Readers Shelf

VOLUME No. :21	ISSUE NO: 07	April 2025
No. of Pages in this issue		28pages
Date of Posting: 10-11 at RMS, Jodhpur		

Editorial Office

J.V. Publishing House, 15, Gajendra Nagar, Near Old FCI Godown, Shobhawaton Ki Dhani, Pal Road, Jodhpur-5

Website: www.readersshelf.com

*Email:*readersshelf@gmail.com, jvph@rediffmail.com

Typesetting: Ankita, Jodhpur

Printed by: Manish Kumar, ManakOffset, Jodhpur

Published by

Smt. Neeta Vyas

For J.V. Publishing House,

Jodhpur

RNI No.: RAJENG/04/14700

ISSN No.:2321-7405

Subscription Charges: Single Copy: Rs.50.00

Annual Subscription: Individual: Rs.**500.00**

Annual subscription: Institution: Rs.900.00

Contents

1. AGRICULTURE ECONOMICS

Financial Inclusion Drive in India: Emerging Approaches

Dr. Shilpa P. Chowti[1], Dr. Saraswathi J. M[2]

[1]Assistant Professor, Department of Agricultural Economics, ZAHRS, [2]Scientist (Home Science), KVK,Babbur Farm, Hiriyur-577598

Introduction

Access to finance by the poor and vulnerable groups is a pre-requisite for poverty reduction and social cohesion and this has to become an integral part of our efforts to promote inclusive growth. The various financial services include credit, savings, insurance and payments and remittance facilities. Financial inclusion may be defined as the process of ensuring access to financial services and to provide timely and adequate credit needed by vulnerable groups such as weaker sections and low income groups at an affordable cost. Rural India presents a remarkable opportunity for bankers and financial institutions to seek their fortunes and bring prosperity to the aspiring poor through Financial Inclusion.

Financial inclusion enables improved and better sustainable economic and social development of the country. It helps in the empowerment of the underprivileged, poor and women of the society with the mission of making them self-sufficient and well informed to take better financial decisions. Financial inclusion takes into account the participation of vulnerable groups such as weaker sections of the society and low income groups, based on the extent of their access to financial services such as savings and payment account, credit insurance, pensions etc. Also the objective of financial inclusion exercise is easy availability of financial services which allows maximum investment in business opportunities, education, save for retirement, insurance against risks, etc. by the rural individuals and firms.

The financial inclusion development stages were assessed in two phases. In the first stage various stages of development were documented. In the second stage, the progress made during post liberalisation period and various activities initiated by the NABARD was analysed.

Stages of Development of Financial Inclusion

The concept of examining financial access became important immediately after the All-India Rural Credit Survey that was completed in the 1950s. The results of the survey revealed that farmers relied heavily on money-lenders in the year 1951-52. Only the urban areas had large number of bank branches compared to rural areas. Such a condition continued in the country until RBI started financial inclusion growth model in the 2000s. Because the urban areas were fully concentrated with numerous bank branches, this resulted in the higher absorption of bank credit in the urban areas. Stages of development of financial inclusion are divided in to two phases

First phase

- Social control of banks(1968)
- Nationalization of Banks(1969)
- 1969-1991 : expansion of branch network – average population covered per branch reduced from 64000 to 13711
- Introduction of Lead Bank Scheme(1969)
- Introduction of Priority Sector Norms(1974)
- Formation of Regional Rural Banks(1975)
- Establishment of NABARD (1982)
- Introduction of Service Area Concept(1989)

Bank nationalization in India marked a paradigm shift in the focus of banking as it was intended to shift the focus from class banking to mass banking. The rationale for creating Regional

Rural Banks was also to take the banking services to poor people.

Second Phase

- Post liberalisation– financial sector reforms- deregulation of interest rates – increased competition
- Launch of concept of micro finance
- Scheme of linkage of SHGs with banks
- Kissan Credit Card(1998)
- Creation of small enterprises development fund with SIDBI
- Creation of rural infrastructure development fund – 1995-96 with NABARD

Dimensions of Financial Inclusion

There are three tangible and critical dimensions on the basis of which the level of financial inclusion in India can be measured. These dimensions can be broadly discussed under the following heads:

1. Branch Penetration: Penetration of a bank branch is measured as number of bank branches per one lakh population. This refers to the penetration of commercial bank branches and ATMs for the provision of maximum formal financial services to the rural population.
2. Credit Penetration Credit Penetration takes the average of the three measures: number of loan accounts per one lakh population, number of small borrower loan accounts per one lakh population and number of agriculture advances per one lakh population.
3. Deposit Penetration: Deposit penetration can be measured as the number of saving deposit accounts per one lakh population. With the help of this measure, the extent of the usage of formal credit system can be analysed.

Among the three dimensions of financial inclusion, credit penetration is the key problem in the country as the all India average ranks the lowest for credit penetration compared to the other two dimensions. Such low penetration of credit is the result of lack of access to credit among the rural households

Features of Approaches to Financial Inclusion

1. Offering a clear customer proposition and customised bouquet of products
2. Transaction-driven pay-per-use features
3. Scalable business model with simple, user friendly low-cost technologies
4. Collaborate with local agents and for-profit companies
5. Banks need to learn from both corporate India and the informal sector
6. Subsidiary model to drive down costs
7. Educate them and take them on board
8. Ride on government payments
9. Innovate and test-market pilot products/services**.**

Issues and Challenges of Financial Inclusion

India currently faces several issues and challenges in the area of Financial Inclusion for Inclusive growth. Salient among them are stated here below

1. Spatial Distribution of Banking Services: Even though after often emphasized policy intervention by the government and the concerted efforts of Reserve Bank of India and the public sector banks there has been a significant increase in the number of bank offices in the rural areas; but it is not in tune with the large population living in the rural areas. For a population of 70% only 45% of bank offices provide the financial services.
2. Regional Distribution of Banking Services: The analysis by the authors brings to the fore that there has been uneven distribution of the banking services in terms of population coverage per bank office in the six regions viz; Northern, North-eastern, Eastern, Central, Western and Southern regions of the country.
3. Bank Branches are required to be increased as it has a direct impact on the progress of financial inclusion. It is clearly established that as the bank branches increase number of bank accounts also increase significantly.
4. Poverty levels are having direct relationship with the progress of financial inclusion. The authors have established in their study that as the poverty levels decrease financial inclusion also increase. As such, there should be multi fold strategic approach in such

poverty dominated areas for financial inclusion.

5. Scheduled population: It is ascertained by the authors' study that in the areas of Scheduled population the progress of Financial Inclusion is slow which indicates that the efforts for Financial Inclusion has to be increased significantly in such areas in order to bring in social and economic equity in the society.
6. Overcoming Bankers' Aversion for Financial Inclusion
7. Even though no banker openly expresses his aversion for the financial inclusion process, overtly it can be noticed that they are averse to it in view of the cost aspects involved in opening of no frill accounts.

Conclusion

It is becoming increasingly apparent that addressing financial exclusion will require a holistic approach on the part of the banks in creating awareness about financial products, education, and advice on money management, debt counselling, savings and affordable credit. The banks would have to evolve specific strategies to expand the outreach of their services in order to promote financial inclusion. One of the ways in which this can be achieved in a cost-effective manner is through forging linkages with microfinance institutions and local communities. Banks should give wide publicity to the facility of no frills account. Technology can be a very valuable tool in providing access to banking products in remote areas. ATMs cash dispensing machines can be modified suitably to make them user friendly for people who are illiterate, less educated or do not know English.

Financial inclusion is a great step to alleviate poverty in India. But to achieve this, the government should provide a less perspective environment in which banks are free to pursue the innovations necessary to reach low income consumers and still make a profit. Financial service providers should learn more about the consumers and new business models to reach them. Credit has done more to enrich nations than all the gold mines in the world put together. Therefore financial inclusion has the potential to wipe out the last tear from the face of most deprived person on the Indian soil.

References

IDBI Gilts, 2008, Economic Research: The need for financial inclusion with an Indian perspective.

Ranagarajan, C. 2013, Report of the Committee on Financial Inclusion, submitted to the Government of India.

