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IMPLICATIONS OF DIGITAL MARKETING ON THE INDIAN AGRICULTURAL SECTOR

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ABSTRACT

Agriculture is the prime framework for the development of the Indian economy. Therefore, effective agricultural product distribution is necessary to develop the country's economic condition. Digital marketing is one of the most important tools that can transform rural India into a digital India. Moreover, it connects the farmers with their customers with no involvement of any middlemen. Therefore, the government introduced several digital means of marketing, including e-NAM, e-governance effort, Agri Market app, and many more. The general overview of this article is to display farmers' awareness of digital marketing and the problems farmers face due to the lack of technology.



INTRODUCTION

India is one of the world's most influential countries that contributes to the world through its more outstanding production of numerous foods and agricultural goods. Globally, India occupied the sixth position regarding grocery and food markets (Deshmukh and Patil, 2021). In addition, India is known for its more prominent capacity to produce agricultural goods, including several operations in this method which begin with buying agricultural inputs, i.e., fertilizers, seeds, pesticides, herbicides, and so on, till harvesting of crops or other produce, followed by their selling to the market. Hence, it indicates that from purchasing various inputs to selling the products, agriculture is directly connected with marketing. Therefore, the loss and profit of the farmer mainly depend on marketing through which the exchange of goods and services will be delivered (Deshmukh and Patil, 2021).

Agricultural marketing encompasses two words, i.e., Marketing and agriculture. Generally, agriculture is defined as the cultivation practices of crop plants and livestock using natural resources, whereas marketing refers to the distribution of goods or commodities from production to consumption. A few years ago, marketing was done through radio, pamphlets, tv, and billboards. However, nowadays, it can be done through digital marketing, where social media platforms, SEO (search engine optimization), and several other technologies are applied to marketing agricultural goods. In comparison to 2018, digital advertisements increased revenue by 26 % in 2019, reaching about Rs. 13683 crores (Deshmukh and Patil, 2021). The Dentsu Aegis Network reported that overall growth due to advertisement was 9.4%.

Moreover, global data reported that in 2020 the growth was 27%, transcending the 17000-crore mark due to the blooming of the digital marketing segment. According to global data, India contained the most internet users, about 700 million, and it is expected that the number of users will be increased to 970 million in 2025 (www.globaldata.com). In addition, it will assume that in India, active internet users will be 666 million by 2023. Hence, digital marketing will play a significant role in the successful growth of several companies like AgroStar, Ninja cart Flipkart, Dehaat, Amazon, and so on. Therefore, it can be said that digital marketing plays have an immense potential in boosting production and agricultural market growth.

DIGITALIZATION OF THE MARKETING SECTOR OF AGRICULTURE

Digital marketing is one of the major interventions promoted by Governments which helps sell products or commodities digitally from the point of source to the consumer directly without interposing from any mediators. On July 1st, 2015, Digital India was launched to change rural India into a digitally authorized economy (Rameshkumar, 2022). Many farmers and industries use digital marketing to sell goods or commodities digitally in the global market without mediators. In comparison to the traditional method of marketing, it is much more facile to contact larger consumers with the help of digital marketing.

Moreover, the advertising cost is also less for digital marketing and deals with the consumers depending on their daily needs. Therefore, it offers many opportunities to the youth agriculturist by developing online marketing tools to extend their commodities to the global market. In the business sector concept of digital marketing is well accepted. However, in the agricultural sector, it is still less accepted due to insufficient knowledge about digital marketing,

more cost for initiating start-ups, scarcity of digital tools and proper infrastructure, and farmers' lack of habituated or interest in accepting new technology or methods (Rameshkumar, 2022). Therefore, if this kind of limitation is minimized promptly, the farmers or many agroindustries will profit more. Hence, it can be said that Digital Marketing has an immense role in developing the country's socio-economic condition.

FUTURE SCOPE OF DIGITAL MARKETING IN AGRICULTURE

Several business sectors have introduced digital marketing methods and continue their business strategy by using both online and offline campaigns, but in the agriculture sector, the adoption rate of technology is quite low. Even though the government pushed the "Digital India Movement", in which the main focus is on the transformation of rural areas of the country into a digitally empowered economy, due to the belief that traditional marketing is more valuable than digital marketing, it is not gaining momentum. The government is promoting initiatives to educate and train farmers on weather forecasts, crop care, and farming practices. In 2017, a survey discovered that 65% of data of internet users came from households in rural areas using e-commerce. In 2017, the revenue was 86 billion Indian Rupees, less than 292 billion generated in 2022 using digital marketing (Fig-1) (Alokbatia.com, 2022). From discovering that data, it can be said that there is mild hope that farmers are now shifting their marketing strategy toward digital marketing (Linkedin.com, 2022).

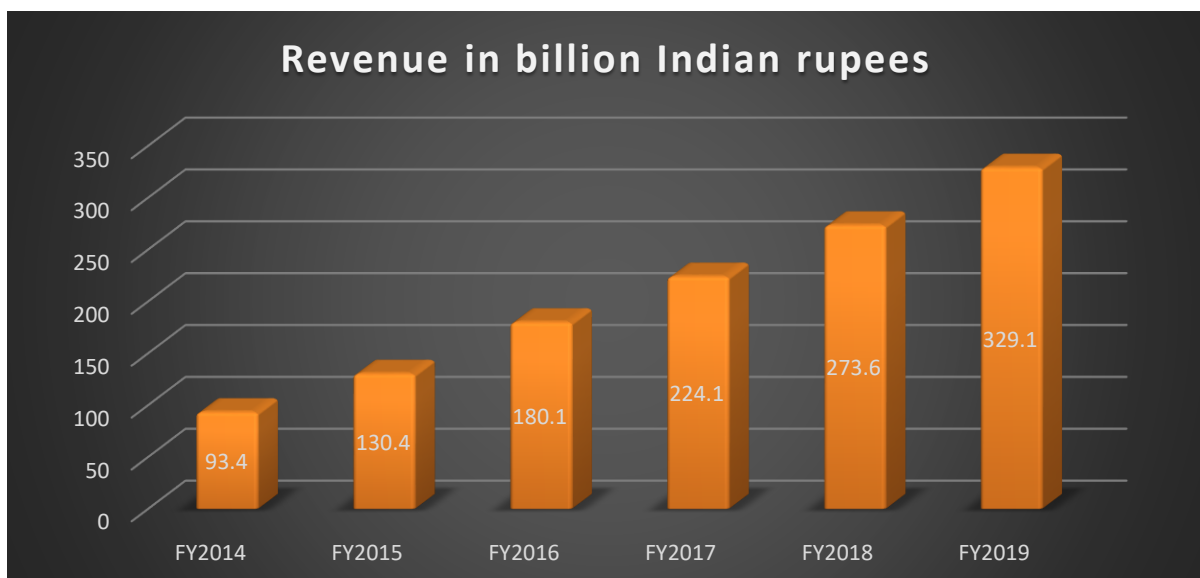


Fig.1 Revenue generated in India 2017-2022. (Source: Alokbatia.com, 16th September 2022)

NEEDS OF DIGITAL MARKETING IN THE AGRICULTURAL SECTOR

Nowadays, people are more likely to purchase products through online marketing; Hence without digital marketing, it is more difficult to reach all consumers worldwide (Schwarzl and Grabowska, 2015). In India, internet users are expected to increase by approximately 970 million in 2025 (Deshmukh and Patil, 2021). Therefore, there is a chance for the farmers to reach their customers directly. Moreover, it eliminates the commission of intermediaries, and farmers will be able to get more profit by selling their ample amount of fresh products to consumers, i.e., chefs, direct buyers, restaurants, etc. It creates an opportunity to get consumer feedback and assess target customers' general requirements. Understanding the necessity for digital marketing platforms in the agriculture sector, the Indian government has taken some innovative action through digital India and email marketing and also by developing an online trade portal named e-NAM, mainly used for trading agricultural produce (Deshmukh and Patil, 2021). Some of the initiatives introduced by the government to encourage the digital marketing of agriculture are mentioned below-

