquire different behavior of buying the product. In this result buying behavior of farmers has been studied for the fungicides of the major horticultural crops.

Table No. 10 Factors influencing the purchase decision for fungicides.

Name of Product	RBQ Mean	Rank
Ridomil Gold (Syngenta)	**81.25**	**1**
Saaf (UPL)	**48.75**	**4**
Delma (Swal Corporation ltd.)	**53.5**	**3**
Conika (Dhanuka Agritech pvt. Ltd.)	**66.5**	**2**

Source: Researcher's computation from field data

Table 10 describes the information of 4 major fungicides provided by 4 major players of the market. With the result shown, Ridomil Gold of Syngenta comes on number 1 rank which is used for potato. Rank 2 has been given to Conika from Dhanuka Agritech which is suitable for fungus

in kinnow. Rank 3 has been given to Delma of Swal Corporation followed by Saaf from UPL which is on rank 4.

Usage of fungicides is being noticed as increasing as the production of horticultural crops is increasing by the farmers cultivating kinnow, potato, tomato, onion, anar, etc.

Table No. 11 Information regarding reasons for buying fungicides.

Reasons	RBQ Mean	Rank
Influenced by dealers	82	1
Pricing	72.4	2
Efficiency of product	68.8	3
Personal influence	43	4
Availablity	33.8	5

Source: Researcher's computation from field data

Table 11 interpreting the result rank wise of the behavior shown by the farmers while buying the fungicides. Mainly farmers get influenced by the dealers from whom they buy the fungicides. Hence the reason of dealer's influence comes on rank 1 followed by pricing of the fungicide. Then comes efficiency of the product which matters for the farmers while buying it so it comes on rank 3 followed by personal influence by company and availability of the fungicides in the market which comes on rank 4 and 5 respectively.

Table No. 12 Information regarding factors affecting the buying behavior of farmers.

Factors	RBQ Mean	Rank
Quality	77.6	1
Dealers	74.5	2
Field demo	68.3	3
Other farmers	52	4
Company staff	43	5
Gifts	34.5	6

Source: Researcher's computation from field data

Table 12 providing information about the factors affecting the buying behavior of farmers for the fungicides. Quality is the main factor affecting the buying behavior and that's why it comes on rank 1 which is being followed by rank 2 which includes dealer and their manipulative motive to influence. Rank 3 is given to field demonstration of the fungicide which is being seen by farmers on their own which is being followed by rank 4 and 5 to other fellow farmers and company staff respectively.

Table No. 13 Effective mode of promotion of fungicides

Mode of Promotion	RBQ Mean	Rank
demonstration on field	83	1
meeting of farmers	72.6	2
farmer individual approach	69.8	3
media print	47.4	4

social media	27.2	5

Source: Researcher's computation from field data

Table 13 describing the information regarding effect of promotional activities for the product. Rank 1 includes the physical demonstration on field in front of group of farmers which is being followed by rank 2 group meeting of farmers. Rank 3 includes individual approach to farmers. Rank 4 and 5 includes media print and social media respectively.

Table No. 14 Reasons for the switch of brands

Reasons	**RBQ Mean**	**Rank**
Dealer influence	86.8	1
Current product price rise	73.4	2
Undesired results	69	3
Others influence	45.9	4
Unavailability	24.7	5

Source: Researcher's computation from field data

Table 14 describing the factors affecting to the farmers choice of fungicides which lead to the switching the brand situation. Main factor is dealer manipulative behavior which comes on rank 1 as they affect a lot the buying behavior of farmers and get followed by product price rise which comes on rank 2 for the reasons for switching of present brand. Rank 3, 4 and 5 includes undesired results, other fellow influence and unavailability respectively responsible for the switching the brand which is currently being used.

Table No. 15 Factors responsible for dealer behavior

Factors	RBQ Mean	Rank
Margin for dealer	91.6	1
Brand image	76.6	2
Price	65	3
Credit on trade	56.6	4
Product efficiency	38.3	5
Gifts	31.6	6

Source: Researcher's computation from field data

Table 15 describes the behavior of dealer for the particular product to sell in the market. Rank 1 includes margin they are getting for the product which is being followed by rank 2 which includes brand image of the particular product. Rank 3 includes prices of the product as price will be higher farmers would not buy the product. Rank 4, 5 and 6 includes trade credit, efficiency of the product and incentives and gifts respectively.

4.3. Competitive analysis of fungicide for major horticulture crops in the study area.

There are major numerous players in the fungicides market for agricultural crops but for horticultural crops few major players are there as production is not much high as other crops. For the competitive analysis, information required would be all the factors affecting and contributing in the market.

