"Cultivating Prosperity: Transforming the Agriculture Sector for Productivity and Profit"

Submitted To:
National Centre for Good Governance
Prepared by: Tanisha Gupta

Table of Contents

“Seeds of Prosperity:Innovative Strategies for Boosting Productivity and Profitability in Agriculture"

In the countryside, it's common to see farmers working hard to produce food, which is a very important job. However, if you look closer and talk to farmers, you'll notice that there aren't many young people working on farms anymore. There has been integration of young people in the manufacturing sector, in the service sector but not in the agricultural sector yet. The laborious nature and lack of prestige associated with agricultural work, coupled with the allure of alternative opportunities in urban settings, often prompt young individuals to migrate away from rural regions. Farmers in India are predominantly over the age of 40, which highlights a significant challenge faced by the agriculture sector and the population relying on their produce. The average age of Indian farmers was 50.1 years in 2016, and this trend is concerning as the younger generation is increasingly abandoning farming as a profession. This situation poses a potential future where India, a major consumer of food, will have a scarcity of farmers. Presently, both middle-aged and young individuals are turning away from agriculture, indicating a potential absence of the next generation of farmers. In 2011, 70% of Indian youths resided in rural areas where agriculture served as the primary livelihood. However, the 2011 Census reveals that 2,000 farmers abandon farming each day. Furthermore, farmers' incomes are approximately one-fifth of those in non-farming occupations.

Facts: In India, agriculture is crucial to the economy, involving 54.6% of the workforce (Census 2011) and contributing 17.8% to the Gross Value Added in 2019-20 (current prices).
In India, a significant majority, specifically 58%, of rural households rely on agriculture as their primary source of income. According to the Ministry of Statistics and Programme Implementation, during the 2017-18 period at current prices, the agricultural and allied sectors contributed 16.4% to the Gross Value Added. Farmers' households earn an average monthly income of Rs. 6426, with cultivation contributing to 47.9% of this income.

Historically, the agricultural sector concentrated on enhancing farm productivity. Nowadays, the emphasis has shifted from simply increasing farm output to generating higher returns on investments. Nonetheless, the agricultural landscape in India confronts several obstacles that hinder the acceleration of agricultural growth. These challenges encompass issues such as subpar farm productivity, restricted access to inputs and markets, land fragmentation, depletion of natural resources, the impact of climate change, unprofitable pricing, and limited potential for value addition.

In light of these circumstances, the Centre for Study of Developing Societies, headquartered in Delhi, discovered that a significant majority of farmers in the country would opt for alternative employment if given the opportunity. Based on a survey conducted across 18 states involving 5,000 farming households, the results indicate that 76% of farmers would choose a profession other than farming, and within this group, 61% prefer urban employment. This phenomenon leads to a trend known as "feminizing agriculture," wherein women

become increasingly engaged in agricultural and related activities. Census data from 2011 demonstrates a 24% rise in the number of female agricultural laborers between 2001 and 2011, marking an increase from 49.5 million to 61.6 million.
Consequently, a dual challenge arises. On one hand, there exists a necessity to diversify agriculture to enhance its profitability through a focus on value addition and processing. On the other hand, rural youth are progressively distancing themselves from the agricultural sector.

Youth

The pivotal role in the anticipated transformation of agriculture in India is expected to be played by the younger generation. As defined by the national youth policy, individuals falling within the age bracket of 15 to 35 are categorized as young. Currently, 35% of the overall population belongs to this age group, with 75% of them residing in rural regions. The migration rate of rural youth to urban centers stands at approximately 45% nationwide, and it is estimated that merely 5% of the youth are involved in agricultural activities. In developed nations, the proportion of skilled workforce ranges from 60% to 90% of the total labor force; in stark contrast, India's skilled workforce is a mere 5% within the age group of 20 to 24.

Empowering the youth to enhance their skills and encouraging their continued engagement in agriculture within rural settings presents a set of challenges. The establishment of successful economic models within villages is of paramount importance to inspire and motivate young individuals to take up entrepreneurial roles in rural areas and serve as guides to others in their vicinity.

Though instilling interest and fostering confidence among rural youth towards agriculture is a complex task, it is by no means unattainable. Numerous instances of profitable agricultural ventures have been demonstrated across various circumstances, serving as tangible evidence. The retention of youth within the realm of agriculture is thus intrinsically tied to the sector itself. A conspicuous upsurge in the migration of rural youth to urban locales is observable, driven by the perceived disparities in fundamental amenities, communication, healthcare, and educational facilities between rural and urban environments.

The reasons for the youth's lack of interest in agriculture are low profitability of agriculture, drudgery of farm operations, poor quality of life in the rural area and rapidly shrinking size of land holdings are the most significant among them. Dr. Singh also applauded that ecological balances are of paramount importance and need to be addressed. He expressed that reduction of migration of youth from rural areas to urban areas can be done, if sufficient employment opportunities are available in the village.

The Alarming Decline in Agricultural Interest among Indian Youth

Introduction:
A significant trend has emerged in India's agricultural sector, indicating a growing disinterest among the youth towards farming. This phenomenon, commonly referred to as the "Great Indian Agro Brain Drain," highlights the declining inclination of students graduating from agricultural universities to pursue careers in agriculture. Moreover, even those involved in family farming or other agricultural activities do so out of compulsion rather than genuine interest.

Youth Perspective:
A study conducted by the non-profit organization Pratham revealed that a mere 1.2% of the surveyed rural youth aspired to become farmers, out of a total of 30,000 participants. Notably, 18% of boys expressed a preference for joining the military, while 12% aspired to become engineers. Similarly, 25% of girls, who play a crucial role in traditional farming, expressed a desire to become teachers instead.

Limited Enrolment:
The number of students enrolling in agricultural or veterinary courses across India accounts for less than half a percent of all undergraduate admissions. This statistic, shared by Madhav Chavan, the founder of Pratham, highlights the scarcity of educated and trained individuals within the agricultural workforce. Given that agricultural productivity lags significantly behind leading nations worldwide, there is an urgent need for a skilled and knowledgeable workforce in this sector.

Global Trend:
The issue of an aging farming population is not unique to India. Farmers worldwide are reaching retirement age without adequate successors in place. In the United States, the average age of farmers is 58, while in Japan, it is 67. Moreover, every third European farmer is over 65 years old. Similar to India, farmers across the globe are abandoning agriculture. For instance, in Japan, 40% of farmers plan to quit farming in the next six to eight years. The Japanese government has therefore initiated a large-scale plan to encourage individuals under 45 to take up farming.