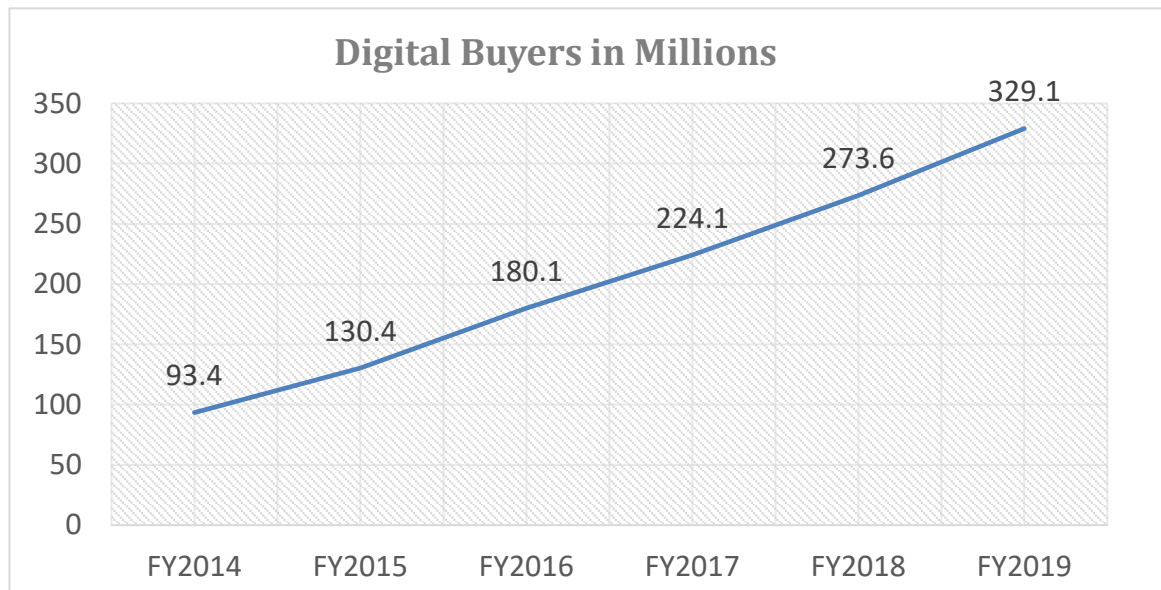
- e-NAM (National Agriculture Market): It is a platform for online marketing of agricultural products aiming to aid traders, buyers, producers or farmers with online marketing and receiving a profitable price through soft marketing. Moreover, it also removes asymmetry information between sellers and buyers, and based on the supply and demand of the current situation; it flourishes the discovery of authentic time prices.
- Agri-Market app: The IT department under the Ministry of Agriculture in India developed this application for farmers to keep them informed about the current prices of crops.
- Efforts of E-governance: In this portal government put three operations, i.e., Kisan call center, Kisan portal, and farmer portal, to aid the farmer by informing decisions about effective farming under different agro-climatic situations. In addition, a soil health card is also included in this e-governance portal to provide recommendations about integrated nutrient management for the crop using the soil test method.

Apart from that, various social media tools such as Facebook, Instagram, LinkedIn, Twitter, YouTube, Email, and so on may also be used as a medium for digital marketing of agricultural goods and services.

SCENARIO OF USAGE OF DIGITAL TECHNOLOGY IN THE COUNTRY

Due to a vast population, i.e., about 1.3 billion in India, mobile phone users are more in the country, which is near about 970 million. Hence, there has been a tremendous increase in

mobile phone users since 2000 (Fig-2). It has also been observed that in 2019, the number of smartphone users was 299 million compared to 140 million users in 2014. Moreover, it's also been discovered that in 2018 the number of internet users was 527 million compared to 213 million users in 2013 (Bank, 2019). Thereby, the people in India can negotiate with each other using internet technology.



(Fig. 2). Digital Buyers in India from 2014 to 2019. (Source: Published by Statista Research Department, August 15th, 2016).

FACTORS OF DIGITAL MARKETING IN THE AGRICULTURAL SECTOR

FAO (2018) states that three major factors are mainly responsible for developing digital marketing of agricultural outputs and will affect the future growth of digital marketing. These three factors are as follow:

1. Usage of mobile, social, and internet networks among the extension officers and farmers.
2. Digital efficiency among the farmers or rural community.
3. A culture that impels digital innovation and agri-entrepreneurship.

Using an internet connection of high speed, such as mobile apps, 4G connections, digital engagement, and social media platforms, can improve the accessibility of information and services to the people engaged in producing and distributing agricultural goods. Newly obtained skills regarding digital technology help people to operate it conveniently. Income and education are two vital definitive as the educated crowd is more able to adopt or develop new technology better and faster. As demand for the development of digital skills is increasing, digitalization is

also increasing. Hence, with the enhancement of the literacy rate, digital skills demand is also increasing, leading to rapid adoption. The digitalization process will be faster due to the increment in the competency level of the effective user (Bose and Kiran, 2021).

ADVANTAGES OF DIGITAL MARKETING

Digital Marketing plays a vital role in the nation as it has many environmental, social, and economic benefits. It can exceed challenges faced by farmers as well as agroindustries more effectively rather than the traditional method of marketing. Due to the innovation of e-commerce, the transaction mode of agricultural products is improved. It enhances the transfiguration of the whole agricultural marketing sector as it promotes agricultural products to the international market. To market agricultural products, there are two vital aspects 1) Physical mode, which includes processing, packaging, storage, transportation, and selling agricultural products to the market and 2) includes mechanisms of the market price. Digital marketing can improve the function of these processes, and its application helps the farmers and other communities involved in the agricultural sector by creating many opportunities (Bourish et al., 2006). A few of the benefits are described below:

- ✓ **Market Spread:** Digital marketing in the agriculture sector will aid in expanding the market worldwide. Farmers can reach numerous customers in the global market with the help of internet applications. Due to the spreading of internet marketing in the village areas, the farmers can easily receive information about the different agricultural aspects. As the internet is available all time, the farmers can access their marketing process at any time based on their needs. Hence, it allows people to participate in the marketing process at their convenience and provides much information regarding agricultural products, making the whole method more efficient and effective (Bose and Kiran, 2021).
- ✓ **Decrement of Cost:** Not only carrying out the transportation process of agricultural goods effectively is the main aim of marketing, but it should also keep in mind that the process will be done with less cost. Digital marketing increased the proximity to the global agricultural product market and decreased agricultural goods' transportation costs. In addition, it reduces the supply chain of marketing agricultural goods; therefore, it saves time, and unwanted expenses will also be reduced (Juswadi et al., 2020).
- ✓ **Exclusion of Middlemen:** After the innovation of digital marketing, agriculturists and farmers can reach buyers, including dealers, wholesalers, and consumers, directly without

the interference of any middlemen. Consequently, farmers can profit more by selling that product, and consumers get the product at an accurate price.

- ✓ Facile Availability of Scarce Products: Due to the digitalization of the agricultural market, rare products are available in a confined area where those products are not quickly getting the consumers.