Table No. 16 Prices of Fungicides of Different Company

S No.	Company name	Brand name	Price Bucket (₹/Kg)
1	UPL Ltd.	Saaf	₹ 590-620
2	Dhanuka Agritech Pvt. Ltd.	Conika	₹ 1045-1065
3	Bayer Crop Science ltd.	Nativo	₹ 6300 - 6500
4	Syngenta	Ridomil gold	₹1700-1800
5	Swal corporation	Delma	₹1200-1270

Source: Researcher's computation from field data

Table 17: Packaging of fungicide of different company.

S No.	Company name	Brand name	Packing size
1	UPL Ltd.	Saaf	20gm, 100gm, 250gm, 500gm, 1 kg
2	Dhanuka Agritech Pvt. Ltd.	Conika	50gm, 100gm, 250gm, 500gm, 1 kg
3	Bayer Crop Science ltd.	Nativo	10gm, 50gm, 100gm, 250gm, 500gm, 1 kg
4	Syngenta	Ridomil gold	50gm, 250gm, 1 kg

5	Swal corporation	Delma	600gm, 1.2 kg

Source: Researcher's computation from secondary data

Table 17 shows the packaging size of products of different company. Different sizes are available in the market as per requirement.

Figure No. 5 Availability of Fungicide of Different Company

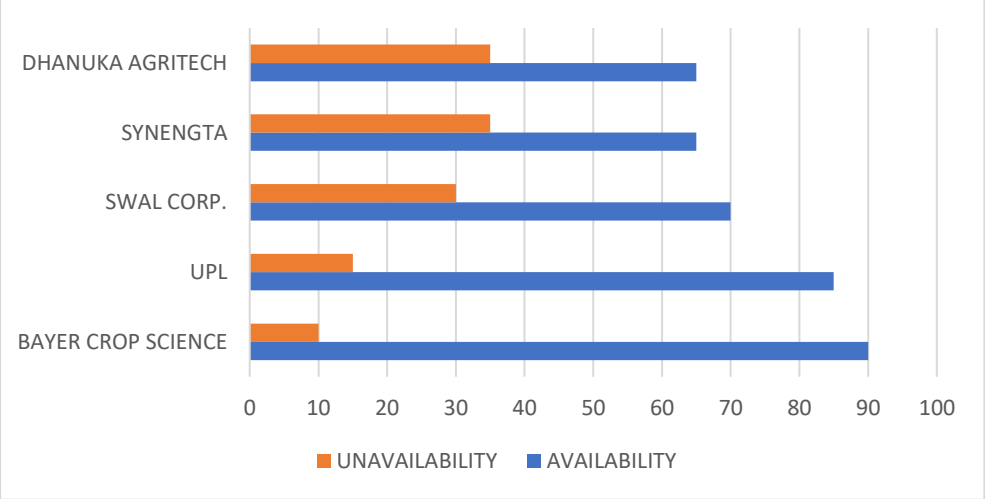


Table No. 18 Company providing fungicides for horticultural crops.

Company name	RBQ Mean	Rank
UPL Ltd.	38	4
Dhanuka Agritech Pvt. Ltd.	72	3
Bayer Crop Science ltd.	28	5
Syngenta	86	1
Swal corporation	76	2

Source: Researcher's computation from field data

Table 18 describing the rank wise result of the major companies providing the fungicides for the horticultural crops. Rank 1 includes Syngenta in the market which is being followed by Swal Corporation ltd. which provides fungicides for potato, kinnow etc. which comes on rank 2. Rank 3 includes Dhanuka Agritech pvt. Ltd. which is working on providing the fungicides for kinnow which is being followed by rank 4 and 5 which includes UPL Ltd. and Bayer Crop Sciences respectively.

Other than these major companies there are numerous of small enterprises in the market such as Sirot seed & chemical private ltd., loyal crop safe pvt. Ltd., etc. There is going to be more addition of companies providing and targeting farmers who cultivates major horticultural crops.

