GOVERNMENT ARTS COLLEGE, PARAMAKUDI

UG DEPARTMENT OF MATHEMATICS

PROJECT TITLE:

India agriculture crop production analysis

SUBMITTED BY:

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DEPARTMENT OF MATHEMATICS

GOVERNMENT ARTS COLLEGE, PARAMAKUDI.

PROJECT REPORT

I) INTRODUCTION

OVERVIEW

According to the World Bank, India is a global agricultural powerhouse. It is the world's largest producer of milk, pulses, and spices, and has the world's largest cattle herd (buffaloes), as well as the largest area under wheat, rice and cotton. It is the second largest producer of rice, wheat, cotton, sugarcane, farmed fish, sheep & goat meat, fruit, vegetables and tea. While agriculture's share in India's economy has progressively declined to less than 15% due to the high growth rates of the industrial and services sectors, the sector's importance in India's economic and social fabric goes well beyond this indicator.

PURPOSE

- Food Security. The primary purpose of crop production in India is to ensure an adequate and stable supply of food for its growing population. Crops like rice, wheat, pulses, and vegetables are essential for meeting the dietary needs of the country.
- Livelihoods. Agriculture is a major source of livelihood for a significant portion of India's population. Crop production provides employment opportunities for millions of farmers and laborers, contributing to rural income and economic stability.
- Economic Growth. Crop production is a significant contributor to India's economy. It provides raw materials for various industries, supports the agri-processing sector, and generates income through exports.

Says

What have we heard them say?
What can we imagine them saying?

Thinks

What are their wants, needs, hopes, and dreams?
What other thoughts might influence their behavior?

The history of **agriculture in India** dates back to the Neolithic period.
India ranks second worldwide in farm outputs. As per the Indian economic survey 2018, agriculture employed more than 50% of the Indian workforce and contributed 17–18% to the country's GDP.[1]

Agriculture encompasses crop and livestock production, aquaculture, fisheries and forestry for food and non-food products.[1] Agriculture was the key development in the rise of sedentaryhuman civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities

Doing an exploratory data analysis of this dataset would give insights into Indian agriculture status: state-wise, district-wise, crop-wise, area-wise and levels of productions. A complete analysis will paint a beautiful story of this important aspect of India

Persona's name

Short summary of the persona

Dimensions of the dataset is 246091 rows and 7 columns Out of **seven variables**, we have four categorical variables (State_Name,District_Name, Season and Crop type) and three continuous variables in float (Area and Production) and integer (Crop_Year) format.

provides information on the annual production and yield of crops grown in different parts .

The dataset will be useful for researchers, policymakers, and farmers who are interested in understanding crop production patterns in different regions of India.

Does

What behavior have we observed?
What can we imagine them doing?

Feels

What are their fears, frustrations, and anxieties?
What other feelings might influence their behavior?

See an example

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

1. Before you collaborate
2. Define your problem statement
3. Brainstorm
4. Group ideas
5. Prioritize
6. After you collaborate

Before you collaborate

A little bit of preparation goes a long way with this session. Here's how you need to set it up for success.

Team gathering
Define who should attend the session—the key stakeholders and anyone who might bring valuable insights or perspectives.

Set the goal
Learn how to use the problem statement template to set the goal for your brainstorming session.

Learn how to facilitate the session
Learn how to facilitate the session to get the most out of everyone participating.

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

Problem

How might we [your problem statement]?

Key rules of brainstorming
To run an smooth and productive session

- Stay in topic
- Encourage wild ideas
- Defer judgment
- Listen to others
- Go for volume
- Stay in topic

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

Person 1 | Person 2 | Person 3 | Person 4

Person 5 | Person 6 | Person 7 | Person 8

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all ideas have been grouped, give each group a common theme. Vote on the most promising, interesting, or innovative ideas.

15 minutes

Prioritize

Your team should all be on the same page about which ideas are most important to explore further. Use your votes to help you prioritize ideas on impact and effort, as outlined.

20 minutes

Importance

Feasibility

After you collaborate

You can export the mural as an image or PDF to share with members of your company who might find it helpful.

Quick add-ons

Share the mural
Share a view link to the mural with stakeholders to keep them informed on the outcome of the session.

Export the mural
Export a copy of the mural as a PNG or PDF to share with anyone not invited to the session.