The Importance of Reviving Indian Agriculture:
Revitalizing India's agriculture sector is undeniably one of the country's most critical agendas. The need to meet the growing food demand presents an unprecedented challenge. By 2050, when India's estimated population reaches 1.9 billion, more than two-thirds of the population will fall into the middle-income group, resulting in a doubling of food demand.

Implications:
The advancing age of farmers poses uncertain and unpredictable consequences for agricultural growth. However, this demand surge can be transformed into a significant

income opportunity if India possesses a well-equipped workforce of farmers and appropriate technological support provided by its extensive educational institutions. The decline in interest among Indian youth towards agriculture, known as the "Great Indian Agro Brain Drain," calls for urgent attention. To ensure food security and meet future demands, it is crucial to revive the agricultural sector by encouraging young people to pursue careers in farming. This requires investments in education and training, as well as the development and dissemination of innovative technologies, thereby creating a sustainable future for Indian agriculture.

2) The TIGR2ESS Flagship Project 1 team at ICRISAT conducted a field survey in Warangal district, engaging with farmers, farm women, and rural youth through Focus Group Discussions (FGDs) and key informant interviews. The survey aimed to understand the aspirations of rural youth regarding their involvement in agriculture and their parents' aspirations for their children.
The study included three villages in Warangal, where agriculture serves as the primary source of livelihood for over 98% of households. In recent years, agriculture in the district has undergone significant transformations, including a shift from subsistence to intensive farming, water scarcity issues, rural-urban migration, and declining interest among youth in pursuing agriculture.

India's agricultural sector is of great economic importance, employing approximately 50% of the population and contributing around 17% to the country's gross domestic product (GDP). However, fewer young individuals are opting for careers in agriculture, and rural-to-urban migration among youth seeking employment opportunities is increasing. According to the World Bank, by 2050, half of India's population is projected to be urban, while the percentage of agricultural workers in the total workforce is expected to decline from 58.2% in 2001 to 25.7% by 2050. This demographic shift and the declining interest of rural youth in agriculture are raising concerns.

During the survey, it was found that most of the youth in the villages were graduates, primarily in arts and commerce subjects. Despite farming being the main family occupation, many of the youth were unemployed and expressed a desire to leave the villages in search of jobs. They considered agriculture a risky career option due to water scarcity and uncertainty regarding crop yields and market prospects. They expressed a preference for small jobs in nearby cities rather than following in their parents' footsteps as farmers.

Conversations with parents from farming families revealed similar sentiments. They did not want their children to pursue agriculture due to the hardships and challenges they had experienced. Parents expressed concerns about expenses, low profitability, high investment requirements, and frequent crop failures and losses. The aspirations of rural youth are vital to understand, as they contribute to overall well-being. High aspirations lead to forward-looking behavior and efforts to achieve a prosperous future, while low aspirations result in reduced efforts.

There is a need for more empirical studies on rural aspirations, particularly in developing countries like India, where agriculture is a significant livelihood activity. Understanding and nurturing these aspirations is crucial for improving the well-being of the rural poor, including youth. Rural youth migration exacerbates the challenges faced by the aging farming population and creates economic burdens in urban areas. Addressing these challenges requires efforts to upskill rural youth and involve them in agricultural activities, supported by comprehensive studies and assessments of their aspirations and training needs at the state and district levels.

The TIGR2ESS program conducted this research in Telangana's rural, peri-urban, and tribal areas to better understand rural youth aspirations. The findings aim to provide evidence-based policy recommendations to government and development agencies for designing programs that enhance the well-being of rural youth.

$$Y = C + I + G + NX$$

"When youth can't find viable jobs in their communities, they begin to migrate from rural areas in search of opportunities in bigger cities or different countries"

A significant number of young individuals residing in developing and transition nations hold unfavourable views regarding agriculture. This lack of interest can be attributed to their perception of farming as outdated and financially unviable. Historically, the agricultural sector has been associated with subsistence farming, where individuals cultivate crops solely for their own sustenance rather than as a commercial enterprise. As a result, the youth fail to perceive agriculture as a profitable business opportunity.

Women in Agriculture in India

The intentional decision to focus on young women emphasises their significant role in agricultural transformation. Their contributions to the value chain have been observed in various countries, where they have demonstrated great potential and provided valuable opportunities. It is believed that young women are crucial to the future of smallholder farmers, and therefore, efforts should be made to support and empower them.

Is Agriculture not profitable for everyone?

1) **Small scale and Marginal Farmers**

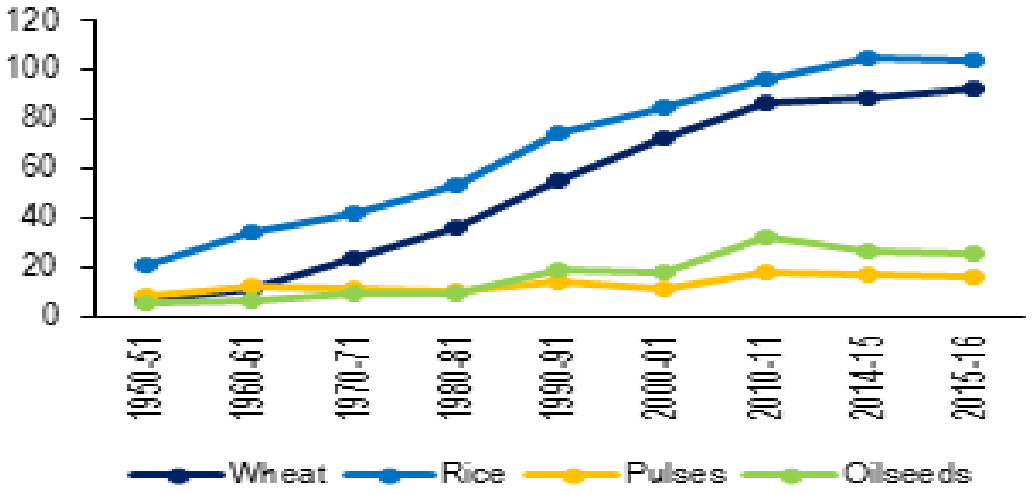
According to the report conducted by the National Sample Survey Office (NSO) under the Ministry of Statistics and Programme Implementation (MoSPI), a Situation Assessment Survey (SAS) was conducted during the 77th round of the NSS (January 2019- December 2019) in the rural areas of the country. The survey focused on Agricultural Households and referred to the agricultural year from July 2018 to June 2019. The findings of the survey indicate that approximately 89.4% of agricultural households in the rural areas of the country own less than two hectares of land.