CONSTRAINTS OF DIGITAL MARKETING IN THE AGRICULTURAL SECTOR

Farmers face many constraints in the digital marketing of agricultural goods and services. A few of them are expressed below:

- ✓ Infrastructure Issue: Agriculture is an underdeveloped sector for digital marketing, while another sector has already developed its business strategy digitally (Sulimin et al., 2019). Due to a lack of proper infrastructure, the farmers do not have access to agricultural information. Therefore, it is not always possible for them to sell the products globally.
- ✓ Connectivity Problem: Connectivity of the network is the important primary tool of any digital marketing sector. Although India occupied the 2nd position in using the network, most rural parts still faced connectivity issues (Sulimin et al., 2019).
- ✓ Illiteracy Level and Lacking of Digital Skills: The illiterate of rural people is the only major thing responsible for the lower development of digital marketing. According to FAO (2019), poor skills of digital skills and lower e-literacy hamper new technology usage. Therefore, the literacy level should increase among the country's local youths to overcome these issues.
- ✓ Lack of Awareness: Most farmers are unwilling to shift from traditional farming to modern technological agriculture due to a lack of awareness about digital technology. Due to a lack of information sources, 72% of farmers cannot practice new technology for better productivity. Moreover, the government set up many facilities such as insurance, marketing, and credit facilities for the farmers, but about 40 % of farmers are not able to access these facilities (Netscapeindia.com, 2022)

CONCLUSION

Digital Marketing will enlighten the usage and value of agricultural goods and services at a high swiftness and can work as an intermediary between farmers and consumers. Due to increased literacy and improved agriculture infrastructure, the agricultural marketing sector changed its direction toward digital marketing platforms. Several agribusinesses and agri-entrepreneurs are reaching their desired customers using the internet or digital marketing. State

and Central Governments are spreading the information effectively regarding projects, schemes, and beneficiaries among the rural people or farmers through the digital platform. Further increased adoption of digital marketing in the agriculture sector may further reduce transportation costs and improve farmers' profits.

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A STORY OF THE LEGENDARY TYCOON OF LAC SECTOR: INSPIRING JOURNEY OF A SMALL ENTREPRENEUR TOWARDS THE BUSINESS LEADER

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ABSTRACT

Natural gums, resins and latexes are among the most widely used and traded Non-Wood Forest Products. Applications of gums embrace food, pharmaceutical and miscellaneous technical purposes. Shri Roshan Lal Sharma is the most experienced person in the Lac business, having experience of about seven decades in the Lac industry. During the journey of more than 60 years in the lac sector, his entrepreneurship could generate employment for the local tribal's. His factories process about 1500 tons of raw sticklac to produce different qualities of value-added grades of seedlac, shellac, bleached lac, lac dye and other by-products, which earns valuable foreign exchange for the country and provides employment to about 100 tribal workers.



Natural gums, resins and latexes are among the most widely used and traded Non-Wood Forest Products. Applications of gums embrace food, pharmaceutical and miscellaneous technical purposes. Resins have an equally diverse range of applications in paints, varnishes and lacquers, flavors, and fragrances. Latexes have specialized applications in, for example, insulating materials and the manufacture of golf balls and chewing gum. Some of these products have declined because of synthetic products' competition. However, over time, changes occurred, and the experiences of an entrepreneur/processor/industrialist/exporter in the natural resin industry may highlight the lac sector's potential and opportunities. It also focuses on the impact of technological and policy interventions.

At 85, Shri Roshanlal Sharma is the most experienced person in the Lac business, having experience of about seven decades in the Lac industry. He can rightly be called a living encyclopedia of Lac business and industry, having seen the evolution and ups and downs in the history of Lac in India and abroad. Although he hails from Punjab, he came to Jhalda (presently in West Bengal) on June 20th 1956 and worked in the Calcutta office of Achhruram Kalkhof (Shellac) Private Limited. In 1964 he was sent to Murhu (presently in Jharkhand) to build a new factory for the company, where he worked as a manager. As the company grew, he was assigned to open new purchase and production centres in other lac-producing areas of Palamu (Jharkhand), Madhya Pradesh, Maharashtra and West Bengal. Meantime he also extended & increased the production capacity of the company's Murhu factory to 4-5 times which by the time 1982 was the largest shellac & seedlac-producing factory in India.



File Pic of Shri Roshan Lal Sharma

In 1983 he decided to set up his own industry & business and rented a small (cottage) factory in Khunti (presently in Jharkhand). After running the rented factory for three years, he bought a piece of land by the side of river Tajna & built his factory in Khunti with financial assistance from Bihar State Financial Corporation and named the factory Tajna Shellac factory. As his business was growing with financial support from the State Bank of India, the factory was converted into a Private Limited Company in 1993.

In 1997 another unit for value-added shellac production was named Tajna River Industries Private Limited in financial and technical collaboration with M/s Kane International Corporation, New York USA. The US is the largest buyer of shellac and seedlac in the world. He lost his mother at the tender age of five, which was partially compensated by his grandmother's nurturing. The situation changed after the death of his grandmother when he had to go to Gorakhpur to live with his father and stepmother. He was a bright student whom the esteemed college of Banaras Hindu University offered a scholarship. Soon he escaped stepmotherly treatment and decided to move to Jhalda at 18, leaving his academic education



halfway to work in the Indian Shellac factory in Jhalda. That was his first contact with lac. He picked up work quickly and put in his best efforts. Subsequently, he contacted ILRI, Ranchi's experts and got the help of legendary publications entitled "Chemistry of Lac" and "Monograph of Lac" at the

Institute library. He was trained to test and analyze different qualities of Lac samples under the guidance of the then director Dr S V Puntambaker, of the Indian Lac Research Institute, Namkum in Ranchi.

In 1962–63 when the Murhu Seedlac Factory was formed, he was sent to Murhu from Kolkata with his wife and son to this factory. He took over the production of Seedlac and worked very hard to supply the best quality Seedlac to M/S Kalkhof GmbH Petersen und Stroever in Frankfurt / Mainz in, Germany. The company had three units in Mainz, Hamburg and Bremen). In 1957 When Dr Kalkhof Rose visited India. This was the first time Mr Sharma met with the couple, and it was the beginning of a long business relationship with them which continues with Mrs Rose. His training in the Lac Research helped him to make trials of making value-added shellac while employed in the company, and with the help of the Lac Institute, he was very happy when he could succeed in making two tons of Bleached Shellac in 1975. In 1980 Late Shri Sohanlal Bahl, owner of the company, provided him with the opportunity to get

training at the factories of Kalkhof GmbH Petersen und Stroever Germany for the production of Bleached Shellac as per the proper quality standard specifications. He worked with the same spirit and enthusiasm but decided to leave in 1982 for personal reasons.

Once again, he had to start from scratch, but his experience, courage, faith and confidence inspired him to start making Seedlac in a small rented building in Khunti, Jharkhand. He got the first order for Seedlac and handmade Shellac from Europe in 1986. After that, he continued manufacturing various grades of Seedlac & handmade shellac. In 1988-89, the production of Machine-made shellac was also added to fulfil the quality requirements of the Indonesian buyers. Shri Sharma desired to work on high-value product lines as the demand for lac dye and bleached lac from the overseas market. In 1990-91, Mr Sharma got training (May 31st to June 14th 1990) on value-added products of Aleuritic acid and lac dye and for increasing the shelf life of Bleachedlac in the Lac Institute.

In 1997 the production of value-added improved-quality bleached lac was introduced. After that, Tajna River Industries Private Limited Khunti was established with 50 tons per month capacity. He also started the production of orange shellac in Jakarta, Indonesia, in partnership with an Indonesian businessman of Jakarta to cater to the requirements of Indonesian customers who worked for ten years and had to be closed because the cultivation of lac had significantly reduced in that country.

During the journey of more than 60 years in the lac sector, his entrepreneurship could generate employment for the local tribal's. In both of his factories, about 1500 tons of raw sticklac is processed to produce different qualities of value-added grades of seedlac, shellac, bleached lac, lac dye and other by-products, which earns a valuable foreign exchange for the country and provides employment to about 100 tribal workers.