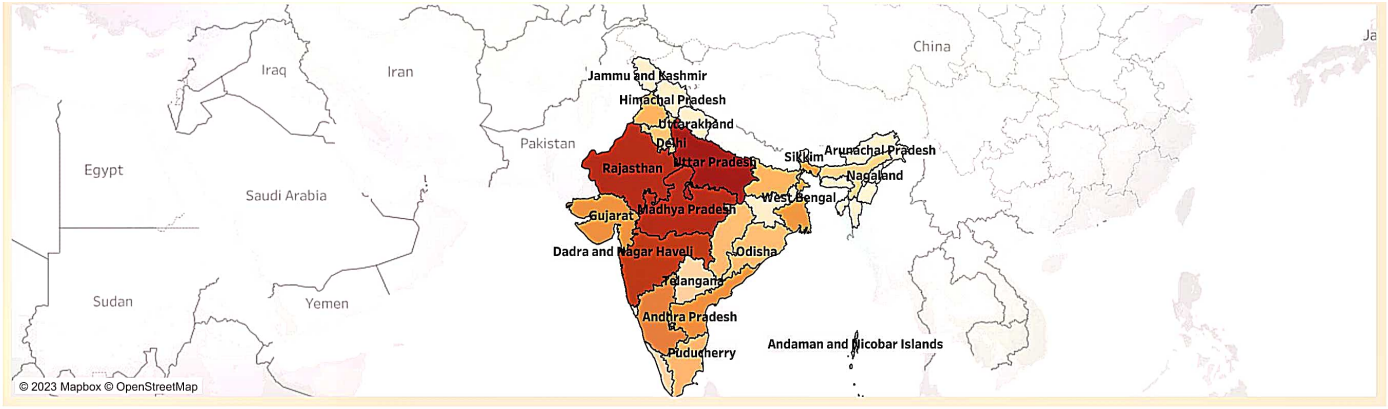
Keep moving forward

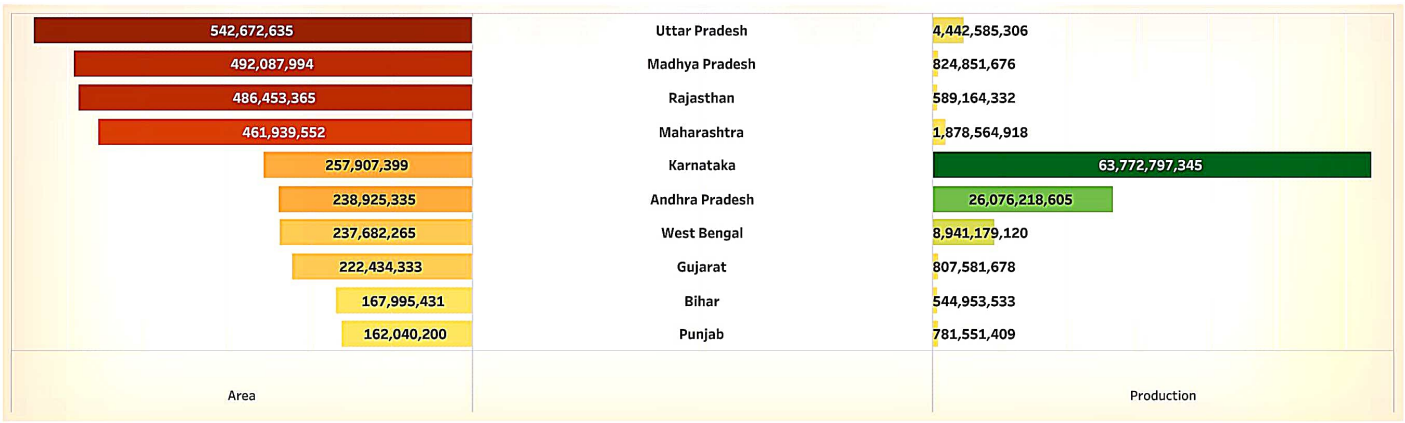
Strategy blueprint
Define the components of a new idea or strategy.
Open the template →

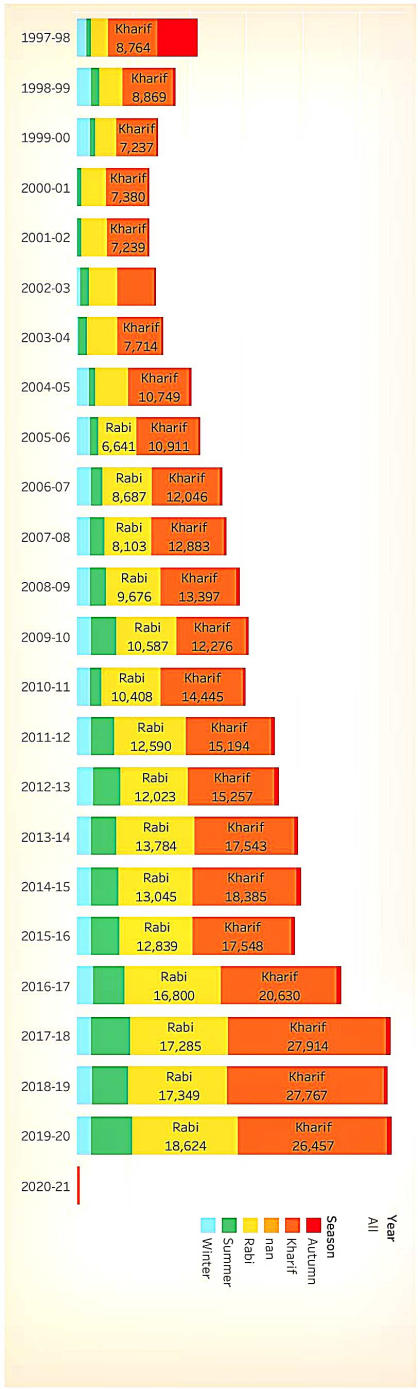
Customer journey map
Understand customer needs, motivations, and obstacles for a better experience.
Open the template →