Based on the recently published report "Situation Assessment of Agricultural Households and Land and Livestock Holdings of Households in Rural India, 2019" by the Ministry of Statistics and Programme Implementation, a significant shift has been observed in the livelihood patterns of small and marginal agricultural households in rural India. The report highlights that a majority of these households now rely heavily on wage work for their income.

According to the findings, approximately 49.7% of the income for these agricultural households is derived from farming activities, including crop cultivation and animal husbandry. However, a closer examination of the data reveals a noteworthy trend among small and marginal agricultural households with land holdings of less than 1 hectare. These households have predominantly transitioned into wage earners, implying that their primary source of income is no longer farming but rather employment in other sectors.

2) Large scale Farmers

The appeal of substantial investments in industrial agriculture is linked to the benefits of scale and variety. Advanced production methods enable larger farming operations to realize anticipated profits more quickly than smaller counterparts. Through amalgamation and streamlined coordination, not only have expenditures been lowered, but the array of available food items has also increased while mitigating informational challenges. Large, coordinated agricultural ventures offer year-round financial security by diversifying product offerings, thereby providing a safety net during market downturns for specific items.



Sources: Ministry of Agriculture

In a recent update from the Ministry of Agriculture, it's projected that the yield for food grains will reach 272 million tonnes for the fiscal year 2016-17. The significant increase in wheat and rice production, initially sparked by the Green Revolution of the 1960s, has led these crops to constitute 78% of the country's total food grain output as of 2015-16. Looking ahead, India will need an estimated 300 million tonnes of food grains by 2025 to sustain its

growing population. This means that the annual growth rate for crop production should hover around 2%—a rate which aligns closely with current trends. However, it's worth noting that, even with high production numbers, India's agricultural yield still lags behind that of other major crop-producing nations.

Natural Farming/ Chemical Free Farming/ Organic Farming

“Health for ecosystems and communities, Ecology's balance with nature, Fairness in human relationships, and Care for the environment's future."

In contemporary times, certain individuals have been endangering their well-being by employing hazardous pesticides and fertilisers. The issue of population growth is particularly serious in India, resulting in escalated food requirements. Consequently, the prevalent approach to addressing the demand for food production involves the utilisation of chemical fertilisers, toxic pesticides, and hybrid crops. Regrettably, this has had detrimental effects on human health and the environment. An effective solution to mitigate these concerns lies in the adoption of organic farming practices.

Organic farming, although not a new concept, serves as an agricultural method in India that prioritises nurturing live and healthy soil. Achieving this goal involves utilising organic waste, discarded crops, animal and farm residues, aquatic waste, and other similar organic materials. Remarkably, there is a growing awareness of organic agriculture among farmers in India, signifying a positive trend towards safer and environmentally friendly farming practices.
Organic farming in India is a way of growing crops using natural methods to control pests and fertilise the soil. It began as a response to the harm caused by chemical pesticides and synthetic fertilisers on the environment. Key elements of organic farming include the utilisation of organic inputs, green manures, and cow dung, among others, to promote sustainable agriculture.

Status of Organic Farming in India:

India has approximately 2.78 million hectares of land dedicated to organic agriculture. The country produces a variety of organic products, including oilseeds, tea, coffee, dried fruits, millets, cereals, and spices. These products are not only abundant within India but also exported to other countries. The states leading in organic farming are Sikkim, Uttarakhand, and Tripura, while other significant contributors include Madhya Pradesh, Rajasthan, and Maharashtra. In the realm of organic farming, Sikkim stands as the pioneering or the first state, being fully engaged in this agricultural practice. Additionally, Tripura and Uttarakhand have also ventured into the domain of organic farming. **Madhya Pradesh holds the position of being the leading producer of organic products in India. It achieves this distinction by cultivating organic crops on an extensive area of 0.76 million hectares.**

Organic agricultural products are low in the early years. Farmers find it difficult to accommodate mass production.
The main disadvantage of organic farming is the lack of marketing of the products and Inadequate infrastructure.

How to address these 3 problems?

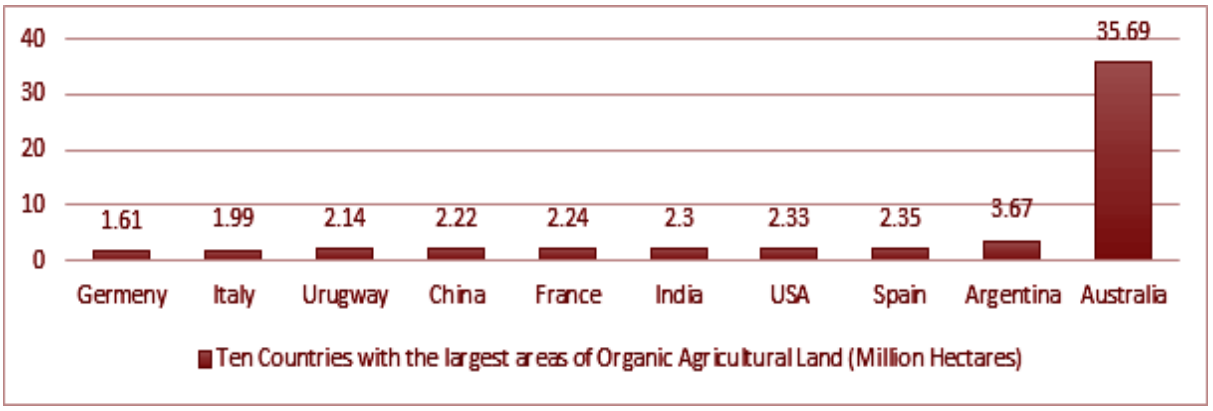
According to the National Centre for Organic and Natural farming research findings indicate that ecological production fields host approximately 30% more wildlife and plants compared to conventional farming areas. This difference can be attributed to the absence of pesticides and reduced usage of fertilisers in ecological farming practices. Furthermore, the Covid-19 pandemic has significantly influenced people's views on organic food, shifting attention towards its safety, nutritional value, and its potential to support a robust immune system.

As per the FiBL survey conducted in 2021, India stands out as a distinctive country among 187 nations practising organic agriculture. It holds a remarkable position with 30% of the world's organic producers and a vast cultivation area covering 2.30 million hectares. This area is managed by a total of 27,59,660 farmers, including 11,60,650 under PGS (Participatory Guarantee System) and 15,99,010 under India Organic certification. Additionally, there are 1703 organic processors and 745 traders involved in this sector. Notably, India has experienced a significant increase in organic agricultural land across the entire country in recent times.

