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REVOLUTIONIZING AGRICULTURE: MODERN METHODS IN OILSEED CULTIVATION IN TIRUPATTUR DISTRICT, TAMIL NADU

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Abstract

Agriculture has been undergoing a systemic change in the oilseed sphere where modern techniques are being adopted in cultivation. In this study, the outcomes regarding the adoption of modern technologies (precision agriculture, advanced breeding and new sustainable practices) are examined. The study explains precision farming technologies, genetic improvements, and resource-efficient management which have increased oilseed yield and quality. Let's also consider precision agriculture, leveraging drones and sensor technologies best practices. Resource management meets to improve and advanced breeding techniques provide a faster breeding cycle and resistance against diseases. It is centred on sustainability, efficient organ allocation, and resistant husbandry. The evidence base on farmer empowerment focuses more on technology transfer schemes and market competitiveness. Though these results are impressive, clear obstacles remain on the horizon such as the cost of implementation and potential policy changes which could affect operations.

Keywords: OILSEED CULTIVATION, MODERN METHODS, SUSTAINABILITY, TECHNOLOGY TRANSFER.

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Introduction

The business of agriculture is dynamic and the desire for new and sustainable solutions is greater than ever. Today in the context of soaring global demands for edible oils and nutritional seeds, the focus has inexorably shifted towards oilseed cropping. This scrape will lead us to the domain of "Revolutionizing Agriculture: Modern methods in Oilseed Cultivation" - to discover the innovative ways and latest practices that are transforming the very idea of how we have been doing this crucial arm of farming.

Traditionally forming is one of the cornerstones of agriculture, oilseed cultivation has undergone a sea change cosmetically driven by technological advances, environmental awareness, and the ever-pressing quest for higher productivity. This journey through the latest methods aims to unravel the intricacies of these changing times, offering a glimpse into the future of oilseed farming. This question will span from aspects of modern oilseed cultivation, starting from precision agriculture and unlocking digital innovation to sustainable, ecologically balanced practices. It shall add to increased yields and more resiliently cultivate a more environmentally sensitive agricultural landscape through examinations of smart technology integration, data-driven decision-making, and applications of eco-friendly approaches.

Join us in this journey of discovery into dynamic and futuristic methodologies propelling oilseed cultivation into the future. The chapters that follow will embrace an interactive tapestry of insights interlocking legacy and technology, sustainability, and productivity the trifecta leading to an agricultural revolution that hasn't happened since beyond the farm gate.

Objectives:

1. Explore the trends in Oilseed Cultivation in Tirupattur District.
2. Examine Sustainable Practices for Eco-Friendly Oilseed Farming in the study area.
3. Showcase Successful Case Studies and Implementable Strategies.

Methodology:

The present study is based on secondary data collected from various books, published reports of RBI and NABARD, Census Surveys, SSI Reports, newspapers, journals, websites, and other relevant materials. For analysis, MS Excel, diagrams, and tables were used.

Review of literature:

Balwant Singh Rawat (2020) confirmed that a very healthy trend in the agriculture sector of

the state. Crop rotation, organic cultivation, efficient water management, and conservation of soil have increased the productivity of oilseed crops and added to long-term sustainability from an environmental point of view. This has generated adequate income and employment through oilseed cultivation and therefore fuelled rural development and improved livelihoods. Moreover, setting up local processing units and strengthening market linkage have added value to these oilseed crops and assured better profitability for farmers. The benign policy of the government in providing subsidies and other kinds of support has gone a long way in mitigating risks and encouraging sustainable practices. The issues of market volatility, pest attacks, and climate change, however, are the dampeners that need to be equally looked upon. In light of this, experiences from Tamil Nadu underline the incorporation of sustainable agricultural practices in robust economic frameworks. Additional investment in research and extension services, together with resilient crop varieties, shall ensure that continuous growth and sustainability in the oilseed sector are guaranteed.