His attitude towards business has been guided by humility and oneness with all. He is constantly in touch with the latest development in lac and with the lac Research Institute now known as the Indian Institute of Natural Resins & Gums, with which he has an old association and is still enthusiastically guiding his R&D laboratory with vital tips on shellac. He is also a member of the advisory committee of Research & development of the Indian Forest Institute of Productivity in Ranchi.

Having come a long way from a simple boy from Punjab to a successful industrialist and exporter, he can look back and attribute his success to devoted hard work, dedication, openness to learning, curiosity, global attitude, gratitude and optimism. He gives honesty great

importance in all his dealings with his suppliers and customers in the overseas markets. He has never become bitter with failure or hardships but remained grateful and gracious about what life has bestowed on him. Today, he keeps himself fit by getting up at 3 a.m. and following a disciplined regimen of Yoga, *Pranayam* & meditation. The case study revealed that introducing technological interventions in the existing scenario makes a difference in resource utilization and productivity.

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AN OVERVIEW OF CROP INSURANCE IN INDIA

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SUMMARY

Transitioning from a government-funded social crop insurance programme to a market-based crop insurance programme with actuarially sound premium rates and product design is a significant step forward. Farmers should get significant benefits from the improved product and active participation of personal sector insurance markets, including faster claims settlement, more equal subsidy allocation, and lower basis risk. In addition, crop coverage schemes can be implemented more efficiently with the aid of newer technology, such as GPRS-enabled and digicam-equipped mobile phones.



INTRODUCTION

Everyone is in danger when the agriculture sector is threatened. Without safeguards to assist farmers in quickly recovering from losses, the food supply gets stifled, and society suffers as a result. Droughts, floods, cyclones, typhoons, landslides, earthquakes, and other natural disasters often disrupt India's agricultural production and farm income. The vulnerability of agriculture to these disasters is exacerbated by epidemics and man-made errors such as fire, the sale of phoney seeds, fertilizers, pesticides, price falls, and so on. Most of these operations significantly impact farmers, resulting in manufacturing and farm profit losses, and are beyond their control. The importance of loss due to unfavourable circumstances grows as agriculture becomes more commercialized. Mechanisms such as agreement farming and futures buying and selling have been introduced in recent years, and they are expected to give some protection against fee changes, either directly or indirectly. On the other hand, agricultural insurance is seen as a critical instrument for effectively dealing with the risks to output and earnings posed by various natural and man-made activities.

NEED FOR AGRICULTURAL INSURANCE IN INDIA

Natural disasters primarily harm poor farmers in developing countries. Crop insurance also protects farmers against the loss of crops due to natural disasters, extreme weather, or revenue loss due to the agricultural market's price fluctuations. A farmer who struggles with his plough will be assured that, in the case of a disaster, he will at least receive some return.

ADVANTAGES OF CROP INSURANCE

- 1. INCOME SECURITY:** It protects farmers from crop failure-related losses. It's a tool that farmers can use to manage yield and pricing concerns.
- 2. MINIMAL DEBTS:** Farmers will be able to repay their loans with the help of crop insurance, even if their crops fail.
- 3. TECHNOLOGICAL PROGRESS:** Insurance firms can also provide knowledge on reducing losses, which can benefit farmers. Furthermore, the Internet of Things (IoT) can aid in technological growth.
- 4. NEW AGRICULTURAL TECHNIQUES:** Crop insurance ensures economic interest by guarding against loss. In exchange, farmers can adopt innovative agricultural techniques and test novel crop-protection strategies.

According to the Fourth Plan, "many challenges exist for farmers due to failure due to drought, floods, and other natural calamities." This danger is likely amplified in the context of large investments in fertilizers, insecticides, improved seeds, and other inputs that the Fourth Plan may recommend for widespread usage. The agency of crop coverage may be one of the most important approaches to alleviating misery arising from herbal catastrophes."

IS GOVERNMENT NECESSARY TO SPONSOR AGRICULTURAL INSURANCE PROGRAMMES?

Given the enormity of agriculture risks –production and price – an actuarially fair insurance premium may not be feasible or appealing to farmers. Therefore, subsidies from the government are required to entice farmers.

Agriculture risks must be reduced by extending canal and other surface water irrigation systems and developing an integrated national market for agricultural products.

PAST EXPERIENCE IN CROP INSURANCE

1. First Ever-Individual Approach Scheme

From the beginning of the seventy's decade, different experiments on crop insurance were undertaken on a limited, ad-hoc and scattered scale. The first crop insurance program was introduced in 1972-73 by the 'General Insurance Department of Life Insurance Corporation of India on H-4 cotton in Gujarat. Later, the newly set up General Insurance Corporation of India took over the experimental scheme and subsequently included Groundnut, Wheat and Potato and implemented in Gujarat, Maharashtra, Tamil Nadu, Andhra Pradesh, Karnataka and West Bengal.

2. Pilot Crop Insurance Scheme (PCIS) – 1979

The research was commissioned by GIC and entrusted to famous agricultural economist Prof. V.M. Dandekar based on the background and experience of the aforementioned experimental crop insurance schemes. Prof. Dandekar, a pilot, provided all of the advice. As a result, the plan became entirely dependent on "location strategy." ii. Cereals, millets, oilseeds, cotton, potato, and gramme were all included in the strategy. iii. The scheme became available to loanee farmers on a first-come, first-served basis.

3. Comprehensive Crop Insurance Scheme (CCIS)

With the active cooperation of State Governments, the Government of India created a Comprehensive Crop Insurance Scheme (CCIS) with effect from April 1st, 1985, based on the experience gained from implementing PCIS.

4. Experimental Crop Insurance Scheme (ECIS)

Attempts were occasionally made while the CCIS was operating to amend it as the states required. From Rabi 1997-98, a system known as the Experimental Crop Coverage Scheme was introduced, which was implemented in 14 districts across five states. Due to administrative and financial issues, the programme was cancelled after one season. The programme benefited 454555 farmers. The value insured increased to Rs.168.11 crores, with claims totalling Rs.37.80 crores against a top class of Rs.2.84 crores.

5. National Agricultural Insurance Scheme

In response to state requests to expand the scope and substance of CCIS, the country implemented a broad-based National Agricultural Insurance Scheme (NAIS) in Rabi 1999-2000, with the following goals.

- a. To give farmers insurance coverage and financial assistance if any of the notified crops fail due to natural disasters, pests, or illnesses.

- b. Encourage farmers to use progressive farming practices, high-value inputs, and advanced agricultural technology.
- c. To assist in the stabilization of farm income, particularly during calamity years.

PRESENT SCENARIO OF CROP INSURANCE

Pradhan Mantri Fasal Bima Yojana

The new Crop Insurance Scheme adheres to the One State, One scheme theme. It combines the best features of all prior systems while eliminating any previous flaws or drawbacks. In addition to the revised NAIS, the PMFBY will replace the current two schemes: the national Agricultural Coverage Scheme and the National Agricultural Insurance Scheme. (www.vikaspedia.in)

TARGETS

- To offer insurance coverage and financial guidance to the farmers within the occasion of failure of any of the notified crops because of natural calamities, pests & diseases.
- To stabilize the earnings of farmers to ensure their continuance in farming.
- To encourage farmers to adopt progressive and cutting-edge agricultural practices.
- To ensure to go with the flow of credit to the agriculture region.

Farmers may be required to pay a consistent premium of merely 2% for all Kharif vegetation and 1.5% for all Rabi vegetation. The top rate to be paid by farmers in the case of annual industrial and horticultural crops could be as high as 5%. The premium rates to be paid by farmers are very low, and the government might pay the balance top rate to give farmers the entire insured amount in the event of crop loss due to natural calamities.