Srinivasa.,K., 2007, Policy issues and role of banking system in financial inclusion. *Economic and Political Weekly,* **42**:3091-3095.

http. // www.rbi.org.in

http. // www.nabard.org

2. AGRICULTURE

Use of Artificial Intelligence in Crop Management

Sachin Chinchorkar, F.G.Sayyad

Assistant professor, Polytechnic in Agricultural Engineering,AAU,Dahod,Gujarat

Absactrct

Integration of AI and ML into plant management offers considerable potential to improve productivity, sustainability and resilience in the face of growing challenges such as climate change and nutritional security. Through advances in predictive analytics, KI and ML have more accurately predicted crop yields, pest outbreaks and weather patterns so that farmers can be properly discovered and optimized resource consumption. The synergy of AI, ML and emerging technologies such as IoT and autonomous agricultural equipment promises to revolutionize agriculture even more. These technologies allow monitoring and decision-making in real time, automate labor-intensive tasks and personalize agricultural solutions to the specific needs of individual farmers. Furthermore, the use of AI and ML accelerates the development of resilient plant varieties in harvest breeding and genomics, contributing to the long-term sustainability of

agricultural practices. Issues such as data quality and availability, technical complexity, high costs, and infrastructure limitations create significant obstacles, especially for smallholder farmers in developing regions. Additionally, ethical considerations regarding data protection, job shifts and digital gaps must be addressed to ensure that the benefits of AI and ML are distributed fairly.

Keywords : AI and ML, Crop Management, agricultural practices

Introduction

Agriculture has always been the bedrock of human civilization. Today, amidst rapid technological advancements, it is undergoing a profound transformation. With the global population expected to increase significantly, the need for about 70% more food by mid-century poses a substantial challenge, especially under the current constraints of resource scarcity and changing climate conditions. Water management and sustainable land use are becoming increasingly critical.

At this pivotal moment, Artificial Intelligence offers unprecedented opportunities for agriculture. From enhancing crop yield and quality to optimizing resource usage, AI's impact is far-reaching. Whether it's analyzing land use with high-precision satellite imagery or predicting crop diseases through real-time monitoring, AI applications are gradually taking root globally. This wave of technology is not only garnering widespread attention in agri-tech but also attracting investments to fuel innovation and growth.

As AI deepens its roots in agriculture, we are witnessing the dawn of a smarter, more efficient, and sustainable era of farming. Let's explore these exciting technologies and how they are revolutionizing traditional agricultural practices.

Understanding AI in Agriculture

AI in agriculture combines advanced technologies like machine learning, robotics, and data analytics to improve farming. These tools help make better decisions, automate tasks, and forecast environmental effects on crops. AI transforms traditional farming, leading to smarter, more efficient, and cost-effective methods.

Definition and Overview

Machine learning in farming uses algorithms to analyze vast agricultural data. This provides insights into crop health, soil conditions, and weather. The technology, starting in World War II, has evolved significantly, impacting farming and lives.

For example, John Deere's partnership with NASA has led to GPS-guided tractors. This innovation reduces field overlap, saving costs. AI tools in dairy, like wearable heat detectors, also show AI's wide application in agriculture. Norm, an AI advisor, offers farmers economic advice, highlighting AI's significant impact.

Key Technologies Driving AI

Several technologies lead AI in agriculture:

- **Machine Learning Algorithms:** These tools analyze vast data, providing quick and accurate insights for farm management.
- **Robotics:** Automation of tasks like harvesting and irrigation addresses labor shortages and cuts costs.
- **IoT Devices:** Real-time monitoring of crops and soil conditions enables farmers to make informed decisions, improving yields and resource use.

AI and **machine learning in farming** streamline processes and address challenges like land scarcity, climate change, and environmental issues. As the global population nears 10 billion by 2050, AI is key to increasing crop production sustainably.

Enhanced Decision-Making

AI-driven precision agriculture significantly aids in decision-making through real-time data analytics. This enables farmers to apply resources precisely, optimizing usage and reducing waste.

- AI can predict optimal planting and harvesting times, reducing crop losses.
- Advanced AI algorithms can forecast weather conditions, crop stress, and yield losses, helping mitigate these issues proactively.

Improved Resource Efficiency

AI's role in agricultural data analytics

greatly enhances resource efficiency. For example, AI-driven systems can cut water usage by 20% to 60% through precision irrigation. These systems analyze soil moisture levels, ensuring water is used effectively and leaks are detected promptly.

- AI can identify areas needing fertilizer, conserving resources and reducing emissions.
- AI-driven autonomous crop management systems provide precise amounts of water, promoting eco-friendly farming practices.
- The use of AI in crop management has led to a 90% reduction in herbicide use.

AI technology also helps maintain biodiversity by analyzing agricultural practices' impact on ecosystems. With only 12% of the earth suitable for farming, AI maximizes output on available land while promoting sustainability.

Key Features of Machine Learning and Artificial Learning in Crop Management

Effective crop management is essential for maintaining healthy crops and maximizing yields, encompassing activities such as soil preparation, planting, irrigation, fertilization, pest and disease control, and harvest. Each of these activities requires careful planning, monitoring, and adjustment to ensure optimal crop growth and productivity. The integration of AI and ML into crop management leverages advanced technologies to optimize resource use, reduce costs, and enhance yields. By adopting these technologies, farmers can not only ensure food security and economic sustainability but also contribute to the global effort to mitigate climate change and environmental degradation.

Predictive Analysis

The AI algorithms can analyze historical weather data, soil conditions, and crop characteristics to forecast future crop yields and nutrient deficiencies. This predictive capability enables farmers to make informed decisions regarding planting times, irrigation levels, and fertilizer application. Moreover, predictive analytics can identify specific field areas that require additional attention and resources, thereby enhancing overall efficiency and productivity [3, 4]. Crop management relies heavily on accurate weather forecasting, as predictions regarding temperature, rainfall and other weather variables guide decisions on irrigation and fertilization. By analyzing extensive datasets of weather information, AI and ML algorithms can detect patterns and predict future conditions with greater accuracy. These algorithms consider variables such as temperature, humidity, wind speed, and rainfall, providing more reliable forecasts than traditional methods.

Disease Detection

Artificial intelligence and machine learning have revolutionized disease detection in crop management, offering farmers powerful tools to identify and manage plant diseases with greater precision and efficiency. These technologies use a combination of image processing, pattern recognition, and predictive analytics to detect diseases early, often before symptoms become visually apparent to the human eye. The AI and ML models can analyze images of crops captured by drones, satellites, or smartphones to identify disease symptoms. These models are trained on large datasets of images that contain various stages and types of plant diseases. Convolutional neural networks are particularly effective in recognizing patterns associated with specific diseases, such as leaf spots, blights, and rusts. This allows for rapid and accurate disease identification across large fields [5]. Artificial intelligence and machine learning can also predict the likelihood of disease outbreaks by analyzing environmental data such as temperature, humidity, and soil moisture. These predictions help farmers take preventive measures, such as adjusting irrigation practices or applying fungicides at optimal times, thus reducing crop losses. The ML models can predict the spread of diseases like late blight in potatoes by analyzing weather patterns and historical disease data [6].

Harvest Optimization

Harvest optimization is a critical aspect of crop management, where the timing and method of harvest can significantly impact crop yield and quality. Artificial intelligence and machine learning are increasingly being

utilized to optimize the harvesting process, ensuring that crops are harvested at the right time and in the most efficient manner possible. The AI and ML algorithms can analyze a wide range of data inputs, including weather patterns, soil conditions, crop growth stages, and historical yield data, to predict the optimal time for harvesting. This helps farmers maximize yield and quality by harvesting crops when they are at their peak. Machine learning models can predict the best harvest time for fruits like grapes and apples, considering factors such as sugar content and ripeness, which are crucial for the quality of the final product [7]. AI-powered robotics and machinery are being developed to automate the harvesting process, especially for labor-intensive crops like fruits and vegetables. AI-driven robots equipped with cameras and sensors can distinguish between ripe and unripe fruits and selectively harvest only those that meet the desired criteria [8]

Challenges of AI and ML in Crop Management

Although AI and ML offer promising solutions for improving crop management, several challenges need to be addressed to fully harness their potential. These challenges span technical, economic, and social dimensions, which are critical for the successful integration of AI and ML into agriculture. The AI and ML algorithms rely heavily on large datasets for training and accurate predictions. However, in agriculture, data collection can be inconsistent, especially in regions with limited technological infrastructure. The implementation of AI and ML in crop management requires specialized knowledge in both agriculture and data science. Farmers and agronomists often lack the necessary technical expertise to deploy and maintain these systems effectively. The adoption of AI and ML technologies in agriculture involves significant upfront investment in hardware (e.g., sensors, drones) and software. In many rural areas, particularly in developing countries, the lack of infrastructure such as reliable internet connectivity, electricity, and technical support poses a significant barrier to the adoption of AI and ML. Without the necessary infrastructure, farmers cannot effectively implement or benefit from AI-driven crop management solutions. The use of AI and ML in agriculture raises ethical concerns related to data privacy, job displacement, and the digital divide. Farmers may be reluctant to share data due to concerns about privacy and data ownership. Additionally, the automation of tasks traditionally performed by laborers could lead to job losses, particularly in regions where agriculture is a major source of employment.