In the process, Tamil Nadu will be a ready-made model that other regions use to strive to achieve what it will be in the future in sustainable agriculture, as well as economic development. They have contributed to the data regarding the production of oilseed and India. In relation, he says that India is a global leader in producing oilseeds with nine numbers growing in the country. These are groundnut, rapeseed-mustard, sunflower, soya bean, and sesame. India is the biggest palm, and groundnut is an important oil seed of the country, and groundnut forms a part. Production of groundnuts has been declining in Andhra Pradesh and even in Karnataka where there are rising trends. On the other hand, results have been increasing in Tamil Nadu, Groundnut expansion patterns generally declined outside of Rajasthan where Gujarat, Tamil Nadu, and Karnataka have relatively stable groundnut crop areas. Contributions to the Economic Aspect of India, it ranks as the world's biggest producer of oilseeds. The productivity of groundnut has been declining in the states of Andhra Pradesh and Karnataka.

Amit Kumar and LS Bareth et al., (2022) this paper concentrates on the flagship program of NMOOP in India, with its primary objectives of enhancing oilseed production and minimizing edible oil imports. It further assesses investigations into farmers' attitudes towards growing groundnut in Bikaner district. The results show that groundnut growers had having less favourable attitude as compared to other respondents; the percentage of groundnut growers have a less favourable attitude towards growing practices out of 11.24%. 69.38% of the respondents were moderately favourable to groundnut cultivation. A group of 80 beneficiary farmers and 80 non-beneficiaries ware selected. The respondents were interviewed to know their opinions about groundnut growing. Improving production and productivity of oilseeds and oil palm: Enhancing availability of vegetable oils: Reducing the imports of edible oil:

M. Muthuraj, (2017) this paper centres on the behaviour of market arrivals and prices of groundnuts in Tamil Nadu. India ranks second in the global production of groundnuts. Tamil Nadu is one of the dominant groundnuts – cultivating states in India. Price is a factor that determines the quantity of market arrivals in the short run. In general, arrivals and prices of groundnuts have positive trends over time. Tamil Nadu is one of the leading groundnut-growing states in India. Among the districts in Tamil Nadu, Tiruvannamalai is the most important groundnut producer.

S. Poornima et al. (2008) noted that the paper reports of oilseeds including groundnut, sunflower, and sesame have prospective areas for cultivation in one and two districts respectively in Tamil Nadu. In this connection, one study was carried out to find out the perspective districts for growing field crops in Tamil Nadu. Promising districts for rice, maize, sorghum, pearl millet, pulses, cotton, and oilseeds have been earmarked Promising districts for the production of rice crops have been identified as Trichy, Thanjavur, Madurai, Tirunelveli, Cuddalore, Thiruvallur, Villupuram, Tiruvannamalai, Kancheepuram. Potential districts for the production of other crops are identified as Salem, Erode, Virudhunagar, Theni, and Dindigul are identified as the potential districts to take up major field crops.

Data analysis and interpretation:

Table 1: Castor Oil Seeds Production, Area, and Productivity in Tirupattur District

Season/Crop/District	**Years**	**Area** (Hectare)	**Production** (Tonne)	**Productivity** (Tonne/Hectare)
Castor seeds – Kharif Tirupattur				
	2019-2020	124	39	0.31
	2020-2021	153	48	0.31
	2021-2022	168	53	0.32
	2022-2023	135	42	0.31
Total Castor seeds		456	143	0.31

Source: data.desagri.gov.in

The above table shows that the annual production, productivity and area of cultivation of castor seeds from 2019 – 2020 to 2022 – 2023. The areas of castor seeds' cultivation were 124 hectare with 39 tonne production 0.31 tonne productivity during 2019 – 2020. 153 hectares were cultivated with 48 tonnes production 0.31 tonne productivity of castor seeds during 2020 – 2021. During 2021 – 2022 the area of cultivation rose nearly 168 hectares with 53 tonne production 0.32 tonne productivity. Finally during 2022-2023 the cultivation area decreased to 135 hectares with 42 tonne production along with 0.31 tonne productivity of castor seeds. According to above table the castor seeds cultivation including area, production and productivity for the above period were 456 hectares 143 tonnes production 0.31 tonne productivity.

