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# Study On Marketing And Consumer Buying Behaviour Of (Coromandel Int. Ltd.) Biopesticide In Chandauli District Of Uttar Pradesh

Gaurav Anand Shukla Dr. Mukesh Maurya , Dr. Ramchandra, Dr. Amit Pasi, Dr, Pritesh Dwivedi

Department of Agricultural Economics, SHUATS, Naini, Prayagraj, 211007, India.

## ABSTRACT

Evaluating the effectiveness of existing marketing channels is essential for producers to refine their marketing approaches and gain a competitive edge. This research seeks to investigate the market penetration and marketing performance of various channels, as well as their influence on producers' financial returns. By adopting a hybrid research methodology that integrates qualitative and quantitative data collection and analysis techniques, this study aims to generate actionable insights that can inform producers' marketing decisions and enhance their market positioning. The increasing demand for sustainable and eco-friendly agricultural practices has led to a growing interest in biopesticides as an alternative to traditional chemical pesticides. This study investigates the marketing and consumer buying behavior of Coromandel International Ltd.'s biopesticide in Chandauli district of Uttar Pradesh, India. The research aims to understand the factors influencing farmers' adoption and purchasing decisions of biopesticides, as well as the marketing strategies employed by Coromandel International Ltd. to promote their product. The study's findings will provide valuable insights into the biopesticide market in Chandauli district, shedding light on the opportunities and challenges faced by biopesticide manufacturers and marketers in the region. The results of this study will contribute to the development of effective marketing strategies and policies that support the adoption of eco-friendly biopesticides, ultimately promoting sustainable agriculture practices in Uttar Pradesh.

**Keywords –** Marketing and consumer , Biopesticides, Chemical fertilizers ,

## INTRODUCTION

The rapid growth of the global population, projected to reach 9.7 billion by 2050, has placed immense pressure on the agricultural sector to increase food production sustainably. The environmental and health consequences of relying on synthetic chemical pesticides have become increasingly evident, necessitating a shift towards eco-friendly alternatives. Biopesticides, derived from natural sources such as microorganisms, plants, and animals, offer a promising solution to mitigate the negative impacts of traditional pesticides. By leveraging the potential of biopesticides, agricultural productivity and sustainability can be enhanced, while minimizing harm to the environment and human health. This study aims to explore the role of biopesticides in revolutionizing agricultural practices and ensuring food

security in the face of a rapidly growing global population. The distinction between ectomycorrhizal and endomycorrhizal fungi lies in their mode of interaction with plant roots. Ectomycorrhizal fungi form a mantle around the root without penetrating individual cells, whereas endomycorrhizal fungi invade the cell wall and membrane. The latter category encompasses arbuscular, ericoid, and orchid mycorrhizas, with arbutoid mycorrhizas exhibiting characteristics of both types. Monotropoid mycorrhizas constitute a unique group. The widespread use of chemical pesticides in agriculture has severe long-term consequences, including increased cancer risk, birth defects, and environmental persistence. Despite their effectiveness against pests, these synthetic pesticides dominate the market, influencing product manufacturing. According to a report by Business Communications Company (BCC), Inc., the global biopesticide and synthetic pesticide market was valued at USD 61.2 billion in 2017, with projected growth to USD 79.3 billion by 2022. The intensive use of chemical pesticides in agriculture has led to soil degradation, reduced nutrient availability, and increased disease incidence, compromising food security and nutritional well-being. The Food and Agriculture Organization (FAO) reports that China, the USA, and Brazil are the top three countries in terms of pesticide consumption. In India, pesticide use has seen a significant surge, from 50,410 tonnes in 2016 to 58,160 tonnes in 2018. The majority of pesticides are used on fibre crops (67%), followed by fruits (50%), vegetables (46%), and spices (43%). According to the Ministry of Chemicals and Fertilizers, India, the production of chemical pesticides has increased from 186,000 metric tons in 2014-2015 to 217,000 metric tons in 2018-2019. Globally, Asia accounts for 52.2% of pesticide consumption, followed by the USA (32.4%), Europe (11.8%), Africa (2%), and Oceania (1.6%). China has the highest per hectare pesticide consumption, followed by the UK, while India has the lowest. Within India, Jammu and Kashmir and Andhra Pradesh are the top two states in terms of chemical pesticide consumption. Given these statistics, it is essential to explore alternative methods, particularly the use of biopesticides. Biopesticides are natural substances derived from animals, plants, and microorganisms, which can be used to control pests and pathogens in agriculture. The US Environmental Protection Agency notes that biopesticides are obtained from natural sources, including animals, plants, bacteria, and minerals. These biocontrol agents can be used to prevent crop damage, offering a more environmentally friendly and targeted approach compared to traditional chemical pesticides. By adopting biopesticides, the agricultural sector can improve its pest management strategies and reduce its reliance on chemical pesticides.