Conclusion

Integration of AI and ML into plant management offers considerable potential to improve productivity, sustainability and resilience in the face of growing challenges such as climate change and nutritional security. Through advances in predictive analytics, KI and ML have more accurately predicted crop yields, pest outbreaks and weather patterns so that farmers can be properly discovered and optimized resource consumption. The synergy of AI, ML and emerging technologies such as IoT and autonomous agricultural equipment promises to revolutionize agriculture even more. These technologies allow monitoring and decision-making in real time, automate labor-intensive tasks and personalize agricultural solutions to the specific needs of individual farmers. Furthermore, the use of AI and ML accelerates the development of resilient plant varieties in harvest breeding and genomics, contributing to the long-term sustainability of agricultural practices. Issues such as data quality and availability, technical complexity, high costs, and infrastructure limitations create significant obstacles, especially for smallholder farmers in developing regions. Additionally, ethical considerations regarding data protection, job shifts and digital gaps must be addressed to ensure that the benefits of AI and ML are distributed fairly.

References

https://www.basic.ai/blog-post/7-applications-of-ai-in-agriculture

https://keymakr.com/blog/ai-in-agriculture-revolutionizing-crop-management-and-yield-prediction/

Bali N, Singla A. Emerging trends in machine learning to predict crop yield and study its influential factors: A survey. Arch Comput Methods Eng. 2022;29(1):95–112.

Bose S, Banerjee S,Kumar S, Saha A,

Nandy D, Hazra S. Review of applications of artificial intelligence (AI) methods in crop research. J Appl Genet. 2024;65(2):225–240

Ferentinos KP. Deep learning models for plant disease detection and diagnosis. Comput Electron Agric. 2018;145: 311–318.

Mahlein AK. Plant disease detection by imaging sensors–parallels and specific demands for precision agriculture and plant phenotyping. Plant Dis. 2016;100(2):241–251.

Koirala A, Walsh KB, Wang Z, McCarthy C. Deep learning for real-time fruit detection and orchard fruit load estimation: Benchmarking of 'MangoYOLO'. Precis Agric. 2019;20(6):1107–1135.

Bac CW, Van Henten EJ, Hemming J, Edan Y. Harvesting robots for high-value crops: State-of-the-art review and challenges ahead. J Field Robot. 2014;31(6):888–911.

****

3. AGRIULTURE

Role of Women in Start-up India

S.S.Chinchorkar and F.G.Sayyad

Assistant Professor, Polytechnic in Agricultural Engineeing, AAU,Dahod,Gujarat, India

Introduction

Woman entrepreneurs may be a contemplation of as a single lady or a group of them who commence enterprise, set up system, and give a life blood cell to the business enterprise. Through the definition of Government of India, one can summarize that a woman having competences of taking ownership, ability to control the business and having least financial interest of 51% of capital and generating at least 51 % employment in the business for other women. The past decades record that out of the total entrepreneurs, women contribute only 10% that has been considered as significant growth in self-employment of women with women starting a new business at three times the rate of men. This statistic shows that women should be encouraged to come out and to contribute towards the economic growth of the country and one way of achieving this is by motivating them to become entrepreneurs.

(Sharma M. Y., Women Entrepreneur in India, 2013).

Since mid-1991just after the financial crisis in India, the Indian economy has been witnessing tremendous change with new policies of economic liberalization, globalization and privatization initiated by the Indian government. Furthermore, the women entrepreneurs have been awarded since the last three decades with the sudden growth of increasing ratio of women ventures and their sustainable contribution towards economic growth. Since, 1974, the Indian economy has observed the contribution of women with 14.1% participation of women which reached to 31.6% participation of women in 2001 into the entrepreneurial field. (Sharma P. , 2013).

However, reaching to this extent was not a walk on roses for women. There are varioushindrances which affect women to be successful entrepreneurs such as finance, marketing, workplace facilities, etc. It is conceivably for these rationale government and non-government organizations and national and international agencies have shown their interest in the issues related to entrepreneurship. Furthermore, there has been much development of training and programmes which help women to develop their entrepreneurial roles. Women entrepreneurs perform a key role in confidence building and creating awareness among other women to be self-reliant and empowered. (Sharma, Dua, & Hatwal, 2012).

In January 2016, the start-up initiative came in to its own form and designed in a way to develop ecosystem without biasing gender for men and women (StartupIndia, 2018).After that in current scenario, the start-up ecosystem really commenced and came in to its real form where its came through various enormous aspects such as financial availability from money lenders, unification of pursuit to grow, adoption of new technology to grow and negotiating the domestic market. The previous figures states

that the government has decided its target of 3000 women to be motivated to join start ecosystem and now its increased more than 11,500 by 2020. It is considered as a revolutionary change which has affected the market trends in India (Chandiok, 2016). Globally, it is considered that start-up is an opportunity and an initiative for beginner to contribute as a nation builder as they bring a tremendous impact into the growth of the economic development of a country like India. (Manikandan & Jayakodi, 2017).

Concept of Women Entrepreneurs

Woman who takes initiative to start her a venture personally or in group with others and run a business enterprise to fulfil the desire to be socially and economically independent by keeping in mind about her personal, family needs and social recognition. Women entrepreneurship can be considered as an ownership, creation and control of business by women which results in social and economic empowerment of women. (Rai, 2018).

Women Start-Ups in India

To begin with, the current ecosystem for women to start their venture is encouraging. There is a significant change into the field of entrepreneurs and startups. India is considered at third rank on number of businesses started with more than 4000 businesses started from home. Now investors are looking forward to give funding and that has increased the incubation facilities and supportive start-up ecosystem. Simultaneously, the current scenario is also changing their visionary concept amongst women who performed as entrepreneurs; the identity of woman entrepreneur is considerably counted as persevere, creator, risk taker, knowledgeable, confident and passionate with versatile ability to manage her own enterprise. Now it is not a talk of rumors that more and more women are in business but they inspire thers too. (Manshani and Dubey, 2017).

Opportunities of Indian Women Entrepreneurs

Women entrepreneurs believe good enough to contribute for the society well-being in order to tap the opportunities in entrepreneurship. They have many responsibilities towards society betterment.in recent days woman entrepreneurs are performing extremely fantastic. (DEEPTHI POREDDY,2020)

- Eco-friendly technology
- Bio-technology
- IT enabled enterprises
- Event management
- Tourism industry
- Telecommunication
- Plastic materials
- Vermiculture
- Mineral water
- Sericulture
- Floriculture
- Herbal & health care
- Food, fruits & vegetable processing

Suggestions

There should be a continuous attempt to inspire,encourage, motivate and operate women entrepreneurs. Government should encourage and support women by providing infrastructural facilities,finance, training programmes, skill development programmes etc. AN awareness programme should be conducted on a mass scale with the intention of creating awareness among women about the various areas to conduct business. Vocational training to be extended to women community that enables them to understand the production process and production management. Skill development to be done in women industrial training institutes. Women entrepreneur guidance cell may be set up to handle the various problems of women entrepreneurs.

References

Chandiok, D. S. (2016). India the world's fastest growing start-up ecosystem: A Study. Amity Research Journal of Tourism, Aviation and Hospitality, 1 (2), 84.

Deepthi Poreddy,2020. Role of Women Entrepreneurs in India – Problems And Opportunities, Volume 4, Special Issue No.1, July 2020

Manikandan, D., & Jayakodi, J. (2017). An Empirical Study on Consumers Adoption of obile Wallet with Special Reference to

Chennai City. International Journal of Research, 5 (5), 110.

Manshani, S., & Dubey, A. (2017). Startup Women in Startup India: A Study of Women Entrepreneurs in India. International Journal of Business and General Management (IJBGM), 6 (4), 91.

Rai, M. K. (2018). Issues and challenges of women entrepreneur in India. International Journal of Academic Research and Development, 3 (1), 634.

Sharma, P. (2013). Women Entrepreneurship Development in India. Global Journal of Management and Business Studies, 3 (4), 371-374.

Sharma, D. A., Dua, M. S., & Hatwal, M. V. (2012). Micro Enterprise Development and Rural Women Entrepreneurship: Way for Economic Empowerment. Arth Prabandh: A Journal of Economics and Management, 2 (6), 114-116.

Startupindia. (2018). https://www. startupindia.gov.in. Department of Industrial Policy and Promotion. Delhi: Government of India - Ministry of Commerce & Industry, Department of Industrial Policy and Promotion.