CONCLUSION

Transitioning from a government-funded social crop insurance programme to a market-based crop insurance programme with actuarially sound premium rates and product design is a significant step forward. Crop coverage Schemes can be implemented more efficiently with the aid of newer technology, such as GPRS-enabled and digicam-equipped mobile phones. A comprehensive programme of capability development tailored to the needs of stakeholders such as country government officials, insurers, and critical government agencies involved in Crop Insurance Schemes should be established. Farmers should also get significant benefits from the improved product and active participation of personal sector insurance markets, including faster claims settlement, more equal subsidy allocation, and lower basis risk.

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VALUE CHAIN OF NATURAL RESINS IN INDIA

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ABSTRACT

*Resins are the secretion of several plants, particularly coniferous trees, used to produce varnishes, adhesives and food glazing agents and synthesize incense and perfume. This group of natural resins includes lac secreted by an insect *K. lacca* (Kerr) and plant-originated products like rosin, copal and dammar. The current outlook of the lac sector revealed abundant opportunities for entrepreneurs and farmers to operate the production, processing and value addition for livelihood and commercial level. Moreover, this industry may play a big role in household economies, food security, and environmental security, such as the conservation of biological diversity.*



INTRODUCTION

Non-wood forest products (NWFPs), based on their chemical composition, may be classified into three categories: natural resins, natural gums and gum resins. Natural resins are solid or semi-solid materials; usually a complex mixture of organic compounds called terpenoids, which are insoluble in water but soluble in certain organic solvents. Resins are the secretion of several plants, particularly coniferous trees. Resins are used to produce varnishes, adhesives and food glazing agents. These are also used as raw materials for synthesizing incense and perfume. This group of natural resins includes lac secreted by an insect *K. lacca* (Kerr) and plant-originated products like rosin, copal and dammar. Solidified resin from which the volatile terpene components have been removed by distillation is known as rosin.

According to the Global Forest Resources Assessment 2019, forestry and logging have a significant role in employment generation by creating 62.42 lakh FTE. As per the Forest Act 1927, lac secreted by a tiny insect, *Kerria lacca* is defined as the forest product collected by the forest dwellers. Subsequently the transformation of the rural structure, farmers started its cultivation scientifically on various lac host trees. Recently a bushy plant is also introduced by the institute in multiple states. Consequently, more than 95% of production is routed through the farming community, and it is no more the collection by the forest department. Hence, policy interventions must be taken to declare it as agricultural produce. About 70% of the NWFP collection in India takes place in the tribal belt of the country (Mitchell *et al.*, 2003). Around 55% of employment in the forestry sector is attributed to this sector alone (Joshi, 2003).

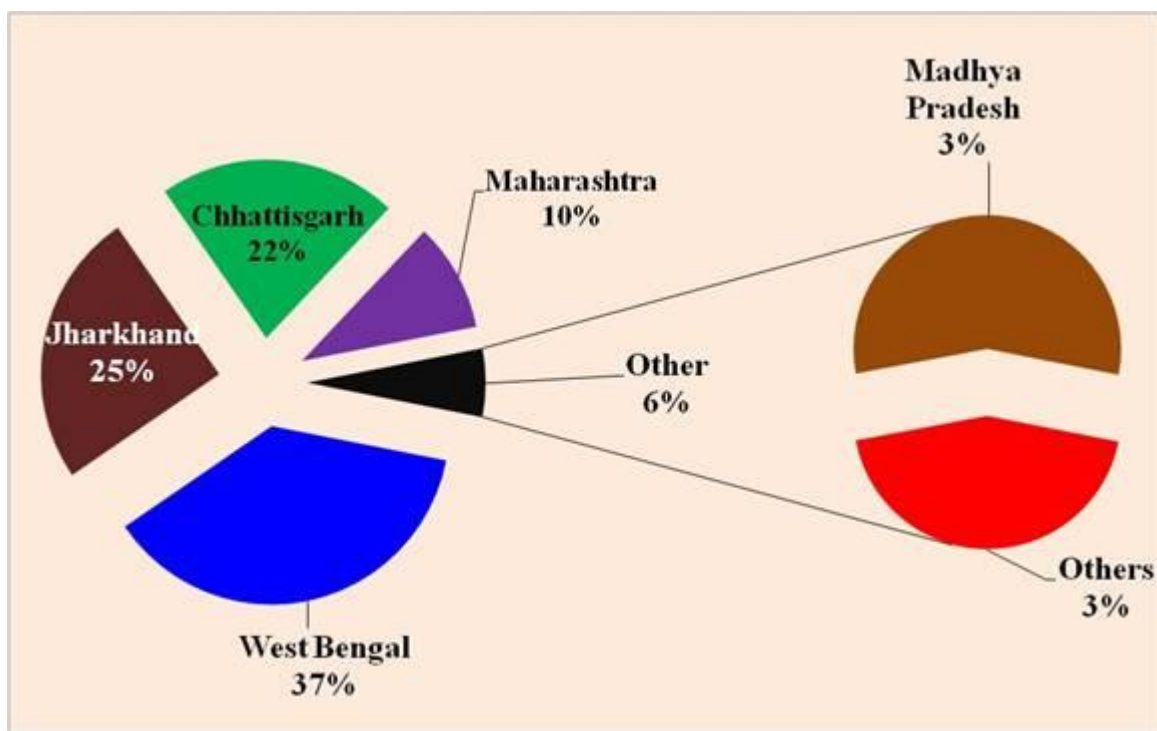


Figure 1 Share of different states in lac processing

Lac growers sell the sticklac or scraped lac in small quantities or lots in the rural weekly markets (*haats*). Rural markets (*haat*) in remote lac-growing areas operate once or twice a week. Lac growers, after harvesting sticklac sell to *packers* (primary purchasers). Progressive lac growers nearer to lac processing units sell their produce directly to processors. Subsequently, collection of scraped lac on the market day, the *paikars* sell it to the wholesaler in the same market or nearby processing centres in bigger lots. Finally, the wholesalers also sell their purchases to processors.

Further, raw and value-added products of lac are supplied to domestic and overseas firms for various industrial applications. Based on surveys conducted at different lac processing centres in the country, the total quantity of sticklac processed during 2019-20 was 18747 tons, including the imported and previous years' carry-over stock in India. Information about the share of different states in lac processing is presented in Figure 1.

TRENDS IN THE PRICE OF LAC OVER THE TIME

Time series data on prices of *rangeeni* and *kusmi* sticklac and seedlac was collected from the above-mentioned lac markets of Jharkhand, West Bengal, Chhattisgarh, Maharashtra and Madhya Pradesh on a quarterly basis. The prices of *rangeeni*, kusmi sticklac and seedlac have shown an increasing trend from December 2010 to December 2012. TRIFED, Ministry of Tribal Affairs, GoI launched a mega scheme to safeguard the interest of the forest dwellers by providing a Minimum Support Price (MSP) to procure scraped lac. Subsequently, the market price also started to rise up from December 2015 to its lowest level. In the comparison of this scenario, it is evident from Figure 2 that the local market price of lac improved significantly till March 2020. It declined suddenly due to a complete lockdown from April to Sept 2020 and futher got momentum.