World Scenario of Organic Agriculture

The practice of organic agriculture is widespread, with 187 countries adopting it. Around 72.3 million hectares of agricultural land are being managed organically, benefiting at least 3.1 million farmers. Among the countries with the largest organic agricultural land, Australia takes the lead with 35.69 million hectares, followed by Argentina with 3.63 million hectares, and Spain with 2.35 million hectares.

Across all regions, there has been a noticeable increase in organic agricultural land. In 2019, the global sales of organic food and drinks surpassed 106 billion euros. According to the latest survey by FiBL on organic agriculture worldwide, the organic farmland expanded by 1.1 million hectares, and organic retail sales continued to experience growth.



Source: FiBL Survey 2021

According to the FiBL Survey 2021, the number of organic producers worldwide is on the rise. In 2019, the reported count reached 3.1 million. Among the countries with the highest number of organic producers, India leads with 1,366,000 producers, followed by Uganda with 210,000, and Ethiopia with 204,000. Most small-scale producers are certified in groups based on an internal control system. (FiBL Survey 2021).

Present Scenario of Organic farming in India:

The current status of organic farming in India is at an early stage. As of March 2019, approximately 2.30 million hectares of farmland were being used for organic cultivation, which is only two percent of the country's total net sown area of 140.1 million hectares. A few states are leading the way in promoting organic farming, with a major portion of the organic cultivation area concentrated in these states. Madhya Pradesh stands out at the top with 0.76 million hectares of land under organic cultivation, which is more than 27 percent of India's total organic farming area. The top three states, namely Madhya Pradesh, Rajasthan, and Maharashtra, account for around half of the area under organic cultivation. Moreover, the top 10 states together cover about 80 percent of the total area dedicated to organic farming in the country.

To meet the growing demand for organic agricultural products, the government launched two key schemes in 2015-16:

1) **Paramparagat Krishi Vikas Yojana (PKVY)**
2) **Mission Organic Value Chain Development for North Eastern Region (MOVCDNER)**.

These schemes assist organic farmers from production to marketing, including certification, processing, and packaging. Specific details on areas and farmers under PKVY in states like Uttar Pradesh and Rajasthan. The Bhartiya Prakritik Krishi Padhati (BPKP), introduced in 2020-21 as a part of PKVY, focuses on promoting traditional farming practices. The scheme emphasizes the exclusion of synthetic chemicals, promotes biomass recycling, and stresses the use of organic materials like cow dung and plant-based formulations. Till date, 4.09 lakh

ha has been covered with a fund release of Rs. 4980.99 lakh across 8 states. Organic farming improves soil fertility and crop productivity. Research from ICAR suggests yields comparable to conventional methods are achievable in 2-3 years for certain crops, with stabilization in 5 years for others.

Under PKVY & MOVCDNER:

1) Financial assistance: Rs. 31000/ha/3 years and Rs. 32500/ha/3 years respectively.
2) Funds are allocated for organic inputs, farmer organization formation, training, certification, and organic produce marketing.
3) BPKP offers Rs. 12200/ha over 3 years for various organic farming support activities including certification and analysis.

Participatory Gurantee System will be the key approach for quality assurance. Under the PKY scheme cluster formation, training, certification and marketing are supported. The central focus of both PKVY and MOVCDNER is the comprehensive support for organic farmers, covering the entire process from cultivation to post-harvest activities, inclusive of certification and marketing. While PKVY extends its reach across India excluding the North Eastern states, the MOVCDNER is tailored specifically for these states.
Financial aid is provided to organic farmers through both schemes. Specifically, the PKVY allots up to Rs 50,000/ha for three years. In contrast, the MOVCDNER offers Rs. 46,575/ha over a three-year period. This aid encompasses FPO creation, premium seeds, organic inputs, and training, coupled with certification.
Historical data indicates that from 2015-16, the PKVY scheme has incorporated 11.85 lakh ha under organic farming. Furthermore, there's an aspiration to integrate an additional 6.00 lakh ha into the scheme between 2022-23 to 2025-26. Under PKVY, farmers of various states of the country are provided financial assistance of Rs 50000/ha for 3 years out of which, Rs 31000/ ha / 3 years is provided directly to farmers through DBT for on-farm and off-farm organic inputs. Financial assistance of Rs 20 lakh/ cluster of 1000 ha for 3 years are provided for value addition and infrastructure creation. Under the scheme assistance is provided @ Rs 7500/ha for 3 years for training and capacity building whereas, Apart from this, Rs 2700/ha for 3 years is provided for certification and residual analysis.

Under MOVCDNER, there is provision of financial assistance of Rs 10000/ha for 3 years for training, handholding and ICS documentation and farmers are provided assistance @ Rs 32500/ ha for 3 years for off farm /on –farm organic inputs. Under the scheme need based assistance is provided for various component namely Integrated Processing unit @ Rs. 600 lakh, Collection, aggregation and grading unit @ Rs. 10.00 lakh, Integrated Pack house @ Rs 37.50 lakh, Refrigerated vehicle @ Rs 18.75 lakh, Pre-cooling, cold stores, ripening chambers @ 18.75 lakh and Transportation / 4 wheeler @ Rs 6.00 lakh.

State-wise and year-wise details of area added to organic farming through PKVY scheme since 2015-16

S. No	State	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
1	Andaman & Nicobar	1360	1360	1360	1360	1360	1360	1360
2	Andhra Pradesh	8660	8660	26000	106000	106000	206000	206000
3	Arunachal Pradesh	380	380	380	380	380	380	380
4	Assam	4400	4400	4400	4400	4400	4400	4400
5	Bihar	6540	6540	10600	10600	10600	24600	24600
6	Chattisgarh	3760	3760	4000	24000	24000	109000	109000
7	Goa	80	80	80	10080	10080	10080	10080
8	Gujarat	2000	2000	2000	2000	2000	2000	2000
9	Haryana	400	400	400	400	400	400	400
10	Himachal Pradesh	2200	2200	4200	4200	5700	17700	17700
11	J & K	560	560	560	560	560	560	560
12	Jharkhand	2000	2000	5540	5540	5540	8940	23940
13	Karnataka	10900	10900	10900	10900	20900	20900	20900
14	Kerala	2380	2380	12380	12380	12380	96380	96380
15	Lakshadweep	0	0	0	2700	2700	2700	2700
16	Madhya P	17600	17600	27600	76560	76560	175560	175560