****

4. AGRIULTURE-DIGITAL MARKETING

Role of Digital Marketing in Transforming Indian Agriculture

Shilpa P. Chowti [1] and Saraswathi J. M [2]

[1] Assistant Professor, ZAHRS, Babbur Farm, Hiriyur., [2] Scientist, KVK, Hiriyur

Introduction

Digital marketing refers to the use of digital channels, platforms, and technologies to promote products or services to consumers and businesses. It encompasses a wide range of marketing activities that leverage the internet and electronic devices.

There is a saying that "Ignoring digital marketing is like opening a business but not telling anyone." - KB Marketing Agency. This quote cuts straight to the point that digital marketing is a quintessential part of the business world today.

Agriculture and Digital Marketing

Digital marketing has become an increasingly vital tool for the agricultural sector, offering numerous opportunities to enhance the reach, efficiency, and profitability of farming operations.

Key roles of Digital Marketing in Agriculture:

I. Enhancing Market Reach

- **Global Audience:** Digital marketing enables farmers and agribusinesses to reach a global audience, expanding their market beyond local boundaries. This is particularly beneficial for niche products or unique agricultural innovations.
- **Targeted Advertising:** By using tools such as social media ads and Google Ads, agricultural businesses can target specific demographics, interests, and locations to reach potential customers more effectively.

II. Building Brand Awareness

- **Content Marketing:** Creating and sharing valuable content such as blog posts, videos, and infographics about farming techniques, crop care, and sustainable practices helps build brand authority and trust.
- **Social Media Presence:** Platforms like Facebook, Instagram, and LinkedIn are instrumental in engaging with the community, sharing success stories, and promoting products.

III. Driving Sales

- **E-Commerce:** Digital marketing supports the establishment of online marketplaces where farmers can sell their produce directly to consumers,

bypassing middlemen and increasing profit margins.

- **Email Marketing:** Sending targeted email campaigns to customers about new products, special offers, and seasonal produce can drive sales and foster customer loyalty.

IV. Educating and Engaging Consumers

- **Informative Campaigns**: Digital platforms allow for the creation of educational campaigns that inform consumers about the origins of their food, the benefits of organic produce, and sustainable farming practices.
- **Interactive Content:** Engaging consumers through quizzes, surveys, and interactive infographics can increase awareness and interest in agricultural products.

V. Networking and Partnerships

- **B2B Marketing:** Digital marketing facilitates connections with other businesses, suppliers, and distributors. LinkedIn and industry-specific forums can be used to form strategic partnerships.
- **Influencer Collaborations:** Partnering with influencers in the agriculture or food industry can help promote products and practices to a wider audience.

VI. Enhancing Efficiency and Innovation

- **Market Research:** Digital tools provide valuable data and insights into market trends, consumer preferences, and competitor strategies, enabling more informed decision-making.
- **Innovative Solutions**: Promoting new technologies and innovations through digital marketing can help farmers adopt more efficient and sustainable farming practices.

Examples of Digital Marketing in Agriculture

- **Farm Blogs and Vlogs:** Farmers sharing their daily routines, challenges, and triumphs through blogs and video blogs (vlogs) to engage with their audience and build a community.
- **Virtual Farm Tours:** Using virtual reality (VR) and 360-degree videos to provide virtual farm tours, giving consumers a firsthand look at farming operations.
- **Online Workshops and Webinars:** Hosting educational workshops and webinars on topics such as organic farming, pest management, and crop rotation to engage and educate farmers and consumers.

Digital Marketing Challenges

The digital world poses special challenges for marketers. For example, digital channels proliferate rapidly, and marketers have to keep up on them and figure out how to use them effectively. Marketers can also find it challenging to analyze and make productive use of the huge amount of data they can capture through these platforms. Perhaps most important, consumers are increasingly inundated with digital ads and other distractions, making it more and more difficult to capture their attention.

Conclusion

Digital marketing is a transformative tool in the agricultural sector, providing numerous opportunities for farmers and agribusinesses to enhance their reach, efficiency, and profitability. By leveraging digital channels, the agricultural industry can engage with a broader audience, drive sales, build brand awareness, and promote sustainable practices, ultimately contributing to a more connected and informed agricultural community.

References

Bhagowati and D. M. Dutta, “A study on literature review for identifying the factors impacting digital marketing,” *International*

Journal of Sales & Marketing Management Research and Development, Aug., vol. 8, no. 3, pp. 1-8, 2018.

Lavanya A and M. Radhikamani., A study on digital marketing and its impact, *International Journal of Creative Research Thoughts,* vol. 9 (5), pp. 677-684.

Yasmin. S. Tasneem and K. Fatema, "Effectiveness of digital marketing in the challenging age: an empirical study," *Journal of International Business Research and Marketing*, vol. 1, no. 5, Apr., pp. 69-80, 2015.

*****

*****

5. AGRIBUSINESS MANAGEMENT

Challenges in Rural Marketing

Ashish M. Shendurse

Associate Professor, Kamdhenu University, Gandhinagar (Gujarat)

Introduction

India's rural market concept is still developing, and the industry faces several difficulties. The lack of retail locations and distribution expenses are two of the biggest issues facing marketers. In the rural Indian market, a brand's success is as erratic as the weather. Numerous brands that ought to have succeeded have utterly failed. This is due to the fact that most businesses attempt to adapt their urban marketing strategies to rural markets. At the product planning stage, the distinct demands, preferences, and consumption patterns of rural consumers should be examined to ensure that they are met (Mohammad and Syed, 2013). However, there are relatively few examples of comprehending the rural 'mindset' and simply the 'practice' of rural marketing. Assumptions, generalizations and stereotypes replace insights and the extra effort is needed to 'think rural'. Rural marketing is marketing to a rural 'mindset'; not a rural market (Rafiuddin and Ahmed, 2011).

Addressing the rural markets, presents a number of complications for businesses, some of the most important of which are understanding rural consumers, delivering goods and services to isolated rural areas and interacting with wildly diverse rural audiences. Unfortunately, not many businesses have spent enough time in the field and money on research to fully understand rural consumer's requirements, beliefs, goals and usage patterns. The main goal of marketing is "getting to know your customer", yet most businesses in rural areas have failed to achieve success because they have mostly disregarded this fundamental idea (Kumar and Naruka, 2015).

India is a nation with many different languages, customs, and civilisations. Because of these conditions, it is now difficult for manufacturers to tailor their products to the Indian market (Ashu, 2015). The source of income, the frequency of income receipt, the seasonality of income, and consumption are the most important socioeconomic aspects that determine the differences between rural and urban markets. Small, non-contiguous settlement units of villages, rural marketplaces have comparatively few infrastructure amenities, a low population density, and distinct lifestyles. Farmers who rely on the whims of nature for their income constitute the majority of rural customers (Kaur, 2015; Meenakshi and Takkar, 2015; Nisha, 2016).

Challenges in Rural Marketing

The most common factors, which the marketers of different sectors are facing in marketing their products/services in rural markets, are as follows (Jain and Saini, 2012; Arora, 2015; Meenakshi and Takkar, 2015):

- **Seasonal Demand**: Since agriculture is the primary source of income in rural markets, demand for commodities is influenced by

agricultural conditions. Since agriculture is heavily reliant on the monsoon, demand and purchasing power are neither consistent or stable.

- **Transportation**: Market accessibility is reduced in rural India due to inadequate transportation infrastructure. Rail travel does not connect many remote locations. During the monsoon, *Kacchha* routes become impassable, and settlements in the interior get cut off. Other issues include the lack of bus or truck services in rural areas as a result of inadequate road construction.
- **Warehousing**: Storage facilities are needed to fill the gap between production and consumption. Rural areas lack adequate storage infrastructure to fulfil seasonal demands. Proper storage is necessary to safeguard grains against insects, pests, and birds. Therefore, one of the biggest obstacles facing marketers in rural areas is the absence of sufficient and scientific storage facilities.
- **Communication Issues**: There are several barriers to marketing communication in rural markets. It is caused by a number of causes, including economic backwardness, traditional practices, and low literacy rates. Despite this, there is still another issue, which is that the languages differ from one state and location to another. There is no common language in rural markets. Due to this, the rural consumers, unlike urban consumers do not get exposure to new products. Moreover, lack of proper physical communication facilities like telephone, fax and telegram are poor in rural areas.
- **Traditional Life**: The village system itself causes issues in India. Rural communities are still dominated by antiquated traditions and conventions, and people there are slow to embrace contemporary technology. Additionally, the rural markets are widely dispersed, which makes distribution calls more frequent and makes it more difficult to reach rural customers.
- **Purchasing Decisions**: Rural consumers take their time and are cautious when making purchases. They prefer to try things first, and they only purchase a product once they are personally happy.
- **Access to Suitable Media:** In rural households, formal media reach is limited. Modern communication facilities are available to only 30% of rural populations. According to an old survey, only 18% of Indians living in rural areas are exposed to print media. Although television is a common communication tool in rural areas, the lack of electricity prevents the rural population from benefiting from it. Data transmission to villages is being developed, but it is a gradual process that hinders the significant expansion of rural marketplaces. In rural locations, the market must thus engage in certain sales promotion activities, such as attending fairs, melas, or haats.
- **Cultural Factors**: A system of common values, ideas, and perceptions that shape consumer behaviour is called culture. Every group has an impact on how people behave in villages, and these groups vary according to factors including religion, caste, occupation, income, age, education, and politics.
- **Others Factors**: Additional factors include natural disasters and market conditions (price, supply, and demand); pests and diseases; drought or excessive precipitation; outdated farming practices; inadequate storage facilities that expose grain to rats and rain; market intelligence (villagers are informed of current market prices); a lengthy chain of middlemen (many middlemen between growers and consumers; wholesalers and retailers); and basic practices (market dealers and commission agents receive a good portion of sale of receipts).