## STUDY AREA AND METHODOLOGY USED

### STUDY AREA

The state of Uttar Pradesh in India is divided into 75 administrative districts, with Chandauli district being the focus of this study. Geographically, Chandauli district is situated at 25.27°N 83.27°E, with an average elevation of 70 meters above sea level. Located approximately 30 kilometers from Varanasi, it falls under the Varanasi division of Uttar Pradesh. The district is strategically positioned, with Mughalsarai, a major railway junction connecting northern and eastern India, situated within its boundaries. Chandauli is bordered by Bihar State to the east, Ghazipur District to the north-north-east, Sonebhadra District to the south, and Mirzapur to the south-west, with the Karmanasa river serving as the dividing line from Bihar State. The district's geography and economy are shaped by the Ganga, Karmanasa, and Chandraprabha rivers.

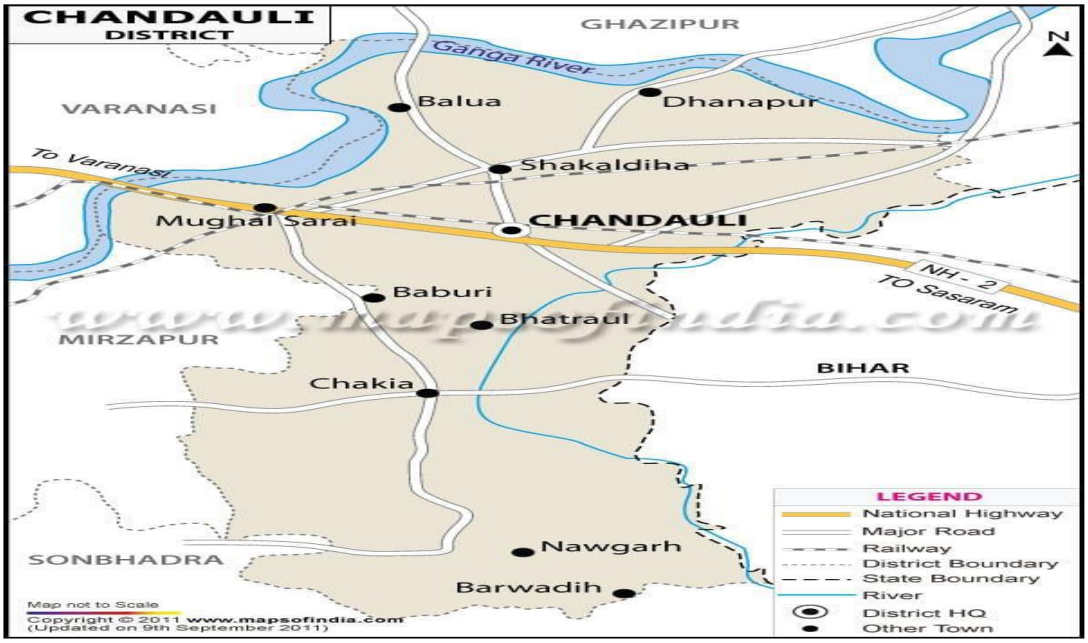


*Figure 1.Map of District*

On the basis of geology, soils, topology, climate and natural vegetation the district Chandauli is subdivided in the following regions Chakia Plateau ,Chandauli Plain ,Ganga Khadar

| Climate Parameter | | Average Value | Range |
|---|---|---|---|
| Average Rainfall | Annual | 1300 mm | 1000 mm - 1500 mm |
| Average Temperature | Summer | 32°C | 28°C - 35°C |
| Average Temperature | Monsoon | 27°C | 25°C - 30°C |
| Average Temperature | Winter | 20°C | 15°C - 25°C |