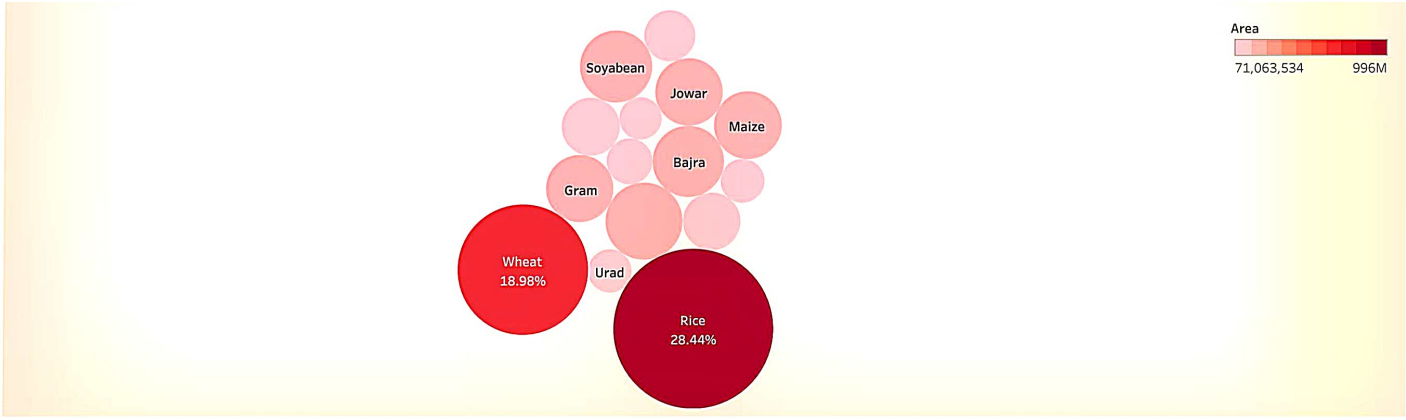
Strategic opportunities
Identify opportunities to explore for your business.
Open the template →