Conclusion

Rural marketing is essential to the growth of the national economy. Although there is no denying the complexity of the Indian rural economy, we must acknowledge some basic facts. Rural customers are extremely cost-conscious. If concentrated, they can influence the company's growth even though they might not have purchasing power. The purchasing power of rural areas increases exponentially with a slight rise in income. Businesses have a chance to swarm into rural areas thanks to the increasing purchasing power of rural consumers. Since the urban market has a smaller market share than the rural one, businesses will see a gain in sales and market share if they focus on the rural markets. The potential of the rural market is enormous and has not yet been realised. India's rural prosperity is the key to the country's overall prosperity, hence no rural area should be overlooked. Understanding rural market potential in relation to the nation's development priorities and formulating a plan where rural markets and industries play a significant part in the overall growth of the country are at the heart of today's scientific approach. In the end, the person who has the necessary time and financial resources as well as the much-needed creative ideas to reach the rural markets will win. For those who can comprehend the intricacies of rural markets, the future of rural marketing is therefore extremely bright.

References

Arora R. (2015). Rural Marketing- Factors Contributed to Growth. International Journal of Research in Finance & Marketing, 5(1): 63-73.

Ashu (2015). Significance of Rural Marketing. International Journal of Research in Finance & Marketing, 5(1): 53-62.

Jain V. and Saini B. (2012). Contribution of Rural Marketing in the Inclusive Growth of India. International Journal of Research in IT & Management, 2(11): 76-81.

Kaur K. (2015). Rural marketing: it's potential & challenges – a study of Ludhiana city. South Asian Journal of Marketing & Management Research, 5(3): 84-98.

Kumar M. and Naruka N.S. (2015). Marketing Strategies of Rural Market and Their Challenges. International Journal in Management and Social Science, 3(9): 102-109.

Meenakshi and Takkar K. (2015). Rural marketing in India: Opportunities and challenges. International Journal of Marketing and Technology, 5(6): 120-130.

Mohammad I. and Syed A.W. (2013). Indian Rural Market: Issues, Opportunities & Challenges. ZENITH International Journal of Business Economics & Management Research, 3(9). Online available at zenithresearch.org.in.

Nisha S. (2016). Rural Marketing. EXCEL International Journal of Multidisciplinary Management Studies, 6(2): 19-24.

Rafiuddin M.D. and Ahmed B. (2011). Understanding the Potential of Rural Marketing in India - An Analytical Study. Int. Journal of Business Economics & Management Research, 1(2): 126-139.

6. SOIL SCIENCE

Role of Digital Soil Mapping in Soil Survey and How Does It Compare to Conventional Soil Mapping?

Vipin Kumar and Akansha Singh

Ph.D Soil Science and Agricultural Chemistry, SVP University of Agriculture and Technology, Meerut (U.P.)

In general, soil maps are accustomed to simply identify soils and their properties but are sometimes required for more specific purposes, like determining the suitability of a soil for particular crops, or the land drainage capabilities of a region. Consistent with Carré *et al.*, 2007, the method of soil mapping involves the creation and population of spatial soil information by the employment of field and laboratory observational methods as well as spatial and non-spatial inference systems. Another sort of mapping is Digital Soil Mapping (DSM). It's a crucial branch of Soil Science which deals with computer-generated

digital maps of soil types and soil properties. It's also called 'predictive soil mapping' or 'pedometric mapping'. It provides detailed information regarding the various soil properties like soil pH, soil moisture content, soil organic carbon, electrical conductivity (EC), cation exchange capacity (CEC), the nutrient concentrations in soil like nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sulfur (S) and other micronutrients, gypsum concentration, percentage of base saturation, the concentration of heavy metals, nature of parent material, etc. Under the Digital Mapping through the digital elevation models, geostatistical modeling and spatial interpolations of the collected soil samples from a given area. Some instruments that use, like Portable X-Ray Fluorescence Spectrometer (PXRF) together with polynomial algorithms and different 'R' software packages play a vital role in Digital Soil Mapping. Geostatistical modeling tools like kriging, splines, simulation options, covariance functions, semi-variance functions and variograms are employed in the spatial interpolation of the collected data to urge digital soil maps.

The National Soil Survey Center-Geospatial Research Unit (NCSS GRU), U. S. Department of Agriculture (USDA) has identified DSM as a vital area of focus in support of soil survey activities. It uses various methods like numerical classification, spatial and temporal interpolation, statistical analysis, sampling design, uncertainty and incorporation of auxiliary data (proximal and remotely sensed imagery and soil-terrain modeling) to extend predictive maps of soil classes and soil properties. The framework of digital soil mapping could be a combination of soil science, geographic science, quantitative methods (statistics and geostatistics) and cartography. It normally involves both technological inputs like Global Positioning System (GPS) receivers, Remote Sensing, Field Scanners, etc. and computational inputs like Geographic Information Systems (GIS), Digital Elevation Models (DEMs), geostatistical interpolations, inference algorithms and data processing.

The popularity of digital soil mapping techniques has progressed as soil scientists have adopted the most recent tools to help within the mapping process. The technique of creating an inference of a couple of landscape segments (e.g., a soil map unit) from some point-based explanation using the operative soil-forming factors is the "model." Whether the soil map is produced using nothing but a bucket auger and an aerial photo or using geospatial software, the strategy may well be a modeling operation. The employment of DSM methods is increasing over time and might eventually cease to be considered distinct, novel techniques.

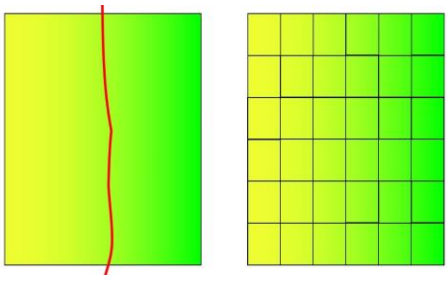
The digital soil map could also be a raster-based map composed of 2-dimensional cells (pixels) organized into a grid during which each pixel includes a specific geographic location and contains soil data. It is a technique for better captures observed spatial variability and reduces the need to aggregate soil types supported by a group mapping scale. (Zhu *et a*l., 2001) The provision and accessibility of geographic information systems (GIS), global positioning systems (GPS), remotely sensed spectral data, topographic data derived from digital elevation models (DEMs), predictive or inference models, and software for data analysis have greatly highly developed the science and art of soil survey.

Conventional soil mapping now incorporates point observations within the sphere that is geo-referenced with GPS and digital elevation models visualized during a GIS. On the opposite hand, the useful characteristic between digital soil mapping and standard soil mapping is that digital soil mapping utilizes quantitative inference models to induce predictions of soil classes or soil properties in a very geographic database (raster). Models supported data processing, statistical analysis, and machine learning organizes infinite amounts of geospatial data into meaningful clusters for recognizing spatial patterns. A significant amount of the information employed in digital soil mapping is archived during a digital format during a GIS, that the expert knowledge accustomed predict soil distribution on the landscape is retained. Objective sampling plans are often implemented to statistically capture the variability of the landscape, represented by digital environmental covariates

(environmental data representing soil-forming factors). The foremost exciting aspects of digital soil mapping relate to the power to depict smaller segments of the landscape for traditional soil classes, continuous representation of chemical and physical properties in multiple proportions and also the associated generation of raster layers representing respective uncertainties. These are capabilities that will allow soil scientists to more completely and thoroughly represent their soil knowledge to users than the present vector model.