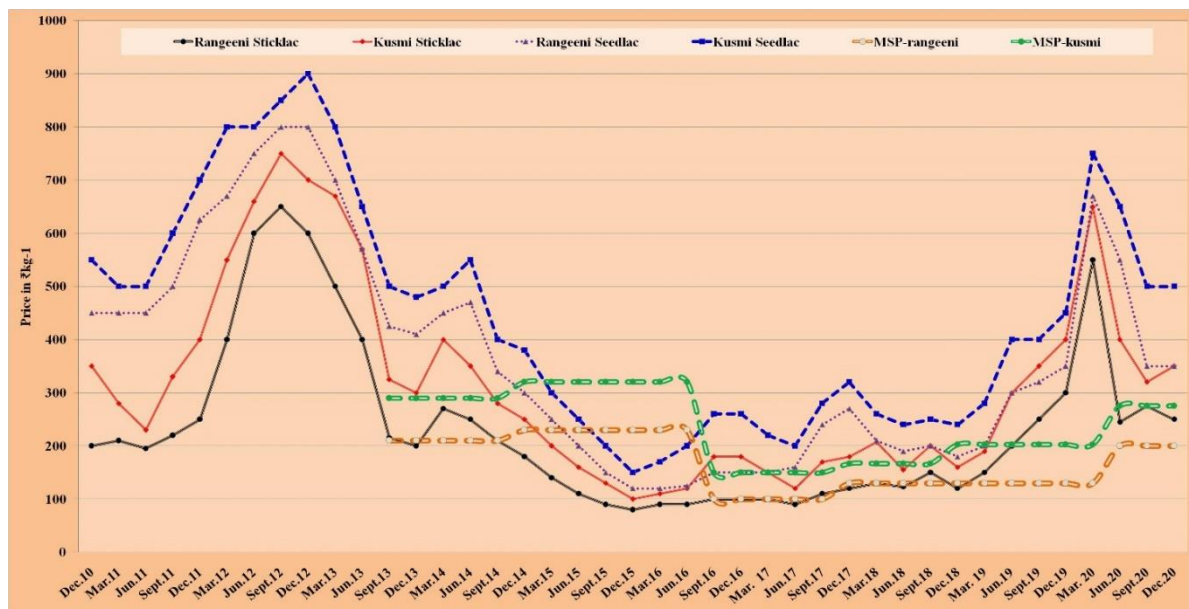


Figure 2. Trends in the price of sticklac and seedlac over the time

INTERNATIONAL TRADE OF LAC AND ITS VALUE-ADDED PRODUCTS

Data on the export of lac and its value-added products from India were collected from Shellac and Forest Products Export Promotion Council (SHEFEXIL), Kolkata. The total export of lac and its value-added products during 2019-20 was 7293.47 tons, valued ₹405.51 crores. Details of export in quantity and value, a list of top importing countries of Indian lac and export of lac have been presented in Table 1 and Table 2. In contrast, the direction of the trade, the trend in the export of lac in quantity and value during the last ten years and the share of different items of lac export value from India are shown in Figure 3, Figure 4 and Figure 5, respectively.

Table 1. Export of lac and its value-added products from India during 2018-20

Name of product	Export in 2018-19		Export in 2019-20	
	Quantity (tons)	Value (₹ lakh)	Quantity (tons)	Value (₹ lakh)
Shellac	2079.72	5676.35	1600.13	8852.79
Aleuritic acid	155.75	3537.82	81.02	2079.99
Seedlac	3515.60	7940.29	3577.14	18730.29
Dewaxed shellac	352.31	1861.32	308.50	2462.89
Bleached lac	306.16	1828.31	216.02	2077.79
Shellac wax	5.70	52.80	3.15	35.90
Buttonlac	1650.96	4428.87	1507.51	6311.36
Dewaxed decolourized	0.00	0.00	0.00	0.00
Gasket lac	5.18	13.20	0.00	0.00
Lac dye	0.00	0.00	0.01	0.69
Dewaxed bleached shellac	0.00	0.00	0.00	0.00
Garnet shellac	0.00	0.00	0.00	0.00
Dewaxed garnet shellac	0.00	0.00	0.00	0.00
Shellac(<i>kiri</i>)	0.00	0.00	0.00	0.00
Stick lac	0.00	0.00	0.00	0.00
Waxy bleacedlac	0.00	0.00	0.00	0.00
Hydrolysed lac	154.00	26.40	0.00	0.00
Total	8225.39	25365.37	7293.47	40551.69

Among the export destinations of lac and its value-added products USA (37.25%), Bangladesh (9.54%), Germany (7.34%), Korea Rp (5.53%), Afghanistan (5.45%), Iraq (4.84%), UK (2.63%), Egypt (2.47%), Pakistan (2.31%), Spain (2.01%), China (1.97%) Japan (1.93%), Indonesia (1.89%), France(1.84%) Thailand (1.56%), Italy (1.54%), Sri Lanka Dsr (1.12%), Australia (1.10%) and Iran(1.02%) remained top destinations with more than 90%

import of lac and its value-added products from India. At the global level, Indian lac was exported to 76 countries in Europe, America, Asia, Africa and Australia during 2019-20. Lac is an important natural resin shipped by and also imported from Indonesia, Thailand, *etc.*, in India.

Table 2. Top importing countries of Indian lac during 2019-20

Country	Quantity (tons)	Value (US \$ Millions)	% Share
U S A	2,155.60	14,687.03	37.25
Bangladesh PR	1,025.40	3,762.97	9.54
Germany	599.98	2,895.72	7.34
Korea Rp	30.20	2,179.60	5.53
Afghanistan	465.39	2,147.13	5.45
Iraq	425.00	1,908.02	4.84
U K	132.63	1,036.55	2.63
Egypt A Rp	215.70	973.78	2.47
Pakistan Ir	373.10	910.95	2.31
Spain	178.07	791.10	2.01
China P Rp	252.57	778.43	1.97
Japan	76.44	762.09	1.93
Indonesia	145.00	744.99	1.89
France	54.47	723.49	1.84
Thailand	118.49	615.30	1.56
Italy	121.70	606.88	1.54
Sri Lanka Dsr	133.07	442.69	1.12
Australia	11.52	432.93	1.10
Iran	80.23	403.56	1.02
Others (57)	497.84	2,623.22	6.66
Total	7,092.40	39,426.43	100.00

During 2019-20, exported value showed that 99.37 % contribution in total export of natural resins was from lac (98.92 %), gum rosin (0.69 %) and other resins (0.39 %). As depicted in Table 3, the average annual export quantity of lac during the XI plan (2007-08 to 2011-12) was 6,898.92 tons, valued ₹18683.58 lakh. The average yearly lac demand was 6,799.60 tons, valued ₹36515.19 lakh from 2012-13 to 2016-17. Subsequently, the average annual lac demand was 7469.45 tons, valued ₹29127.27 lakh from 2017-18 to 2019-20. However, during the previous thirteen years (2007-08 to 2019-20) Compound Annual Growth Rate (CAGR) in exported quantity was positive for lac (0.92%) acceleration in quantity demanded since 2012-13 onwards and slightly negative for total natural resins group

Table 3. Export of lac during XI, XII and subsequent annual plan periods

Year	Quantity (tons)	Value (₹ lakh)
XI Plan		
2007-08	7906.33	12426.87
2008-09	6968.42	12414.50
2009-10	6422.61	11002.33
2010-11	6339.05	21112.92
2011-12	6858.21	36461.30
Average	6898.92	18683.58
XII Plan		
2012-13	4361.30	48027.58
2013-14	8158.10	56853.63
2014-15	6569.17	32249.58
2015-16	7668.42	24755.18
2016-17	7241.00	20690.00
Average	6799.60	36515.19
Annual Plans		
2017-18	6889.48	22590.00
2018-19	8225.39	25365.37
2019-20	7293.47	39426.44
Average	7469.45	29127.27