**Selection of Block:**

For the research project, the decision to focus on a particular block within the Chandauli District was made with careful consideration of various important factors. Chandauli District is divided into 9 administrative blocks, each with distinct agricultural practices and economic backgrounds. Among these, the "**Chahaniya**" block was specifically selected for a detailed study. This choice was informed by the block's notable agricultural activity, including its significant role in the cultivation and application of Herbicides, making it an ideal site for examining the marketing strategies and adoption rates of Coromandel.

| S. No. | Block Name |
|---|---|
| 1. | Niyamatabad |
| 2. | Barahani |
| 3. | Chandauli |
| **4.** | **Chahaniya** |
| 5. | Sakaldiha |
| 6. | Dhanapur |
| 7. | Chakia |
| 8. | Shahabganj |
| 9. | Naugarh |

***Table 1.List of Blocks in Chandauli)***

The choice of the "**Chahaniya**" block for the research focus was the result of a thoughtful evaluation of numerous criteria, such as the intensity of agricultural operations, the utilization of Biopesticide like Coromadel , and the demographic profile of the agricultural community. This particular block provides a quintessential environment for analyzing the effectiveness of marketing strategies for Coromandel and its adoption among farmers in the Chandauli District.

### 3.3 Selection of Village

In the process of selecting villages for the research project, a systematic approach was followed. The "Chandauli" block comprises a total of 176 villages. To ensure a representative sample, a random selection of 8 (5%) villages was conducted from this list.

| S. No. | Selected Villages | Population |
|---|---|---|
| 1 | Kutulpur | 96 |
| 2 | Surchankia | 40 |
| 3 | Keshavpur | 60 |
| 4 | Agastipur | 81 |
| 5 | Ajagara | 62 |
| 6 | Amani | 98 |
| 7 | Amilai | 264 |
| 8 | Arazi Surjan | 197 |

**Table 2.List of Selected Villages**

These selected villages were chosen to represent the diversity of socio-economic conditions and agricultural activities within the "Chahaniya" block, contributing to a comprehensive analysis

**Selection of Respodents:**

To secure a representative cohort of participants, a methodical strategy was employed. The villages within the "Chahaniya" block were classified according to their engagement in Herbicide usage, specifically Coromandel, and participants were chosen from these classifications. Approximately 10% (89) of the potential respondents from each category were interviewed. The respondent categories were established based on their level of usage and familiarity with Coromandel.

Categories of respondents: -

➢ Marginal = upto 1 ha

➢ Small = 1- 2 ha

➢ Semi-medium = 2-4 ha

➢ Medium = 4 – 10 ha

➢ Large = >10 ha

| **District** | | | **Block** | | **Villages** | **Respondents** | |
|---|---|---|---|---|---|---|---|
| **Marginal (<1)** | **Small (1-2)** | | **Semi-medium (2-4)** | | **Medium (4-10)** | **Large (>10)** | **Total** |
| **Chandauli** | **Chahaniya** | Kutulpur | 1 | 5 | 3 | 1 | - 10 |
| Surchankia | - | 2 | 1 | - | 1 | 4 | |
| Keshavpur | 1 | 3 | 2 | 1 | - | 7 | |
| Agastipur | 1 | 4 | 2 | 1 | - | 8 | |
| Ajagara | 1 | 2 | 2 | 1 | - | 6 | |
| Amani | 2 | 5 | 2 | - | - | 9 | |
| Amilai | 7 | 14 | 5 | - | - | 26 | |
| Arazi Surjan | 5 | 10 | 3 | 1 | - | 19 | |
| **TOTAL** | 18 | 45 | 20 | 5 | 1 | 89 | |

*Table 3.Village wise Land Holding in Chahaniya Block of Chandauli district*

**Selection of Market and Market Functionaries:**

In the marketing of agriculture commodities, many market functionaries/marketing agencies are involved. 10% of market functionaries were selected purposively who was marketing biopesticides for the current study.

**Method of Data Collection:**

Two types of market were selected purposively for the study:

➢ Primary market: The primary market (Chandauli market etc.) was selected purposively.

➢ Secondary market: Chandauli market was selected purposively.