Digital Soil Mapping in a Short

- Digital soil mapping is that the generation of geographically referenced soil databases that supported quantitative relationships between spatially explicit environmental data and measurements made within the field and laboratory (Mc Bratney *et al.*, in 2003).
- In this mapping prediction of soil classes or properties from point data employing a statistical algorithm.
- Here map is also a raster composed of 2-dimensional cells (pixels) organized into a grid during which each pixel includes a selected geographic location and contains soil data.
- But in conventional mapping, have some problems like "Where is that the boundary between two soils and also the main focus is on those marginal areas (left figure below).
- Here, the central concept is well defined with variation expressed across the landscape (right figure below).



- These maps show the spatial distribution of soil classes or properties and should document the uncertainty of the soil prediction.
- It could also be accustomed create initial soil survey maps, improve or update existing soil surveys, generate specific soil interpretations, and evaluate risk (Carré et al., 2007).
- It can facilitate the rapid supply, re-inventory, and project-based managing of lands in an exceedingly changing environment.

Conclusion

Digital methods have greatly highly developed our ability to map soil. This is advances greater consistency and efficiency of synthesizing data. The speed at which we will analyze large amounts of information has made it possible for us to leverage the massive increase in data presented (e.g. remote sensing) and to use the information in new ways. As we move forward with digital soil mapping, we should always recognize the explanations behind conventional soil mapping methods and also the real reasons behind why we decide certain techniques in digital soil mapping.

Reference

Carré F, McBratney AB, Mayr T, Montanarella L.(2007) Digital soil assessments: beyond DSM. Geoderma. 2007; 142:69-79.

McBratney, A.B., M.L. Mendonça-Santos, and B. Minasny. (2003). On digital soil mapping. Geoderma 117:3-52.

Zhu, A.X., B. Hudson, J. Burt, K. Lubich, and D. Simonson. (2001). Soil mapping using GIS, expert knowledge, and fuzzy logic. Soil Science Society of America Journal 65:1463-1472.

7. SOIL MICOBIOLOGY

Role of Humic Substances in Soil Fertility

*Dhanni Devi[1] Narayan Prasad Verma[2]
[1 and 2]Department of Agricultural Microbiology, IGKV, Raipur (C.G.)-492012

Introduction

Humic Substances play a vital role in soil fertility and plant nutrition. Plants grown on soils which contain adequate humin, humic acids (HAs), and fulvic acids (FAs) are less subject to stress, are healthier, produce higher yields; and the nutritional quality of harvested foods and feeds are superior. The value of humic substances in soil fertility and plant nutrition relates to the many functions these complex organic compounds perform as a part of the life cycle on earth. The life death cycle involves a recycling of the carbon containing structural components of plants and animals through the soil and air and back into the living plant. The urgency to emphasize the importance of humic substances and their value as fertilizer ingredients has never been more important than it is today. All those concerned about the ability of soils to support plant growth need to assist in educating the public. Humic substances are recognized by most soil scientists and agronomists as the most important component of a healthy fertile soil. They function to give the soil structure, porosity, water holding capacity, cation and anion exchange, and are involved in the chelation of mineral elements.

Humus: Humus is defined as a brown to black complex variable of carbon containing compounds not recognized under a light microscope as possessing cellular organization in the form of plant and animal bodies.

Fractions of Humic Substance: (1) HUMIN, (2) HUMIC ACIDS (HAs), and (3) FULVIC ACIDS (FAs). These sub divisions are arbitrarily based on the solubility of each fraction in water adjusted to different acid alkaline (pH levels) conditions.

Humins: Humins are that fraction of humic substances which are not soluble in alkali (high pH) and not soluble in acid (low pH). Humins are not soluble in water at any pH. Humin complexes are considered macro organic (very large) substances because their molecular weights (MW) range from approximately 100,000 to 10,000,000. In comparison the molecular weights of carbohydrates (complex sugars) range from approximately 500 to 100,000. The chemical and physical properties of humins are only partially understood.

Humic Acids: Humic acids (HAs) comprise a mixture of weak aliphatic (carbon chains) and aromatic (carbon rings) organic acids which are not soluble in water under acid conditions but are soluble in water under alkaline conditions. Humic acids consist of that fraction of humic substances that are precipitated from aqueous solution when the pH is decreased below 2.

Humic acids (HAs) are termed polydisperse because of their variable chemical features. From a three dimensional aspect these complex carbon containing compounds are considered to be flexible linear polymers that exist as random coils with cross linked bonds. On average 35% of the humic acid (HA) molecules are aromatic (carbon rings), while the remaining componentsare in the form of aliphatic (carbon chains) molecules. The molecular size of humic acids (HAs) range from approximately 10,000 to 100,000. Humic acid (HA) polymers readily bind clay minerals to form stable organic clay complexes. Peripheral pores in the polymer are capable of accommodating (binding) natural and synthetic organic chemicals in lattice type arrangements.

Fulvic Acids: Fulvic acids (FAs) are a mixture of weak aliphatic and aromatic organic acids which are soluble in water at all pH conditions (acidic, neutral and alkaline). Their composition and shape is quite variable. The size of fulvic acids (HFs) are smaller than humic acids(HAs), with molecular weights which range from approximately 1,000 to 10,000. Fulvic acids (FAs) have oxygen content twice that of humic acids (HAs). They have many carboxyls (COOH) and hydroxyl (COH) groups, thus fulvic acids (FAs) are much more

chemically reactive. The exchange capacity of fulvic acids (FAs) is more than double that of humic acids (HAs). This high exchange capacity is due to the total number of carboxyl (COOH) groups present. The number of carboxyl groups present in fulvic acids (FAs) ranges from 520 to 1120 cmol (H+)/kg.

Humic Substances and their impact on Soil Fertility

Humic substances are a good source of energy for beneficial soil organisms. Humic substances and non humic (organic) compounds provide the energy and many of the mineral requirements for soil microorganisms and soil animals. Beneficial soil organisms (algae, yeasts, bacteria, fungi nematodes, mycorrhizae, and small animals) perform many beneficial functions which influence soil fertility and plant health. Humus functions to improve the soil's water holding capacity. The most important function of humic substances within the soil is their ability to hold water. From a quantitative standpoint water is the most important substance derived by plants from the soil. Humic substances help create a desirable soil structure that facilitates water infiltration and helps hold water within the root zone. Because of the large surface area and internal electrical charges, humic substances function as water sponges. These sponges like substances have the ability to hold seven times their volume in water, a greater water holding capacity than sod clays. Water stored within the top soil when needed, provides a carrier medium for nutrients required by soil organisms and plant roots.

Humic substances are key components of a friable (loose) soil structure. Various carbon containing humic substances are key components of soil crumbs (aggregates). Complex carbohydrates synthesized by bacteria and humic substances function together with clay and silt to form soil aggregates. As the humic substances become intimately associated with the mineral fraction of the soil, colloidal complexes of humus clay and humus silt aggregates are formed. These aggregates are formed by electrical processes which increase the cohesive forces that cause very fine soil particles and clay components to attract each other. Once formed these aggregates help create a desirable crumb structure in the top soil, making it more friable. Soils with good crumb structure have improved tilth, and more porous openings (open spaces).

These pores allow for gaseous interchange with the atmosphere, and for greater water infiltration. Degradation or inactivation of toxic substances is mediated by humic substances. Soil humic substances function to either stabilize or assist in the degradation of toxic substances such as: nicotine, aflatoxins, antibiotics, shallots, and most organic pesticides. In the microbial degradation process not all of the carbon contained within these toxins is released as CO2. A portion of these toxic molecules, primarily the aromatic ring compounds are stabilized and integrated within the complex polymers of humic substances. Humic substances have electrically charged sites on their surfaces which function to attract and inactivate pesticides and other toxic substances. For this reason the Environmental Protection Agency recommends the use of humates for clean-up of toxic waste sites. Humic substances buffer (neutralize) the soil pH and liberate carbon dioxide. Humic substances function to buffer the hydrogen ion (pH) concentration of the soil. Repeated field studies have provided experimental evidence that the addition of humic substances to soils helps to neutralize the pH of those soils. Both acidic and alkaline soils are neutralized. Soil enzymes are stabilized and inactivated by humic substances. Soil enzymes (complex proteins) are stabilized by humic substances within the soil by covalent bonding. Stabilization renders these enzymes less subject to microbial degradation. Once stabilized and bound to the humic substances enzyme activity is greatly reduced or ceases to function. However many of these bonds are relatively weak during periods of pH change within the soil, these enzymes can be released. When some components of humic substance react with soil enzymes they are more tightly bound Soil temperature and water evaporation rate are stabilized by humic substances.