Diagram 1: Castor Oil Seeds Production, Area, and Productivity in Tirupattur District

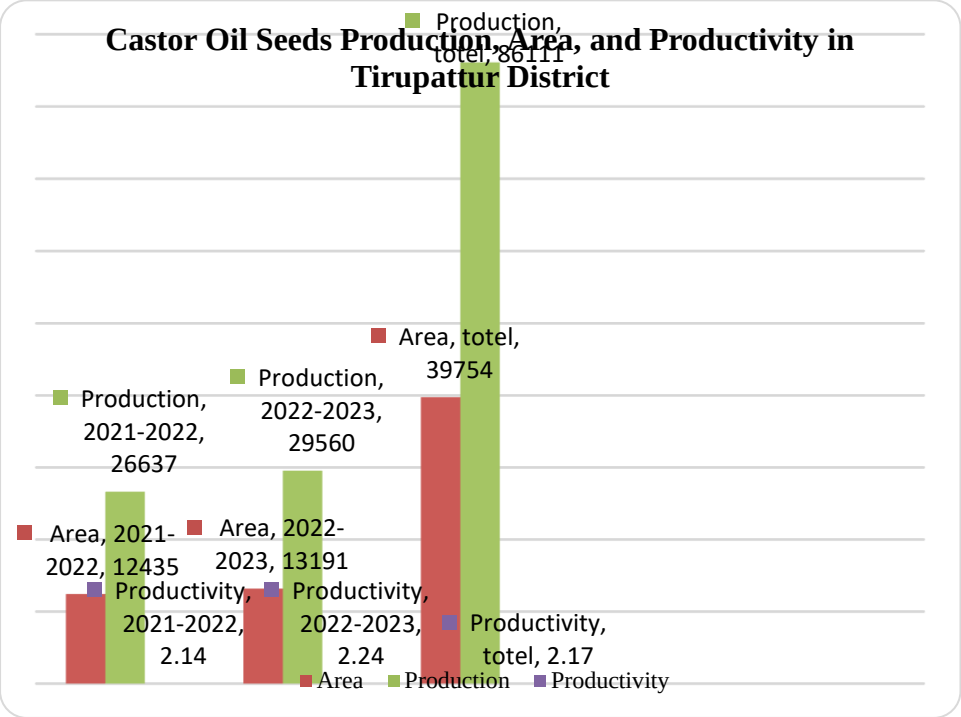


Table 2: Groundnut Oil Seed Production, Area, and Productivity in Tirupattur District

Season/Crop/District	Years	Area (Hectare)	Production (Tonne)	Productivity (Tonne/Hectare)
Groundnut – kharif & Robi Tirupattur	2020-2021	14128	29914	2.12
	2021-2022	12435	26637	2.14
	2022-2023	13191	29560	2.24
Total groundnut		39754	86111	2.17

Source: data.desagri.gov.in

The above table shows that the annual production, productivity and area of cultivation of Groundnut seeds from 2020 - 2021 to 2022 – 2023. The areas of castor seeds' cultivation were 14128 hectare with 29914 tonne production 2.12 tonne productivity during 2019 – 2020. 12435 hectares were cultivated with 26637 tonnes production 2.14 tonne productivity of Groundnut seeds during 2020 - 2021. During 2021 – 2022 the area of cultivation rose nearly 13191 hectares with 29560 tonne production 2.24 tonne productivity. Finally, during 2022-2023 the cultivation area decreased to 13191 hectares with 29560 tonne production along with 2.24 tonne productivity. According to above table the cultivation of groundnut including area, production and productivity for the above period were 39754 hectares 86111 tonnes production 2.17 tonne productivity.

Diagram 2: Groundnut Oil Seeds Production, Area, and Productivity in Tirupattur District