**Primary Data**: The study is entirely based on the primary data collected from the selected. Well-constructed and pre-tested questionnaire and scheduled (appendix) was used to collect the data for the study. For collecting the data, personal interviews were arranged and reconnaissance study was also conducted to collect the data.

**Secondary Data**: Further the required secondary data to supplement the primary data and to support the study was collected from different sources like journals, research papers and magazines etc.

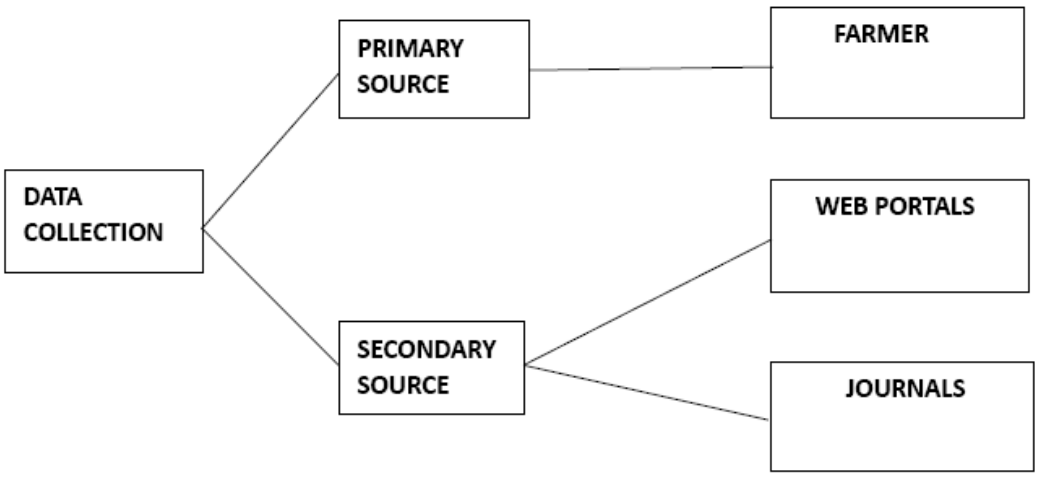


*Table 4.method of collection*

**Analytical Tools and Techniques:**

The analytical tools and techniques to be employed in examining the marketing of the Herbicide Coromandel in the Chandauli district of Uttar Pradesh. The use of these tools will help in better understanding and interpreting the data, enabling comprehensive insights into various dimensions of marketing and the factors influencing it.

**1.** Chi-Square

In order to ascertain if a substantial disparity exists between the anticipated and observed frequencies in one or more categories, the chi-square test will be used.

Formula:

$$x^2 = \sum \frac{(0 - \mathrm{E})^2}{E}$$

Where:

c = Degrees of freedom

O = Observed value(s)

E = Expected value(s)

**2. Marketing Share:**

The market share of Rifit Plus will be analyzed in comparison to other Herbicides available in the market. The analysis will include the volume and value of Rifit Plus sold in the selected markets of Gariaband to understand its position and competitiveness in the market.

**Market Share of x = (Sale of of x / Total Sale) X 100**

**2.1. Marketing cost:** The total cost incurred on marketing by various intermediaries involved in the sale and purchase of the commodity till it reaches the ultimate consumer was computed as follow:-

Marketing cost = C-Cf+Cml+Cm2+Cm3+... + Cmn

**2.2 Price spread:** Price spread is defined as the difference between the price paid by the consumer and the net price received by the producer for an equivalent quantity of farm produce. price spread = (consumer price -net price of producer )*100

**Garrett's Ranking**

The following method will be used to rank the producers' recommended improvement measures and perceived constraints in the production and marketing of soybeans in accordance with Garrett's Ranking Technique.

$$\textbf{Percentage position} = \frac{100(\text{Rij} - 0.5)}{Nj}$$

Where,

Rij-Rank given for "I"th term by "j"th individual.

Nj- No. of items ranked by "j"th individual.

The percentage position of each rank will be converted into Garrett's table.