Humic substances function to help stabilize soil temperatures and slow the rate of water evaporation. The insulating properties of humic substances help maintain a more uniform soil temperature, especially during periods of rapid climatic changes, such as cold

spell or heat waves. Because water is bound within the humic substances and humic substances reduce temperatures fluctuations, soil moisture is less likely to be released into the atmosphere. Humic substances aid in the position of soil minerals by forming metal organic clay complexes, a process termed soil genesis. Soil formation (soil genesis) involves a complexing of transition mineral elements, such as copper (Cu), zinc (Zn), iron (Fe), and manganese (Mn) from soil minerals with humic acids (HAs), fulvic acids (FAs) and days. This complexing process inhibits crystallization of these mineral elements. The complexing process is in part controlled by the acidity of these weak acids and the chelating ability of humic substances.Stored energy and trace mineral content of humic substances helps sustain sod organisms involved in transmutation. Application of humins, humic acids, and fulvic acids to saline soils, in combination with specific soil organisms, results in a reduction in the concentration of sodium salts (e.g. NaCI). The reduction is not correlated with a leaching of the salt, rather with an increase in the concentration of other elements. The addition of humic substances to soils containing excessive salts can help reduce the concentration of those salts. By reducing the salt content of a soil its fertility and health can be "brought back" to provide a more desirable environment for plant root growth.

8. AGICULTURAL EXTENSION

Privatization in Agricultural Extension Services

Surkunta kiran reddy

Ph.D. Scholar, Department of Agricultural Extension, U.B.K.V, Pundibari-736165, West Bengal

Introduction

Historically, national research and extension systems have been solely responsible for agricultural technology promotion and development in smallholder farming systems (Hove, 2006). Worldwide the public sector plays a dominant role in the provision of agricultural extension services. Public sector extension has a rich reserve of experience and research (Kokate, 2012). Public extension system have come under severe criticism due to poor performance. As a result of the relatively poor performance record of public sector extension over the past two decades in India and elsewhere, there has been a trend towards Privatization of agricultural extension services.

Approaches of Privatization in Agricultural Extension

On the basis of international experience, following are some of the approaches suggested by various researcher in India for privatization of extension services.

- **Contractor System:** Government gives total cost of services or work to contractor and then he will be respon sible to provide service to the clients without charging any cost. This increase the efficiency and reduce the cost of service/ work.
- **Extension Contract System:** Agricultural consultant/firm will provide advisory and inputs to individual farmer or group. The cost of inputs is recovered after the harvest. The extension worker/firm is compensated by the farmer with some percent of the value of the crop above the agreed target.
- **Area Based Extension Strategy:** All the areas in the country may be classified into two groups. The developed and underdeveloped. The farmers from those areas which are developed can be provided extension services, but in the underdeveloped areas still government extension services will be required.
- **Separate Extension Strategy for Subsistence and Commercial Farmers:** Another way to privatize the extension system would be to provide fee based consultancy to commercial farmers and free services to the subsistence farmers. The criteria regarding subsistence and

commercial farmers will need to be clearly demarcated in such cases.

- **Contract farming:** The agri-business firm provides all input and technology. It also supervises production process. As per the rule the farmers has to sell his product, as quality specified to the firm only, for a premium price. The firm process and sell the product.
- **Dual Agriculture Extension System (DAES):** DAES extension system will work in two ways. Free service to the resource poor clients through farmer's group/model farms and offering paid consultancy service to the resourceful clients by working through form.
- **Public Extension through Private Delivery:** Agricultural consultancy firms are graded and certified by a government agency. Depending on Private Extension Services Provider (PESP) capacity, extension services are awarded to competitive bidders at different levels i.e. state, district, block/village etc. The service cost is shared between government and clients.

Challenges for Privatization of Agricultural Extension in India

Though privatization of extension services will stand as a partial substitute for public extension, but in India it faces some challenges such as:

- **Vagaries of monsoon:** This is challenge to privatization of extension system. About 70% of net sown area in India is dependent on rain and frequent draught and flood condition in various part of the country results into heavy economic loss. Extension approaches in such situation face lots of hurdles because of complex, diverse and risk proneness of the production environment.
- **Dilemma of farmers on credibility of message from private extension services:** Many of extension professional in education and research institute fear about the real intentions of private extension systems. Commodity oriented agri-business and input dealers always try to push their products without giving any heed to what farmers need. It will create dilemma and may actually put farmers in a confusing state.
- **Diversification of Indian agriculture sector**: Indian agriculture sector has been greatly diversified according to various agro-climatic zones. Any farming technology- that is suitable to one area may not be applicable to other area. Therefore, there is need of location specific technologies. Any effort to privatize extension system should necessarily be able to assess and refine technologies in close collaboration with research and farming community before attempting technology transfer.
- **Woman dominated rural work force:** Agriculture in India is a family occupation. The educational activities conducted by training and developmental organization have been largely non-target oriented. To be successful, extension systems need to have approaches to reach, efficiently and economically and to the farmwomen in addition to fanners and farm youth. Women farmers and farm labour need Particular attention in any agricultural extension and developmental programme designed to reach the un-reached.

Advantages of Privatization in Agricultural Extension Services

Advice from a privatized system may be more effective because the farmer can select an advisor who is best able to help. The farmer also is likely to prepare questions more carefully in order to make best use of the advisor's time for which the farmer has to pay.

Disadvantages of Privatization in Agricultural Extension Services

Privatization of the agricultural extension service has the disadvantage that

it may hamper the free flow of information. Government extension agents often contribute to farm magazines and agricultural radio programmes either without asking for payment or for only a small honorarium. With privatization they may be inclined to charge for their services in order earn the money their organization needs for its survival.

References

Hove, L, (2006): Agriculture technology transfer under relief and recovery programmes in Zimbabwe. Briefing Note no. 6. Cited at http// www.icrisat.cgiar.org/locations/esa

Kokate, K, D, (2012): Indian Extension System: The backbone of Indian agriculture. , *Agriculture Today*. 15(9):22-23

Singh, D. and Singh, B.K. (2011): Agricultural Extension and Rural Development (PP 89-96).

9. SOIL SCIENCE

Fertilizer Pallet Pack (FPP): A Controlled Release Nutrient Composite

[1]Pragyan Paramita Rout, [2]Dhaneshwar Padhan and [3]Gayatri Sahu

[1,3]Siksha 'O' Anusandhan University, Bhubaneswar, Odisha; [2]Central Silk Board, Bengaluru.

Introduction

Normally straight fertilizers are used as the source of nutrients and are broadcasted in crop fields. In surface application, the fertilizer use efficiency is very low (30-40 % for N, 10-20 % for P and 60-70% for K) since fertilizers are prone to various forms of losses *viz.,* volatilization, leaching, denitrification and fixation, etc. To overcome such situation Fertilizer Pellet Pack (FPP) technique was developed wherein crops can be established by placing a FPP near the root zone of each plant either vertically or horizontally in field.

Fertilizer Pellet Pack (FPP)

Fertilizer Pellet Pack (FPP) is a fertilizer pellet encapsulated in a polymer coated pack. Fertilizer pellet is made up of mixture of NPK fertilizers and encapsulated in a bio degradable polymer coated paper pouch. The nutrients in each fertilizer pellet are based on per plant requirement. Normally the degradation of polymer coated pack occurs after a half year. Until degradation, the paper pack is intact acting as a rigid barrier layer around the fertilizer pellet. This technique is a new development in the Department of Soil Science and Agricultural Chemistry, Tamil Nadu Agricultural University (TNAU), Coimbatore. This technology has been upscaled as an industrial entrepreneurship process by the assistance of Department of Science & Technology (DST), New Delhi in coordination with Tamil Nadu State Council for Science and Technology, Chennai during 2011-14.

Design of Fertilizer Pellet Pack

Originally the concept of Fertilizer Pellet Pack (FPP) was developed for the production of field crops. Fertilizer Pellet Pack consists of encapsulated fertilizer in pellet form (Fig 1). Fertilizer pellet is made up of mixture of NPK fertilizers in pellet form and encapsulated in a bio degradable polymer coated paper pouch. The nutrients in each fertilizer pellet are based on per plant requirement. In FPP, polymer paper has the role to permit the slow release of nutrients through minute pores. The shape of fertilizer pellet is cylindrical 20 mm diameter and 30 mm height which is suitable covered in the paper pack.

Fig 1. Design of Fertilizer Pellet Pack (FPP)

Fabrication of Fertilizer Pellet Pack

The fabrication of Fertilizer Pellet Pack involves two steps. In first step, the mixture of fertilizers is made into pellets by fertilizer pelleting machine. The second step involves encapsulation of pellets in a degradable polymer coated paper pouch.

Pelleting of fertilizers: First, required quantity of fertilizer (Urea, Single Super phosphate / DAP and Muriate of Potash) was taken as per the treatment imposed based on per plant requirement, added with 0.5% Maida powder and mixed properly. Then the fertilizer mixture was placed in the feed tray of fertilizer pelleting machine. Then by the reciprocating action of the piston fertilizer mixture was compacted and made out as fertilizer pellet measuring nearly about 30 mm length and 20 mm width and weighing approximately about 12 g.