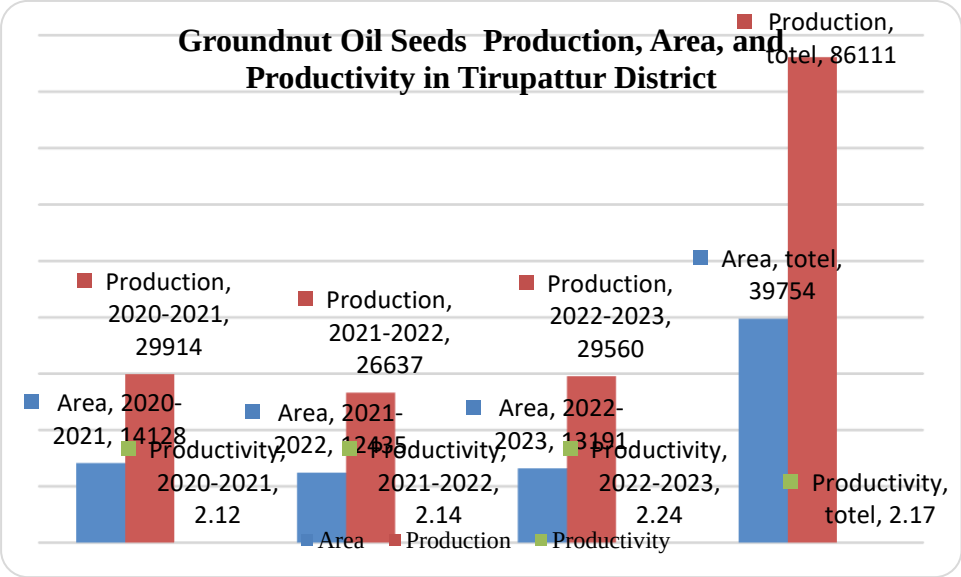


Table 3: Rapeseed & Mustard Oil Seed Production, Area, and Productivity in Tirupattur District

Season/Crop/District	Years	Area (Hectare)	Production (Tonne)	Productivity (Tonne/Hectare)
Rapeseed &Mustard – Robi Tirupattur				
	2019-2020	3	1	0.33
	2020-2021	3	1	0.33
Total Rapeseed & Mustard		6	2	0.66

Source: data.desagri.gov.in

The above table shows that the annual production, productivity and area of cultivation of rapeseed & mustard seeds from 2019 - 2020 to 2020 – 2021. The areas of rapeseed & mustard cultivation were 3 hectares with 1 tonne production 0.33 tonne productivity during 2019 – 2020. 3 hectares were cultivated with 1 tonnes production 0.33 tonne productivity of both seeds during 2020 – 2021. According to above table finally, the cultivation of rapeseed and mustard including area, production and productivity for the above period were 6 hectares with 2 tonnes production and 0.66 tonne productivity.

Diagram 3: Rapeseed & Mustard Oil Seed Production, Area, and Productivity in Tirupattur District.

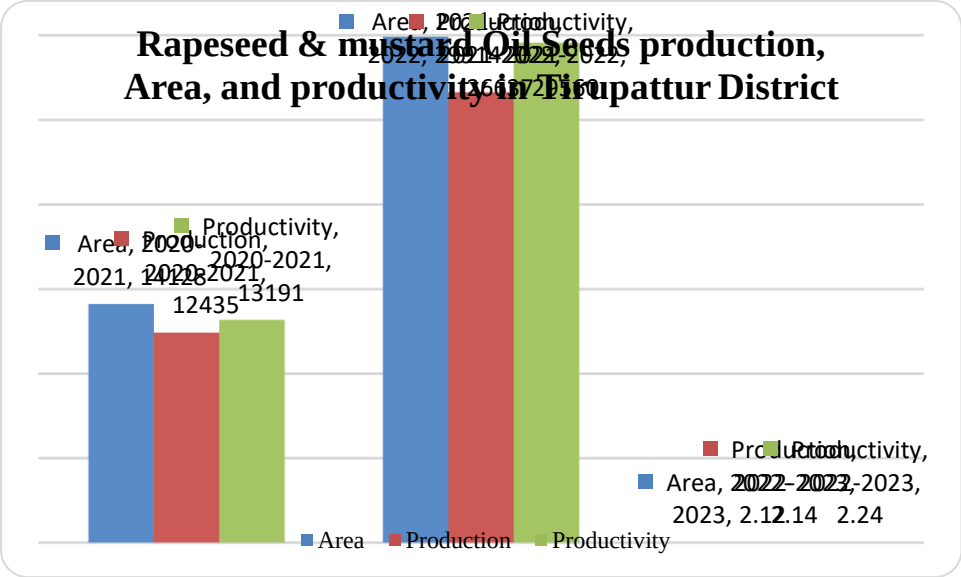


Table 4: Sesame Oil Seeds Production, Area, and Productivity in Tirupattur District

Season/Crop/District	Years	Area (Hectare)	Production (Tonne)	Productivity (Tonne/Hectare)
Sesame – Kharif Tirupattur				
	2020-2021	33	20	0.61
	2021-2022	84	57	0.68
	2022-2023	23	11	0.48
Total sesame		140	88	0.63

Source: data.desagri.gov.in

The above table shows that the annual production, productivity and area of cultivation of sesame seeds from 2020 - 2021 to 2022 – 2023. The areas of sesame seeds' cultivation were 33 hectares with 20 tonne production 0.61 tonne productivity during 2020 – 2021. 84 hectares were cultivated with 57 tonnes production 0.68 tonne productivity of sesame seeds during 2021 – 2022. Finally, during 2022-2023 the cultivation area decreased to 23 hectares with 11 tonne production along with 0.48 tonne productivity. According to above table the sesame seeds cultivation including area, production and productivity for the above period were 140 hectares 88 tonnes production 0.63 tonne productivity.