17	Maharashtra	18640	18640	25160	25160	25160	25160	32160
18	Manipur	600	600	600	600	600	600	600
19	Meghalaya	900	900	900	900	900	900	900
20	Mizoram	680	680	680	680	680	680	680
21	Nagaland	480	480	480	480	480	480	480
22	Delhi	0	0	10000	10000	10000	10000	10000
23	Odisha	6400	6400	6400	20800	20800	44800	44800
24	Pondicherry	0	0	160	160	160	160	160
25	Punjab	1000	1000	5000	5000	5000	5000	7000
26	Rajasthan	15100	15100	23000	123000	123000	123000	123000
27	Sikkim	3000	3000	3000	3000	3000	3000	3000
28	Tamil Nadu	2240	2240	2240	6240	6240	8240	8240
29	Telengana	6000	6000	13800	13800	13800	13800	13800
30	Tripura	1000	1000	1000	1000	1000	1000	1000
31	Uttar P	11500	11500	18800	32800	42800	78580	78580
32	Uttarakhand	11000	11000	12540	90540	90540	140540	140540
33	West Bengal	2400	2400	2400	2400	2400	2400	2400
34	Daman & Diu	0	0	1100	1100	1100	1100	1100
35	Dadar Nagar	0	0	10000	10000	10000	10000	10000
36	Chandigarh	0	0	0	1300	1300	1300	1300
37	Ladakh	0	0	0	0	0	0	10000
	Total	**144160**	**144160**	**247660**	**621020**	**642520**	**1151700**	**1185700**

Cumulative state-wise year under PKVY since 2015-16

Post Harvest Management & Value Addition- Another Problem

Based on recent reports, Indian farmers experienced significant post-harvest losses totaling Rs 93,000 crores in 2019. These losses have been identified as one of the major factors limiting India's share in global agricultural exports. Despite the presence of established postharvest institutions backed by the government and private sector, many farmers remain unaware of the correct methods for food handling and storage. This lack of awareness leads to mechanical losses like bruising, cracking, cuts, and contamination by fungi and bacteria. Additionally, there are physiological losses that affect respiration, transpiration, pigments, and flavors of the produce. As a consequence, market prices are reduced, and consumer acceptance of agricultural produce is compromised. In various parts of India, agriculture is not heavily reliant on agro-chemicals, particularly in mountainous and tribal areas. This low usage of chemicals makes it easier for these regions to transition to organic farming methods.

Natural Farming is an agricultural methodology that aligns with Indian tradition while incorporating contemporary knowledge of ecology, resource recycling, and optimising on-farm resources. This approach is recognized as an agroecology-based farming system that integrates crops, trees, and livestock with functional biodiversity. Its foundation lies in on-farm biomass recycling, emphasising the use of biomass mulching, on-farm cow dung-urine formulations, soil aeration, and the exclusion of synthetic chemical inputs. By reducing reliance on purchased inputs, Natural Farming aims to be a cost-effective practice that also presents opportunities for increased employment and rural development. Several states, including Andhra Pradesh, Karnataka, Himachal Pradesh, Gujarat, Uttar Pradesh, and Kerala, have successfully implemented and established natural farming models. These states are recognized as leaders in this field. Presently, the acceptance and implementation of natural farming practices are in their initial stages but are gradually gaining popularity within the farming community.
Natural farming is an agricultural approach that aims to restore soil health, maintain biodiversity, ensure animal welfare, emphasize the efficient use of natural and local resources, and promote ecological fairness. It is a farming system that works in harmony with natural biodiversity, encouraging the biological activity of the soil and managing the complex interactions between various living organisms, including plants and animals, to promote thriving food production. The adoption of natural farming requires the following important practices:

Elimination of external inputs.
Utilization of local seeds, specifically local varieties.
Use of on-farm microbial formulations, such as bijamrita, for seed treatment.
Creation of on-farm microbial inoculants (Jivamrita) to enrich the soil.
Implementation of cover crops and mulching with organic matter, both green and dry, to recycle nutrients and create a suitable microclimate for beneficial microbial activity in the soil.
Adoption of mixed cropping techniques.
Management of diversity on the farm through the integration of trees.

Pest control through the use of diverse methods and on-farm botanical concoctions, such as neemastra, agniastra, neem ark, dashparni ark, etc.
Integration of livestock, particularly native breeds, to utilize cow dung and cow urine as essential inputs for various practices.
Implementation of water and moisture conservation measures.

The Hon'ble Prime Minister, in his address to the nation on Independence Day in 2019 from the Red Fort, expressed concerns regarding the detrimental effects of chemical fertilizers and pesticides on the soil's health. Recognizing the responsibility as a farmer and a custodian of the land, he emphasized the need to refrain from causing harm to the nation and its soil. The Prime Minister urged a reduction of 10%, 20%, or 25% in the use of chemical fertilizers in agricultural fields and proposed the launch of a campaign called **Muktikar Abhiyan** to achieve this objective. Such measures were seen as crucial for the betterment of the nation and the preservation of Mother Earth.

Over the past decade, a significant increase in input costs, particularly the prices of urea, DAP, and potash, has resulted in a decline in crop income. These essential farming resources have experienced price hikes ranging from 60% to 600%. Although the real value of crop output per hectare has witnessed some growth in recent years, the rise in input costs has far exceeded it, leading to a decrease in overall farm income. Furthermore, it is believed that the prevailing green revolution technology has contributed to the degradation of the agro-ecosystem and diminished economic returns for farmers.

Numerous studies have demonstrated the adverse impact of chemical fertilizers and pesticides on soil health, including the destruction of millions of vital soil microorganisms necessary for sustaining plant life. In contrast, natural farming, an agro-ecology based diversified farming system, is gaining recognition as an alternative approach. This method integrates crops, trees, and livestock, fostering functional diversity while reducing production costs through the use of homegrown alternatives such as Jeevamrit, Beejamrit, Neemastra, as well as adopting intercropping and mulching practices.

In the context of declining fertilizer response and farm income, the Economic Survey of India highlights the significance of natural farming as one of the alternative farming practices that can potentially improve farmers' income.