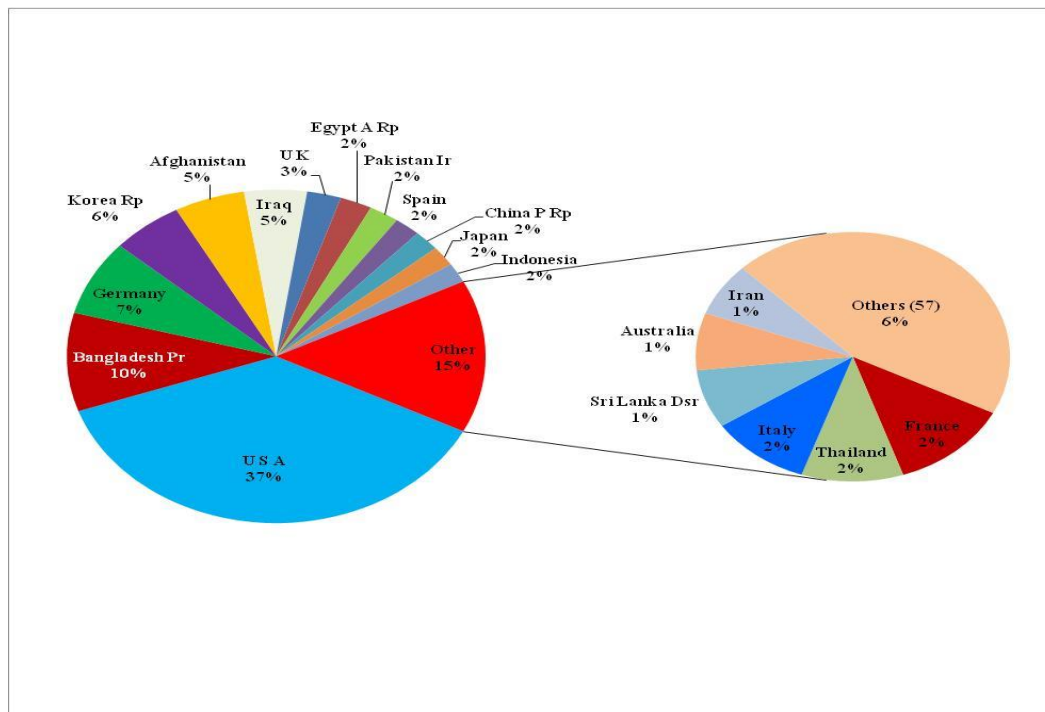


Figure 3. The direction of the trade of lac and its value-added products

(0.0014%). However, in value terms, the lac (7.0%) and total natural resins (6.36%) have accelerated growth rates.

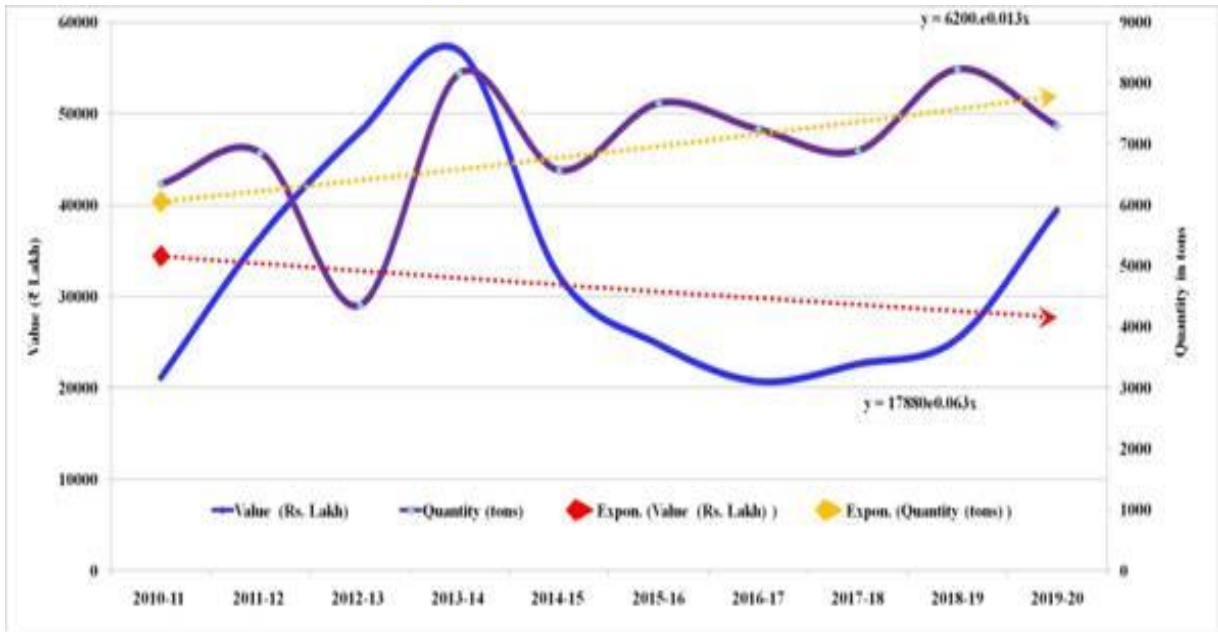


Figure 4. Trends in the export of lac-based products from India

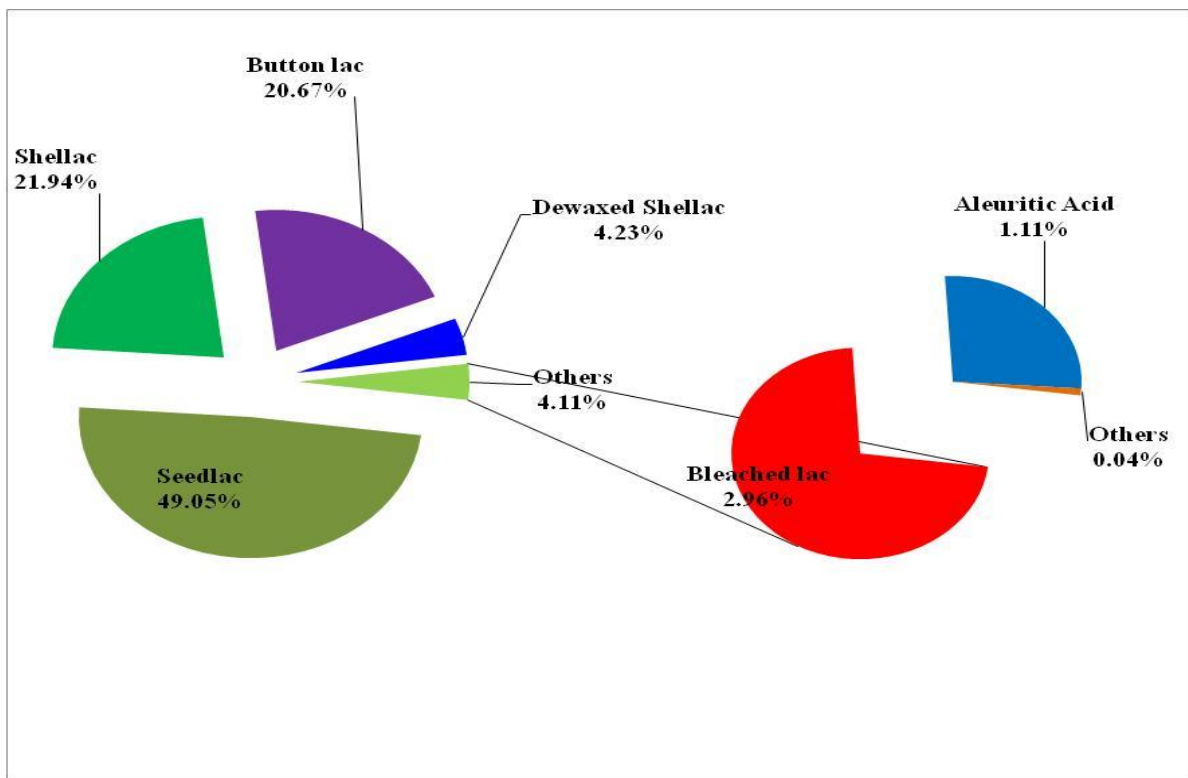


Figure 5. The product-wise export share of various lac-based products



Photo 1. Wool dyed with lac dye

CONCLUSIONS

The current outlook of the lac sector revealed abundant opportunities for entrepreneurs and farmers to operate the production, processing and value addition for livelihood and commercial level. Moreover, lac and its value-added products have attracted considerable global interest in recent years due to increasing recognition of their contribution to household economies, food security, and environmental objectives, such as the conservation of biological diversity.