**4. Likert's Scale Technique:** A Likert's item is simply a statement which the respondent's is asked to evaluate according to any kind of subjective or objective criteria and the level of agreement or disagreement is measured according the score is given:

| S.no. | Response | Score |
|---|---|---|
| 1 | Strongly Agree | 5 |
| 2 | Agree | 4 |
| 3 | Neutral | 3 |
| 4 | Disagree | 2 |
| 5 | Strongly Disagree | 1 |

The scores were summed up and the mean of each attribute was calculated and satisfaction levels were ranked based on it. The mean score was calculated by using the formula-

m = sum of the terms / number of terms

**Result and Discussion**

| Particular | Description/Value | Notes/Comments |
|---|---|---|
| **Target Market Definition** | Families using fertilizer in the survey area. | Based on survey demographics. |
| **Total Market Size** | 1000 families | Estimated total number of families in the area. |
| **Survey Respondent Number** | 89 | Number of people surveyed. |
| **Percentage Unaware of Product** | 10% | Survey should assess awareness levels. |
| **Percentage Interested in Product** | 90% (assumed all are users) | 90% of families use COROMANDEL |
| **Estimated Penetration Rate** | 90% | From survey: 90% of families use the product. |
| **Average Purchase Frequency** | 1 time per year | Families buy fertilizer annually. |
| **Average Purchase Volume** | 4-5 liters per year | Estimated based on survey feedback. |
| **Average Price Point** | Rs. 450 / liter | Price of COMANDEL Biopesticide. |
| **Total Potential Customers** | 900 families | Calculated as Total Market Size * Penetration Rate. |
| **Total Market Potential (Volume)** | 3600 - 4500 liters | Calculated as Total Potential Customers * Average Purchase Volume. |
| **Total Market Potential (Value)** | Rs. 1,620,000 - Rs. 2,025,000 | Calculated as Total Market Potential (Volume) * Average Price Point. |

*Table 5.market dynamics of biopesticides among a group of 89 farmers*

The analysis conducted on Coromandel fertilizer within the specified survey area provides insightful data into the market dynamics and potential. The target market for this study has been defined as families using fertilizer, based on demographics gathered through the survey. An estimated total market size consists of approximately 1,000 families in the area, with 89 individuals participating in the survey to provide valuable feedback on their usage and perceptions of the product.

From the survey, it's noted that about 10% of respondents were unaware of the product, suggesting that the majority, or 90%, of families in the area use Coromandel. This high usage rate indicates a strong market presence and acceptance, with an estimated penetration rate of 90% among the target market. Families reportedly purchase the fertilizer annually, with an average consumption ranging between 4 to 5 litres per year.

Financially, Coromandel is priced at Rs. 450 per liter, establishing a price point for budgeting and market value assessments. By multiplying the total potential customer base, which is about 900 families (derived from the total market size and penetration rate), by the average purchase volume, we estimate the total market potential in volume to be between 3,600 and 4,500 liters annually. This translates to a

total market potential value ranging from Rs. 1,620,000 to Rs. 2,025,000, based on the calculated volume and the unit price of the product.

This comprehensive analysis, underpinned by survey data and market estimates, reveals not only the strong market potential for Coromadel Biopesticide within the survey area but also highlights the product's acceptance and usage rate among the target demographic. The financial implications suggest a significant opportunity for revenue, driven by the product's established market penetration and the annual consumption habits of the families within the area.

## SUMMARY AND CONCLUSION

Biopesticides, also referred to as biological pesticides, are a type of pesticide that originates from natural sources such as animals, plants, bacteria, and certain minerals. These pesticides have distinct modes of action and are considered to be reduced-risk pesticides. They can be categorized into three main classes: biochemical pesticides, microbial pesticides, and plant-incorporated protectants. Biopesticides offer a more environmentally friendly alternative to traditional pesticides, as they are based on microorganisms that target specific pests, providing an effective and ecologically sound solution to pest problems. Commonly used biopesticides include living organisms that are pathogenic to the target pest, such as biofungicides like Trichoderma, bioherbicides like Phytophthora, and bioinsecticides like Bacillus thuringiensis. The key advantages of biopesticides include their cost-effectiveness, reduced number of applications, low residual effect, biodegradability, target specificity, and minimal harm to beneficial pests. As a result, biopesticides are considered a superior alternative to synthetic pesticides, which are highly effective, target-specific, and environmentally friendly. These benefits have led to their widespread adoption in pest management programs globally. Biopesticides are derived from a range of natural sources, including animals, plants, fungi, bacteria, algae, viruses, nematodes, and protozoa. The ongoing research and development in biopesticide applications have significantly reduced environmental pollution caused by synthetic insecticides and promoted sustainable agricultural practices. Since their introduction, numerous biopesticide products have been registered and released, with some becoming market leaders in the agroindustry.