Diagram 4: Sesame Oil Seeds Production, Area, and Productivity in Tirupattur District

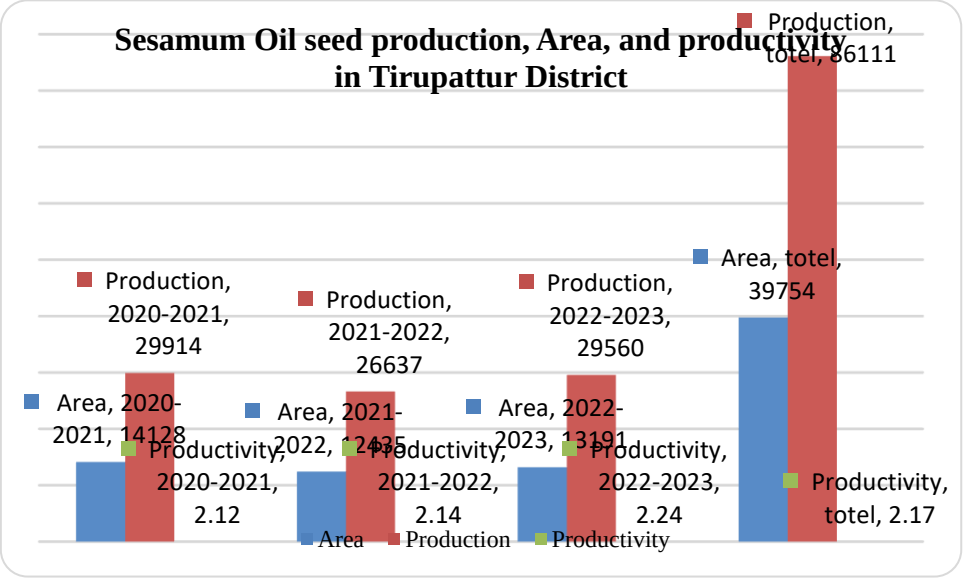


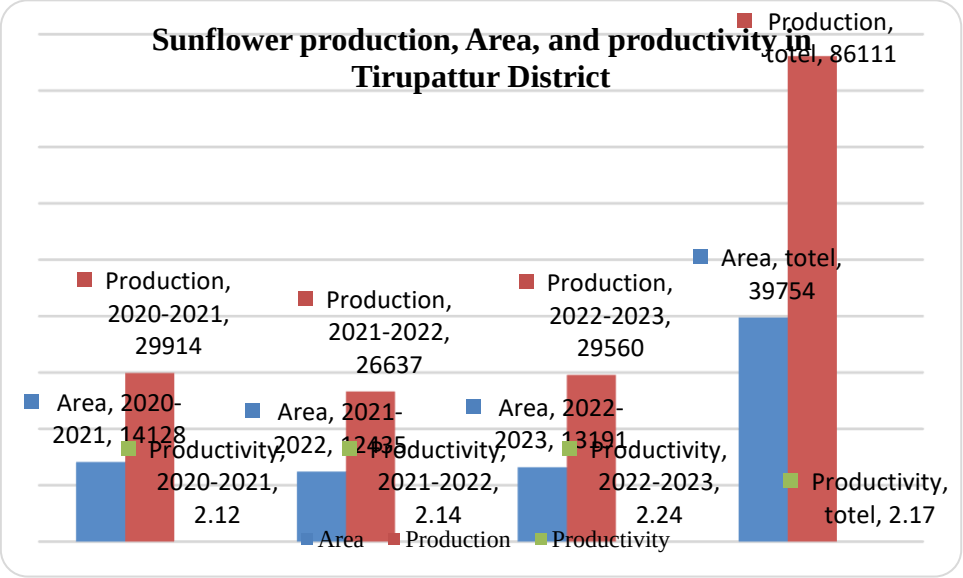
Table 5: Sun flower Oil Seed Production, Area, and Productivity in Tirupattur District