Success story:

Name :Ajay Rattan Address :Village Niun, Block Ghumarwin
Crops :Sugarcane, Gram, Wheat, Pea, Soybean, Moong, Taro Root, Ginger, Capsicum, Gourd and Ridge Gourd Total land:25 bigha Land under Natural farming :25 bigha Chemical farming expenditure: Rs 30,000 Chemical farming income : Rs 65,000 Natural farming expenditure: Rs 20,000 Natural farming income : Rs 3,00,000.

Precison Agriculture

The transformation of agriculture through precision farming is comparable in impact to the invention of the John Deere steel plow in the 19th century. Utilizing contemporary technologies such as the Internet of Things (IoT), GPS, GIS, and satellite imagery, farmers are greatly enhancing their decision-making processes. According to a 2021 report by the Association of Equipment Manufacturers (AEM), the adoption of these precision agriculture tools has led to a 4% increase in crop yields, a 7% reduction in fertilizer use, a 9% decrease in herbicide application, a 6% cut in fossil fuel consumption, and a 4% conservation of water. Adopting advanced technological solutions often necessitates a significant financial investment, posing a challenge for farms operating on slim margins. Additionally, the influx of data generated by these technologies can overwhelm farmers, who may lack the requisite expertise or time to effectively interpret and apply this information.

Way Forward

To effectively scale Precision Farming, there will be a substantial need for specialized service providers and startups proficient in this area. Skill development, particularly in drone operations, should be emphasized as part of the overall training strategy, including data collection capabilities for decision-making tools.

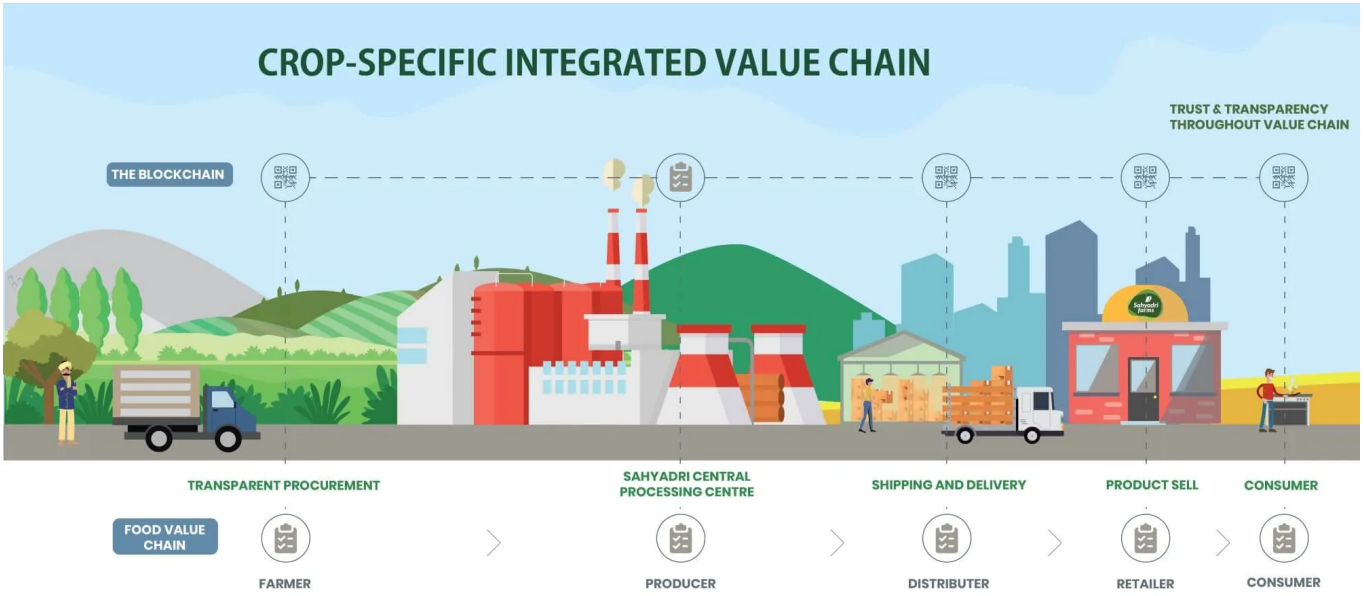
Academic institutions focused on agriculture should prioritize human resource development (HRD) by creating tailored training programs and curricula to equip professionals for teaching, training, and research in precision agriculture. Collaboration is key: stakeholders ranging from industry experts to academics must unite to design Decision Support Systems that enable farmers to make real-time, informed choices. This will necessitate the integration of advanced technologies such as AI, IoT, machine learning, and big data analytics, transitioning from traditional experiential decision-making to real-time, evidence-based actions. The Indian Council of Agricultural Research (ICAR) has recently launched a project focused on Precision Agriculture. To enhance its effectiveness, the project requires expansion to include a broader range of institutions and target additional agricultural domains, such as swine, poultry, goats, and aquaculture. After a period of successful operation, the network has the potential to evolve into a nationwide coordinated research initiative. This would ensure that research in Precision Agriculture becomes a formalized endeavor, producing groundbreaking technologies and methodologies.

Sahyadri: Adopting the Model of Aggregation

"Sahyadri's unwavering vision: Cultivate a foundation of people, processes, and practices, fostering the growth and empowerment of smallholder Indian farmers."

In order to tackle various longstanding challenges in the agriculture sector, it has been recognized that bringing farmers together, particularly those who are small or have limited resources, through producer organisations can be an effective solution. It is evident that providing small-scale farmers with access to technology, resources, and markets is essential for the overall development and progress of the sector. Founded in 2011 in Nashik, Maharashtra, Sahyadri Farmers Producer Company Ltd. (SFPCL) has evolved into India's largest cooperative of farmers within just ten years. Initially envisioned by Vilas Shinde as a platform for "farmer-entrepreneurs," the company transitioned into a full-blown Farmers Producer Company (FPC) due to market demands. It offers over 8,000 registered farmers across 15,789 acres a robust agricultural value chain that elevates small-scale farming into a large-scale operation.