5. CONCLUSION & RECOMMENDATIONS

5.1 Conclusions

- Through structured schedule data was collected and by using tools interpretation of data was done. From the findings following conclusions were drawn. The study was conducted in 10 villages of Hanumangarh District of Rajasthan.
- For estimating the market potential and market share of the study area data that collected was analysed and interpreted. The overall market potential of the study area was 31,163.2 kg and market potential interms value is ₹ 12.56 Lakh.
- From the results that obtained it was clearly evident highest position interms of sale volume was occupied by the Syngenta Ridomil Gold with 343.7 kg followed by Dhanuka Conika with 343.5 kg, UPL Saaf with 297.89 kg and Swal Delma with 68.7 kg.
- Farmers buying behaviour patterns were more likely influenced various factors. Out of 5 factors like pricing, influenced by dealers, availability, efficiency of product and personal influence, most farmers were influenced by dealers' influencing.
- Most effective mode of promotion was demonstration of fungicides on the field followed by meetings with farmers and individual approach.
- When it comes to dealers' preferences while purchasing or stocking the fungicides, they were more attracted by dealers' margin followed by the brand image.

5.2 Recommendations

- As the study demonstrated that influencing behaviour of dealer is the most important factor followed by price for farmers when purchasing fungicides, the input companies operating in this area should produce and promote good quality of fungicides at a fair price to the

farmers in order to increase their market share of fungicides. A thorough understanding of fungicides buying behaviour would help the marketing business in developing appropriate marketing strategies to improve sales volume.

- Few farmers were more concerned about the price, companies should target farmers by bringing down the prices so that farmers can afford the required fungicides and also the companies will get good advantage over the other companies in terms of market potential and market share.
- The company should have to appoint a greater number of distributors/dealers at potential areas to improve its market share, to ensure the timely and adequate supply of the product to the customer/farmers.
- Need to conduct the farmers meeting and field day by the company to convince about the company products. Farmers should attend the demonstrations so that they can learn about the various products rather than depending upon the dealers' recommendations.
- Farmers should practice Integrated Pest Management Practices to reduce the input cost. Dealers should insist right and best products to farmers. It is visible that after credit facility dealers were first of all into their margins, where there is a chance to insist farmers to take the products that gives margins to dealers.

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Appendix - 1

Schedule for farmer

1.Name: -

_____

2.Father name: -

_____

3. Address: -

_____

4. Contact no.: -

_____

5. Land holding size: -

a) less than 1hectare b) 1-2 hectare

c) 2-4 hectare d) 4-10 hectare and above

e) 10 hectare and above

6. Which Crop is being cultivated: -

a) Kinnow b) Ber c) Citrus d) Potato e) Chilli f) Okra

7. Which product of herbicide do you prefer in your wheat field?

1. Ridomil Gold (Syngenta)
2. Saaf (UPL Ltd.)
3. Delma (SWAL Corporation Ltd.)
4. Conika (Dhanuka Agritech Pvt. Ltd.)
5. Any other: - _____

8. Rank the reasons for choosing the particular company (Rank 1 is highest and rank 5 is lowest): -

Reasons	Rank
a) Economical Pricing	
b) Dealers Influence	
c) Easy Availability	
d) Product Efficiency	
e) Company Personnel Influence	
f) Others	

9. Rank the factor that influence you to choose the particular fungicide? (Rank 1 is highest and rank 5 is lowest)

Factors	Rank
a) Dealers	
b) Fellow farmers	
c) Company people	
d) Quality results	
e) Free gifts	
f) Field demonstration	
g) Others	

10. According to you, rank the mode of promotion is better in creating impact on farmers? (Rank 1 is highest and rank 6 is lowest)

Factors	Rank

a) Print media	
b) Farmers meeting	
c) Field demonstration	
d) Individual approach to farmers	
e) Social media	
f) Others	

11. Have you switched any company in past?

Yes/No

12. Rank the reasons for switching the company? (Rank 1 is highest and rank 5 is lowest)

Reasons	Rank
a) Price rise of current brand	
b) Unable to produce desire result	
c) Unavailability	
d) Influence by dealers	
e) Influence by others	
f) Others	

Appendix – 2

Schedule for dealer

1) Name: -

   _____
   __

2) Agency name: -

   _____
   __

3) District: -

   _____
   __

4) Tehsil: -

   _____
   __

5) Age: -

   _____
   __

6) Phone no.: -

   _____
   __

7) Education: - a) illiterate b) primary c) secondary d) graduate e) post graduate

8) Rank the following factor that influence a dealer for buying fungicide. (Rank 1 is highest and rank 7 is lowest)

Factor	Rank
Price	
Trade credit	
Efficiency of product	

Dealer margin	
Brand image	
Incentives and gifts	
Any other: -	

9) Rank the following company you prefer for selling fungicide. (Rank 1 is highest and rank 5 is lowest)

Company name	Rank
UPL Ltd.	
Dhanuka Agritech Pvt. Ltd.	
Bayer Crop Science Ltd (Bayer)	
Syngenta	
Swal Corporation Ltd.	
Any other: -	