Season/Crop/District	**Years**	**Area** (Hectare)	**Production** (Tonne)	**Productivity** (Tonne/Hectare)
Sunflower – Kharif Tirupattur				
	2020-2021	1	2	2
	2021-2022	3	5	1.67
	2022-2023	7	11	1.57
Total Sunflower		11	18	1.64

Source: data.desagri.gov.in

The above table shows that the annual production, productivity and area of cultivation of 2020 - 2021 to 2022 - 2023. The areas of sunflower seeds' cultivation were 1 hectare with 2 tonne production 2 tonne productivity during 2020 – 2021. 3 hectares were cultivated with 3 tonnes production 1.67 tonne productivity of sunflower seeds during 2021 – 2022. Finally, during 2022-2023 the cultivation area increased to 7 hectares with 11 tonne production along with 1.57 tonne productivity. According to above table the sunflower seeds cultivation including area, production and productivity for the above period were 11 hectares 18 tonnes production 1.64 tonne productivity.

Diagram 5: Sunflower Oil Seed Production, Area, and Productivity in Tirupattur District



Results and Findings:

- New modern techniques of cultivating oilseeds have increased the crop yield to a great extent. It was achieved through the adoption of new techniques of breeding, precision agriculture practices, and improved practices adopted for crop management.
- Quality parameters, such as oil content and protein levels, and uniformity in seed size, have also made considerable improvements. This therefore implies that the modern methods offer not only an increase in the yield but also enhance the nutritional and commercial value of oilseed crops.
- Precision agriculture technologies such as drones, GPS-guided tractors, and sensor-based monitoring systems that enabled better utilization of resources—this meant the exact application of fertilizers, pesticides, and irrigation that results in optimized usages of inputs and a reduced impact on the environment.
- Collection of real-time data and its analysis accrued a better decision-making process for the farmers. They were in a position to respond in time to changes in crop health, weather conditions, and soil fertility.
- Advanced breeding techniques for developing oilseed varieties resistant to these factors incorporated marker-assisted selection and genetic modification. Breeding thus took place at a very fast cycle; hence the varieties were resistant to the factors that included diseases and pests, and unfavourable environmental factors that reduced crop losses of farmers by providing more resilient and reliable harvests.

- Modern methods of oilseed cultivation were oriented towards resource efficiency to be sustainable. Reduction in water consumption through better irrigation mechanisms, optimized nutrient management, and reduced chemical inputs were some of the essential constituents for the same.
- Intake of cover crops and strategies for crop rotation contributed towards no degradation to soil health and long-term sustainability in the farming of oilseeds.
- Successful dissemination of the state-of-the-art methods applied through effective technology transfer programs made farmers confident and influential adopters of new technologies. Training, workshops, and information-sharing through various types of digital media have lifted farmers to a level of being confident and influential adopters of new technologies. It built better knowledge and skills, thereby raising the self-sufficiency of farmers and creating a culture for innovation and continuous improvement in the practice of oilseed cultivation.
- Increased adoption of modern methods, hence making oilseed products more competitive in the local market. For the farmers, improved quality and increased yield meant profit increase.
- Major challenges, in terms of initial investments, technology literacy, and regulatory frameworks, must be dealt with before wide-scale adoption of modern methods can take place.
- Research and development in continuous terms are essential in adjusting to changing environmental and market conditions for handling emerging challenges.

The results and findings in the NMOOPs under the implementation of modern methods of cultivating oilseed crops were observed to have a sea change in productivity, resource efficiency, and sustainability. Such positive results emerge as an indication of the fact that continuous innovative measures through collaborative efforts at every stage hold the key to further strengthening the resilience and competitiveness of agriculture as a sector.

Conclusion

The integration of emerging technologies has been used in streamlining traditional practices, but it has also ushered in a new era of precision and efficiency. As such, from smart sensors that optimize irrigation to the use of artificial intelligence in crop monitoring, the potential for augmented yields and diminished environmental impacts increases. The digital revolution in agriculture is not a flash in the pan; rather, it's one of the primordial changes that help farmers make data-driven decisions and adjust to new market demands from the global arena.

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