Sahyadri Farms is not just a business but a farmer-driven movement with a strong ethical backbone. The company exported approximately 22,000 tonnes of grapes during the 2018-2019 season, showcasing its global reach and established trust with international partners. The company's structure is divided into three layers: the top-level organization, specialized FPCs for various crops, and the farmers. While crop-specific FPCs focus on technical support and initial processing, the apex organization takes care of post-harvest management, further processing, and both domestic and international marketing.VSahyadri Farms has created a comprehensive 65-acre facility equipped with advanced technologies for sorting, cooling, and storing produce supplied by its network of farmers. The company uses geo-tagging to monitor crops in real-time, enabling precise harvest planning. Alongside this, they have established an in-house IT platform for end-to-end traceability of produce. With a focus on quality and sustainability, Sahyadri Farms has formed a subsidiary, Sahyadri Agro Retail Ltd (SARL), to offer a range of processed food items. These products are available in nearly 10,000 retail stores in Maharashtra. Additionally, they have 13 owned retail stores with plans to expand further. They have garnered international recognition with a €7.50 million loan from FMO, the Netherlands' development finance company. To tackle the issue of skilled labor shortage, Sahyadri launched a skill development program, resulting in employment for over 150 young people within a year. Moreover, the company collaborates with various organizations for rural development, affirming its commitment to empowering small farmers and fostering community growth.



Farmer Producer Organisations (FPO's)

Empowering Farmers with FPOs (A Step Towards Atmnirbhar Krishi)

A Farmer Producer Organization (FPO) is a group of farmers who come together to improve their agricultural and allied sector activities through collective efforts. They are registered under specific laws and aim to benefit from economies of scale in production and marketing. To help farmers create these organizations, the Small Farmers' Agribusiness Consortium (SFAC) is supporting state governments in the formation of FPOs.
The Government of India has launched a scheme called "Formation and Promotion of 10,000 Farmer Producer Organizations (FPOs)" to create and promote 10,000 new FPOs by 2027-28. The scheme focuses on two approaches: the Produce Cluster Area approach and the specialized commodity-based approach. The cluster-based approach aims to develop product specialization in each district by promoting "One District One Product." So far, 4465 FPO clusters have been assigned for creation by various implementing agencies, with 632 of them already registered. A study by PricewaterhouseCoopers on the scheme's impact indicates that sales through these FPOs have led to a 22% increase in price realization for members, 31% reduced marketing costs, and net savings of Rs. 1384 per acre for 28% of members who purchased inputs through these organizations.

In Andhra Pradesh, 852 FPOs have been established as of 2020. The scheme also provisions financial assistance up to Rs. 18 lakh per FPO over a three-year period to cover management costs. To date, Rs. 249.08 crore has been disbursed to implementing agencies, and an Equity Grant of Rs. 31.22 lakh was provided to four FPOs in Andhra Pradesh for the fiscal year 2020-21.

SFAC- Small Farmers Agriculture Consortium Implementation

It is recommended that the SFAC should enhance its ground staff. However, this doesn't imply expanding its bureaucratic structure. Instead, considering third-party collaborations with skilled agencies could be a viable solution. Furthermore, maintaining regular communication with clients, especially those who are smaller or new to the platform, is essential for providing extra guidance and resolving issues.

While the pathway to profitability is fraught with obstacles for Farmer Producer Organizations (FPOs), only a handful successfully navigate these challenges to achieve commercial success. Confronted by various issues such as limited access to credit and inadequate infrastructure, the importance of highlighting successful models, novel strategies, and insights from prospering FPOs cannot be overstated. Collaborative efforts can play a key role in attaining this objective.
In a cooperative effort, public authorities and private businesses can work together to grant agricultural producers guaranteed avenues for selling their goods, thereby minimizing market uncertainties. Furthermore, by utilizing farm produce for the creation of enhanced-value items like tofu, powdered soya milk, and frozen soya-based desserts, companies have the opportunity to offer more competitive rates to farmers.

Way Forward

In summary, the key function of Community-Based Business Organizations (CBBOs) is to empower Farmer Producer Organizations (FPOs), turning them into attractive options for agricultural workers. Rather than acting simply as businesses, FPOs function as farmer collectives. With the landscape of Indian agriculture primarily made up of small and marginal farmers—owning less than 1.1 hectares of land and making up over 86% of all land holdings—it's crucial to address the unique challenges they face in both production and post-production phases. Forming FPOs can be a strategic way to tackle these issues and boost farmers' income.

This report emphasizes the significance of rural youth in ensuring global food security. However, it highlights a concerning trend where few young individuals perceive a viable future in agriculture or rural regions. The obstacles faced by rural youth in pursuing livelihoods are numerous, including limited access to arable land, credit, and essential resources for agriculture.
Moreover, the appeal of urban life often surpasses that of rural areas, unless adequate economic opportunities are available. This predicament is particularly prevalent in developing countries, leaving rural youth in a difficult position.

The majority of the world's food supply is currently produced by aging smallholder farmers in developing nations. Unfortunately, these farmers are less likely to adopt modern technologies necessary for sustainable agricultural productivity growth, hindering the ability

to feed a growing global population while safeguarding the environment. To address this issue, it is imperative to re-engage youth in agriculture.

Despite the agricultural sector's ample potential to provide income-generating opportunities for rural youth, challenges related specifically to youth participation in this sector – and, more importantly, options for overcoming them – are not extensively documented.
Furthermore, statistics on rural youth are often lacking, as data are rarely disaggregated by important factors such as age, sex and geographical location.

ARYA- Attracting and Retaining Youth in Agriculture

India currently holds the largest youth population in the world, with approximately 356 million individuals aged between 10 and 24 years. Nearly half of this youth population, around 200 million young people, reside in rural areas. Recognizing the significance of rural youth in agricultural development, particularly concerning livelihood security and stable income streams, the Indian Council of Agricultural Research has been implementing the "Attracting and Retaining Youth in Agriculture (ARYA)" project since the fiscal year 2015-16, under its Agricultural Extension Division.

The ARYA project is active in 25 states, operating through Krishi Vigyan Kendras, with the participation of one district from each state. The primary objective of the project is to attract and empower rural youth to engage in various agricultural and allied sector enterprises, ensuring sustainable income and gainful employment in the selected districts.

Within the framework of the ARYA project, rural youth are identified and provided with orientation and training in entrepreneurial skill development. They are encouraged to establish micro-enterprise units in sectors such as apiary, mushroom cultivation, seed processing, poultry, dairy, goatry, carp-hatchery, and vermicompost production. In India, agricultural management has seen a notable shift towards rural women and elderly farmers, with rural youth moving to urban areas in search of employment opportunities. This trend places undue strain on urban centers and depletes the potential human resource pool in rural regions. Nonetheless, there exists substantial potential to transform agriculture into a lucrative source of income and employment. According to Arya's report, the income generated from approximately 17 significant enterprises, such as Apiary, Mushroom, Seed Processing, Poultry, Dairy, Goatry, Carp-hatchery, Vermi-compost, etc., has the potential to yield an average monthly income ranging from Rs. 10,000 to Rs. 12,000. This income projection is based on the economy of scale associated with each enterprise. This initiative aims to specifically target rural individuals below the age of 35 under a specialized program. The goal is to encourage their involvement in the agricultural sector, providing avenues for income generation and active participation in farming.These motivated youth groups serve as exemplary models, showcasing the potential of agriculture-based ventures and offering guidance through training. The enhancement of skills among rural youth not only boosts their confidence in pursuing farming as a profession but also generates additional employment

prospects. This helps address the issue of underemployment and unemployment among rural youth by involving them in secondary agriculture and related services within rural areas. As part of this project, a total of 4280 young individuals, organized into various groups, have received orientation. The orientation is aimed at enabling them to establish small-scale entrepreneurial endeavors across 25 districts.