Encapsulation of fertilizer pellets: Each fertilizer pellet was packed in a small pouch made of degradable polymer coated paper and the mouth was sealed with the hand sealing machine to prepare Fertilizer Pellet Packs. The polymer paper acts as a membrane which can pass through fertilizer solution by diffusion. The degradable polymer coated paper has a thickness of 15 microns. In this paper thin polymer sheet having short and broken polymers was laminated which leads to faster disintegration of the material. The degradation is more physical which is much hastened with exposure to sunlight and soil heat. The pellet packs are finally air dried and stored in plastic bags.

Nutrient release pattern of FPPs

FPP is placed near the root zone of each plant about 50 mm away from the central stem in field/ pot/ media. Normally the degradation of FPP occurs after a half year. Until degradation, the material is intact acting as a rigid barrier layer around the fertilizer pellet. In FPP, polymer paper has the role to permit the slow release of nutrients through minute pores. Through the pores nutrient solution slowly oozes out and then diffuses in the root zone enriching the soil and supporting the plant. Radhika (2010) reported that the rate of ammonia volatilization was low in FPP (3.3%), as compared to surface broadcast (64.4%) during 30 days of incubation. The available forms of N, P and K in surface broadcast for first week, whereas with FPP prolonged availability was observed up to 6 weeks. Thus, the slow release phenomena achieved by the polymer encapsulation in FPP, match the growth rate and nutritional demand of crop.

Advantages of FPPs

Fertilizer Pellet Pack technique enables the application of fertilizer nutrients to crops in a single attempt. Below or at one side of the seedling, the pellets are placed. Thus, nutrient support is provided to the highest extent to the plant in the root zone. Weeds have less chance to tap the nutrients from FPP. Such root zone placement of fertilizers minimizes nutrient losses, improves fertilizer use efficiency and crop yield. It supports each plant in the root zone for a long period in terms of optimum nutrient supply and biological activity, consequently, enables the fullest utilization of nutrients by crops. Muthukrishnan (2013) recorded that application of 100% NPK as FPP recorded highest flower yield of 45.5 t/ha in marigold which was 98.8% higher than surface broadcast. Fertilizer Pellet Pack technique has also been well tested in research trials and demonstration plots in various crops *viz.,* maize, rice, cotton, cauliflower, carnation, marigold, tomato, potato and sugarcane.

References

Muthukrishnan, R. 2013. Characterization of Nutrient Release of Nutripellet Pack for Enhancing Yield of Carnation and Marigold. Ph.D. Thesis. Tamil Nadu Agricultural University, TNAU, Coimbatore.

Radhika, K. 2010. Nutriseed Pack Technique for Enhancing Yield of Maize under Surface and Drip Irrigation. Ph.D. Thesis. Tamil Nadu Agricultural University, TNAU, Coimbatore.

Subscription form

☐NEW ENROLLMENT		☐INDIVIDUAL (12 ISSUES)	Rs. 500.00
☐RENEWAL	[Subscription No.]	☐INSTITUTIONAL (12 ISSUES)	Rs. 900.00
SUBSCRIBE FROM	Click here to enter a date. TO Click here to enter a date.		
	Date: Click here to enter a date.		

Please clearly mention new enrollment / renewal (mention subscription no.)

Please Enroll / Renew me for Readers Shelf (12 ISSUES) at following Address:

ADDRESS			
TITLE:	[First Name][Middle Name][Last Name]		
ADDRESS	[Address]		
CITY	[City]		
DISTRICT	[District]		
STATE	[State]	[Pin Code]	

COMMUNICATION DETAILS			
STD CODE	[STD Code]	PHONE NO.	[Phone No.]
MOBILE NO.	[Mobile No.]	ALTERNATIVE MOBILE	[Mobile No.
EMAIL ID	[Primary email ID]		
ALTERNATIVE EMAIL ID	[Secondly email ID]		

I am enclosing herewith annual subscription for Readers Shelf by Demand Draft / NEFT

PAYMENT DETAILS			
DEMAND DRAFT NO.	[DD No.]	DATE OF ISSUE	[DD Date]
ISSUING BANK	[Issue Bank Name]		
ONLINE TRANSFER TRANSACTION NO.	[Bank Transaction No.]	DATE	[Transaction Date]

Please send your DD in favour of J. V. PUBLISHING HOUSE, Payable at JODHPUR

Authorized Signature
With seal

Subscription Department

J. V. PUBLISHING HOUSE

Plot No. 15, Gajendra Nagar, Near Old FCI Godown, Shobhawaton Ki Dhani, Pal Road, Jodhpur Phone: 94141 28105 E.Mail: m_vyas@outlook.com Website: www.readersshelf.com

J. V. Publishing House
Plot No. 15, Gajendra Nagar, Near Old FCI Godown,
Shobhawaton Ki Dhani, Pal Road, Jodhpur
Phone: 0291-2742287, 0291-2742141
E. Mail: m_vyas@sify.com, Website: readersshelf.com

April, 2025

SUBJECT / TITLES	AUTHOR		PRICE
A Handbook of Extension Education (PB)	De, Dipak		300.00
A Handbook of Soil, Fertilizer and Manure (2nd Ed.) (PB)	Vyas, S.P.		450.00
A Textbook of Agricultural Biochemistry	Purohit, S.S.		450.00
A Textbook of Extension Education	Barman, U.		350.00
A Textbook of Fungi, Bacteria and Viruses (3rd Ed.)	Dube, H.C.		250.00
A Textbook of Genetics	Purohit, S.S.		450.00
A Textbook of Manures, Fertilizers and Agro-chemicals	Vyas, S.P.		450.00
A Textbook of Plant Biotechnology	Purohit, S.S.		450.00
A Textbook of Plant Breeding	Purohit, S.S.		350.00
A Textbook of Production Technology of Fruit Crops	Prasad, S.		550.00
A Textbook of Production Technology of Spices and Plantation Crops	Prasad, S.		350.00
A Textbook of Production Technology of Vegetable and Flower	Prasad, S.		550.00
A Textbook of Seed Science and Technology: Principles and Practices	Vananangumdi, K.		450.00
Agrometeorology: At a Glance	Sahu, D.D.		175.00
Agronomy (PB)	Panda, S.C.		990.00
Agros Dictionary of Plant Sciences	Vanangamudi, K.		295.00
Analytical Chemistry (PB)	Sudhalakshmi C.		250.00
Analytical Chemistry For Agriculture (PB)	Rathinasamy A.		350.00
An Introcution to Agricultural Chemistry	Jothimani, S		225.00
Breeding of Field Crops (PB)	Bhardwaj, D.N.		750.00
Cropping System and Sustainable Agriculture	Panda, S.C.		750.00
Extension Education and Rural Development (PB)	Govind, S.		450.00
Farming System: Concepts and Approaches	Jayanthi, C.		350.00
Fundamentals of Plant Pathology (PB)	Pathak, V.N.		350.00
Integrated Insect Pest Management (PB)	Rao, Venugopal		595.00
International Economics (PB)	Singh, D.P.		595.00
Manual for Organic Farming (PB)	Gosh Hajra, N.		550.00
Modern Plant Pathology (IInd Edition) (PB)	Dube, H.C.		500.00
Modern Weed Management (3rd Ed.) (PB)	Gupta, O.P.		550.00
Nutrient Management and Fertilizer Technology (PB)	Pandian		350.00
Organic Farming: Components and Management (PB)	Gehlot, D.		450.00
Post-Harvest Management of Horticultural Crops (PB)	Saraswathy, S.		495.00
Principles and Practices of Agronomy (2nd Ed.) (PB)	Balasubrananiyan, P.		450.00
Principles of Horticulture (2nd Ed.) (PB)	Prasad, S.		450.00
Principles of Plant Pathology (PB)	Jagtap G.P.		450.00
Production Technology of Spices (PB)	Shakila, A.		300.00
Seed Physiology and Biochemistry: Seed Development and Maturation	Vanangamudi, K.		450.00
Sericulture Industry: An Overview	Savithri, G.		250.00
Soil Fertility and Nutrient Management	Panda, S.C.		450.00
Soil Science-Objectives for SAU Entrance. JRF,SRF, NET & ARS	Tupaki Lokya		250.00
Techniques and Management of Field Crop Production (PB)	Rathore, P.S.		450.00
Weed Management Principles and Practices (3rd Ed.) (PB)	Gupta, O.P.		300.00
Glimpses in Seed Scien ce and Technology	Vinothini, Tamilarasan etc		225.00

The rates are subject to change