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QUALITY PARAMETERS OF WHEAT FOR INDUSTRIAL USES AND ITS AGRONOMIC IMPROVEMENTS

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ABSTRACT

Wheat is an important staple crop of the country with diversified uses, starting from wheat flour, biscuits, cakes, pasta, wheat germ, wheat bran, Maida and other end products. Even wheat straw is used in bio-ethanol production as feeding material for livestock. The composition of wheat flour varies for the production of various end products. Therefore, the physical and nutritional aspect of grain quality is critical. The quality parameters are protein content, falling number and test weight. Proper agronomic measures may improve wheat quality suitable for producing various industrial products.



INTRODUCTION

Wheat (*Triticum* sp.) is one of the most consumed cereals in the Globe and the second most important staple crop of the nation. It belongs to the Poaceae family and is cultivated in the Rabi season. The total wheat area in India is about 29.8 million hectares, with a production of 94.88 million tonnes. Wheat is also called the king of cereals. Wheat is generally eaten in the form of chapatti, a staple food. Apart from this, various other preparations of wheat are famous such as halwa, Dalia, sweet meals etc. Wheat is also known for its industrial uses. It is used in making flakes, cakes, biscuits, pasta etc. It contains more protein than other cereals. The wheat protein called "Gluten" is essential for the bakery industry. Gluten provides the structural framework for the familiar spongy, cellular texture of bread and other baked products. Wheat is largely exploited in flour-making, biscuit-making, and even in the cosmetic industry.

QUALITY OF WHEAT FOR INDUSTRIAL USE

The criteria of quality differ from person to person. The farmer always expects a high yield, the miller expects good milling quality, and the baker expect flour suitable for the end products he desires to produce. The physical and nutritional aspects of wheat grain determine its quality.

PHYSICAL ASPECT OF GRAIN: The physical aspect of grain is determined by purity, moisture content, appearance (colour, size and plumpness) and hardness of the kernel.

- ✓ **The purity of grains** is measured by determining the percentage of pure wheat grains in a bulk sample.
- ✓ **The moisture content** of wheat is crucial from a storage and milling point of view. 12% is the optimum moisture content in the grain.
- ✓ **Appearance-wise**, large, plumed grain of amber in colour is considered better.
- ✓ **Pearling Index** judges the hardness of kernels. A higher value of the pearling index indicates less kernel hardness.

$$\text{Pearling Index} = \frac{x - y}{x} * 100$$

Where x is the initial sample weight, and y is the weight of the material left on a 30-mesh sieve.

- ✓ **The nutritional aspect of grain:** Generally, chemical analysis is done to determine the nutritional aspect of wheat grain.

Table 1: Nutritional aspect of wheat grain

Chemical constituents	Amount in percentage
Starch	60-68%
Protein	8-15%
Fat	1.5-2%
Cellulose	2-2.5%
Minerals	1.5-2%

MILLING QUALITY:

The following standards judge the milling quality.

1. The maximum yield of flour is free from germ and bran.
2. The relative ease with which a high turnover of flour is obtained.
3. The low ash content indicates a thorough separation of bran from flour is obtained.

Chapatti-making quality: It comprises dough colour, water absorption, dough properties (mixing and handling), puffing, texture, preservation quality, taste and aroma. Bread-making quality is determined by high water absorption, gas-production capacity and retention capacity.

Biscuit-making quality: Soft and poor wheat flour having a low water-absorption capacity and high protein content is considered suitable for biscuit making. Gluten should have plasticity so the flour can be stretched without much shrinkage.

Macaroni-making quality: Wheat for macaroni products should have excellent grain qualities like bold and pulp grains, low yellow berries, and high carotene content.

QUALITY REQUIREMENTS FOR DIFFERENT WHEAT PRODUCTS ARE AS FOLLOWS:

Chapati: It requires a hard or medium grain structure with 10-13% protein and medium and extensible gluten strength.

Biscuit and Cake: It requires a soft or very soft grain structure with 8-10% protein and weak and highly extensible gluten strength.

Pav bread: It requires a hard grain structure with more than 13% protein content and strong and extensible gluten strength.

Noodle: It requires a soft or medium grain structure with 10-13% protein and medium gluten strength.

IMPORTANT WHEAT QUALITY PARAMETERS

- 1) **Test Weight:** It indicates the density of wheat kernels. Kernels with more density will yield more flour, making them more profitable for the millers. Stress factors during the grain-filling stage may result in low test weight. These factors are waterlogging, drought, low or high temperature, nutrient deficiency, insect damage, and weather damage.
- 2) **Falling Number:** Wheat flour contains protein and starch. Starch plays a massive role in bread structure, and sprouting occurs if it rains on ripe wheat and favourable environmental conditions follow. Starch is broken down by an enzyme named alpha-

amylase, and excessive sugar forms. Excessive sugar leads to the sticky, runny dough, making it challenging to handle. Bread will also have a dark crust, a coarse texture, poor structure and become difficult to cut mechanically. Wet weather and day temperature has a big effect on pre-harvest sprouting.

- 3) **Protein Content:** The wheat protein, Gluten is suitable for bread. Due to genetic background, different cultivars will exhibit other loaf volumes at the same protein levels. Nitrogen fertilizer leads to higher protein content. Moisture stress leads to an increase in protein content as less starch is formed.



A field view of Wheat crop

AGRONOMIC MEASURES TO IMPROVE THE WHEAT QUALITY

- 1) **Selection of suitable variety and clean seed:** Varieties should be selected based on the end product the farmer wants. The seeds should be purchased from authentic certified sources. The seed should be treated before sowing to reduce insect and disease attacks.
- 2) **Choosing appropriate field and crop rotation:** For producing good quality grains, select a site with suitable soil with low disease and weed pressure. In addition, crop rotation should be encouraged. Crop rotation reduces the infestations of disease and pests and considerably increases the quality of the produce.

- 3) **Proper Nitrogen scheduling:** The amount and timing of nitrogen application affect the grains' protein level. The right quantity of nitrogen must be applied at the critical stages to increase wheat gluten percentage, which is essential for the bakery.
- 4) **Early harvesting:** The timely crop harvest is crucial for getting good quality. Once the crop reaches maturity, delayed harvesting leads to pre-harvest sprouting and weed growth, increasing the risk of DON levels.
- 5) **Proper cleaning, drying and storing of grains:** Wheat quality must be protected post-harvest by proper cleaning, drying and storing. The grain must be dried to 14% moisture for better storage. In addition, fumigation may be done to prevent the stored grain pest attack.

CONCLUSIONS

Wheat is used in industries to produce diversified products like biscuits, breads, pasta, semolina, cakes, etc. It is even used in bioethanol production and the cosmetic industry. Diversification has led to an increase in the returns from wheat production. Wheat quality is essential, as good quality is the prerequisite for producing various end products and getting higher returns. Hence, adopting adequate agronomic management practices may help to maintain the wheat crop's physical and nutritional quality.

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