It remains necessary to emphasize the exploration of the District's capabilities, the recording of indicators related to livelihoods, facilitation of communication among farmers, and the establishment of a baseline for income assessment prior to and following the implementation of the ARYA project. The technology barriers should be tackled first as involving more people does not going to affect productivity.

References:

1) **https://icar.org.in/content/7th-zonal-committee-meeting-arya-project-organized**
2) **Why are rural youth leaving farming?**
3) https://pib.gov.in/PressReleasePage.aspx?PRID=1796561
4) https://www.agrifarming.in/government-schemes-for-organic-farming-in-india
5) https://www.downtoearth.org.in/blog/agriculture/farmers-ageing-new-generation-disinterested-who-will-grow-our-food--65800
6) https://tigr2ess.globalfood.cam.ac.uk/news/rural-youth-aspirations-can-indian-agriculture-regain-interest-rural-youth
7) Improving Condition of Small and Marginal Farmers.
8) http://naturalfarming.dac.gov.in/NaturalFarming/Concept
9) What is Organic Farming in India - Types, Methods & Advantages.
10) https://ncof.dacnet.nic.in/StatusOrganicFarming
11) **https://www.manage.gov.in/publications/reports/Sahyadri-report.pdf**
12) https://allfoodonline.com/en/our-ultimate-goal-is-to-make-small-farmers-agriculture-profitable-sahyadri-farms/
13) https://pib.gov.in/Pressreleaseshare.aspx?PRID=1696547
14) http://sfacindia.com/FPOS.aspx
15) https://www.mofpi.gov.in/sites/default/files/fpo_policy_process_guidelines_1_april_2013.pdf
16) https://prsindia.org/policy/analytical-reports/state-agriculture-india
17) https://www.worldbank.org/en/news/feature/2012/05/17/india-agriculture-issues-priorities
18) https://www.fao.org/india/fao-in-india/india-at-a-glance/en/
19) https://www.niti.gov.in/verticals/agriculture
20) https://pib.gov.in/PressReleasePage.aspx?PRID=1886630
21) https://yourstory.com/2023/08/collaborative-efforts-sustainability-indias-agricultural-sector
22) https://www.gatesfoundation.org/our-work/programs/global-growth-and-opportunity/agricultural-development
23) https://www.jstor.org/stable/24110255

24) https://www.researchgate.net/profile/Ramesh-Sahni/publication/341039824_Farm_mechanization_-_trends_and_policy_for_its_promotion_in_India/links/5eaa3ed9a6fdcc70509b0989/Farm-mechanization-trends-and-policy-for-its-promotion-in-India.pdf
25) https://www.mdpi.com/2073-4395/10/2/207
26) https://www.tandfonline.com/doi/abs/10.1080/13600818.2017.1283010
27) https://demo.dspacedirect.org/items/a94ef210-25e1-4399-b93e-54930f2ba37f
28) https://www.sciencedirect.com/science/article/abs/pii/S0959652621022915
29) https://www.researchgate.net/profile/Suraj-Singh-8/publication/351026185_Mainstreaming_adaptation_strategies_in_relevant_flagship_schemes_to_overcome_vulnerabilities_of_Climate_Change_to_Agriculture_Sector/links/613c36de4e1df271062ae259/Mainstreaming-adaptation-strategies-in-relevant-flagship-schemes-to-overcome-vulnerabilities-of-Climate-Change-to-Agriculture-Sector.pdf?_sg%5B0%5D=started_experiment_milestone&origin=journalDetail
30) https://journals.sagepub.com/doi/abs/10.1177/09730052221107730
31) https://www.indianjournals.com/ijor.aspx?target=ijor:ah&volume=13&issue=1&article=014
32) https://www.researchgate.net/profile/Alok-Sahoo-8/publication/350859334_The_Role_of_Krishi_Vigyan_Kendras_KVK_in_Strengthening_National_Agricultural_Research_Extension_System_in_India/links/607a4fb28ea909241e0536c3/The-Role-of-Krishi-Vigyan-Kendras-KVK-in-Strengthening-National-Agricultural-Research-Extension-System-in-India.pdf
33) http://sifisheriessciences.com/journal/index.php/journal/article/view/2304
34) https://www.emerald.com/insight/content/doi/10.1108/20440831111131505/full/html
35) https://pib.gov.in/PressReleasePage.aspx?PRID=1739593
36) https://www.sciencedirect.com/science/article/abs/pii/S221204162030125X
37) https://books.google.co.in/books?hl=en&lr=&id=JNSiChnCangC&oi=fnd&pg=PR5&dq=government+RESERACH+PAPERS+ON+AGRICULTURAL+marketing+IN+INDIA+LATEST+ONES&ots=d0pQiVkKOM&sig=20XCZCNg0-2qj3zpDqGk9shom84&redir_esc=y#v=onepage&q=government%20RESERACH%20PAPERS%20ON%20AGRICULTURAL%20marketing%20IN%20INDIA%20LATEST%20ONES&f=false
38) https://onlinelibrary.wiley.com/doi/abs/10.1111/0002-9092.00101
39) https://www.researchgate.net/profile/Kadambini-Katke/publication/332318856_Precision_Agriculture_Adoption_Challenges_of_Indian_Agriculture/links/5cad831b299bf193bc2daf05/Precision-Agriculture-Adoption-Challenges-of-Indian-Agriculture.pdf
40) https://www.researchgate.net/profile/Evs-Prakasa-Rao/publication/359938430_Digital_Agriculture_-A_Future_Disruption_in_India/links/6257cd31a279ec5dd7f58d97/Digital-Agriculture-A-Future-Disruption-in-India.pdf
41) https://www.ncpahindia.com/pfdc-mandate
42) http://naas.org.in/News/NN22032022.pdf

****