## CONCLUSION

The development of biopesticide has prompted to replace the chemical pesticide in pest management. Following are the major findings of the study:-

- Study reveals that the age of farmers in the research area to study about the socio- economic conditions of the farmers in which 30% were of below 30 years, 50% were of between 30 to 50 years and 20% were of above 50 years

- Study reveals that the literacy levels of farmers in the research area to study about the socio-economic conditions of the farmers in which 5% were illiterate followed by 9% had done primary, 16% had done middle schooling, 32% had done high school, 21% had done intermediate, 11% had done graduate and 7% had done post graduate.

- Study reveals that the income level of farmers in the research area to study about the socio-economic conditions of cotton growers in which 8% were earning below Rs. 50000 followed by 20% were earning Rs. 50001 to 100000, 55% were earning, 100001 to 150000, 14% were earning Rs. 150001 to 200000 and 3% were earning above Rs.

- Study reveals that the occupation of growers in which 22% of the respondents were having agriculture as their occupation followed by 33% were having horticulture, 19% were having animal husbandry, 11% were salaried and 15% were in business/profession.

- Study reveals that the marketing efficiency of different marketing channels in which marketing efficiency of channel I by conventional method is 3.52, marketing efficiency of channel 11 is 3.11 and marketing efficiency of channel III is 3.95. The total marketing price was high in channel III in comparison of other channels. The maximum net margin received by market intermediaries is highest in Channel II ise. 155.

- Study reveals that the constraints faced by farmers in adopting bio-pesticides by Garett ranking in which Lack of awareness among the farmers regarding knowledge of biopesticides ranks 1, followed by Lack of awareness regarding the crop specific usages of biopesticides ranks II, Non-availability of biopesticides ranks III, Lack of technical support ranks IV, Lack of knowledge regarding use of biopesticides ranks V and Lack of knowledge regarding method of application ranks VI.

- Study reveals that 21.6% farmers prefer to buy a product according to its quality, about 25% prefers the price of the product, about 6.6% prefers the attractiveness ofthe product, 23.3% farmers buy agrochemicals only because of the relationship with the distributor, 6.6% farmers buy product on the basis of brand image, about 8.3% of farmers buys agro products by convinced through promotional strategies and 8.3% farmers take information about products from their friends and neighbours or any other person.

**Suggestions:**

1. Develop targeted educational programs and workshops for farmers to enhance their understanding of effective herbicide use, focusing on both the benefits and safe application practices.

2. Implement gender-inclusive policies and support mechanisms to address the significant gender disparity in land ownership and empower female farmers with access to resources, training, and agricultural inputs.

3. Introduce competitive pricing strategies for Coromandel to make it more accessible to price-sensitive farmers, ensuring that the product offers value for money without compromising on quality.

4. Strengthen the distribution network for Coromandel, particularly in remote and underserved areas, to ensure that all farmers have access to the herbicide, thereby improving market penetration.

5. Leverage digital marketing and social media platforms to raise awareness about Coromandel, highlighting its advantages, user testimonials, and application techniques to build trust and recognition among the farming community.

6. Collaborate with agricultural extension services and local farming cooperatives to facilitate field demonstrations and trials of Coromandel, allowing farmers to witness its efficacy firsthand.

7. Conduct regular market research to stay informed about evolving farmer needs, preferences, and emerging challenges in weed management, ensuring that product development and marketing strategies remain aligned with market demands.

8. Foster partnerships with research institutions and universities to continuously improve the formulation and effectiveness of Coromandel, ensuring it addresses common and emerging weed resistance issues.

9. Encourage feedback from users of Coromandel through surveys and focus groups to gather insights into user satisfaction, perceived value, and areas for improvement, fostering a customer-centric approach to product development.

10. Advocate for policy reforms and support programs that recognize and address the specific challenges faced by smallholder farmers, ensuring they have the necessary support to thrive in an increasingly competitive agricultural landscape.

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