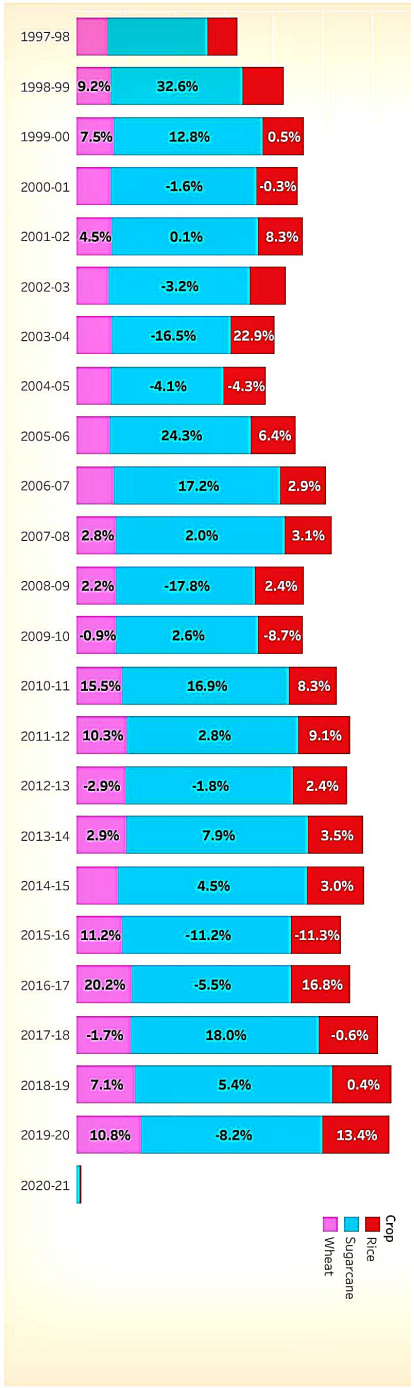
Share template feedback

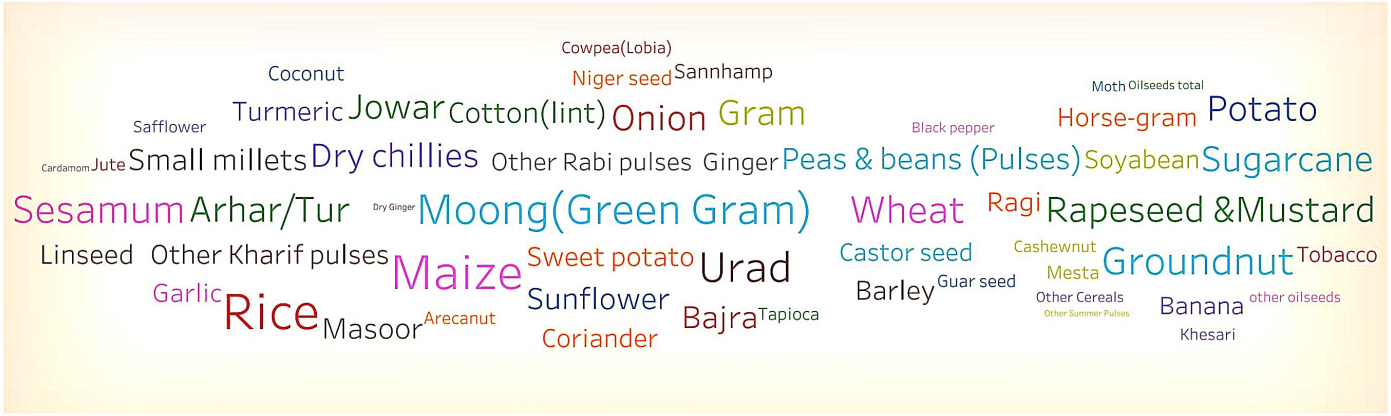

Iraq
Iran
China
Egypt
Saudi Arabia
Pakistan
Sudan
Yemen
Jammu and Kashmir
Himachal Pradesh
Uttarakhand
Delhi
Rajasthan
Uttar Pradesh
Sikkim
Arunachal Pradesh
Nagaland
West Bengal
Gujarat
Madhya Pradesh
Dadra and Nagar Haveli
Odisha
Telangana
Andhra Pradesh
Puducherry
Andaman and Nicobar Islands
© 2023 Mapbox © OpenStreetMap

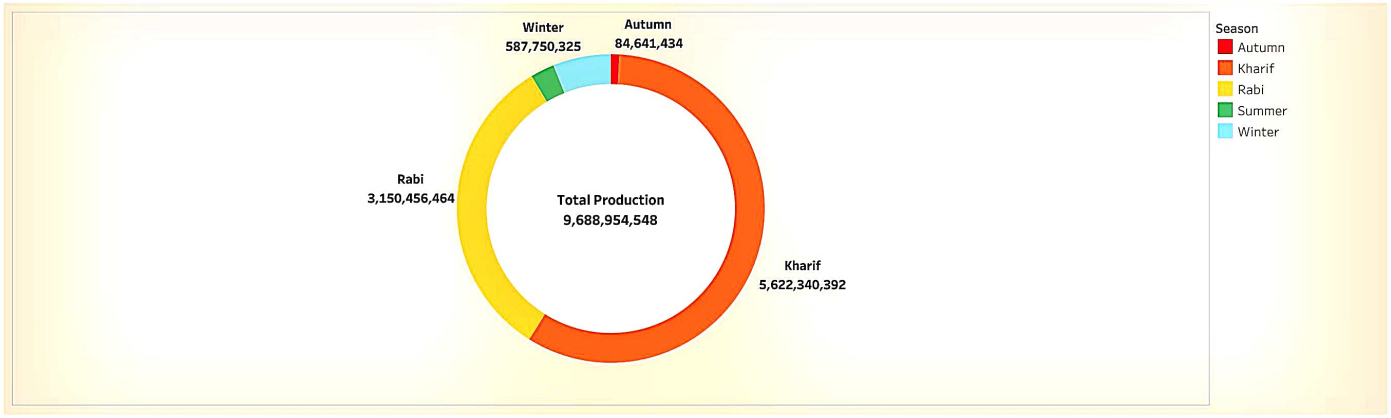

542,672,635
Uttar Pradesh
4,442,585,306
492,087,994
Madhya Pradesh
824,851,676
486,453,365
Rajasthan
589,164,332
461,939,552
Maharashtra
1,878,564,918
257,907,399
Karnataka
63,772,797,345
238,925,335
Andhra Pradesh
26,076,218,605
237,682,265
West Bengal
8,941,179,120
222,434,333
Gujarat
807,581,678
167,995,431
Bihar
544,953,533
162,040,200
Punjab
781,551,409
Area
Production

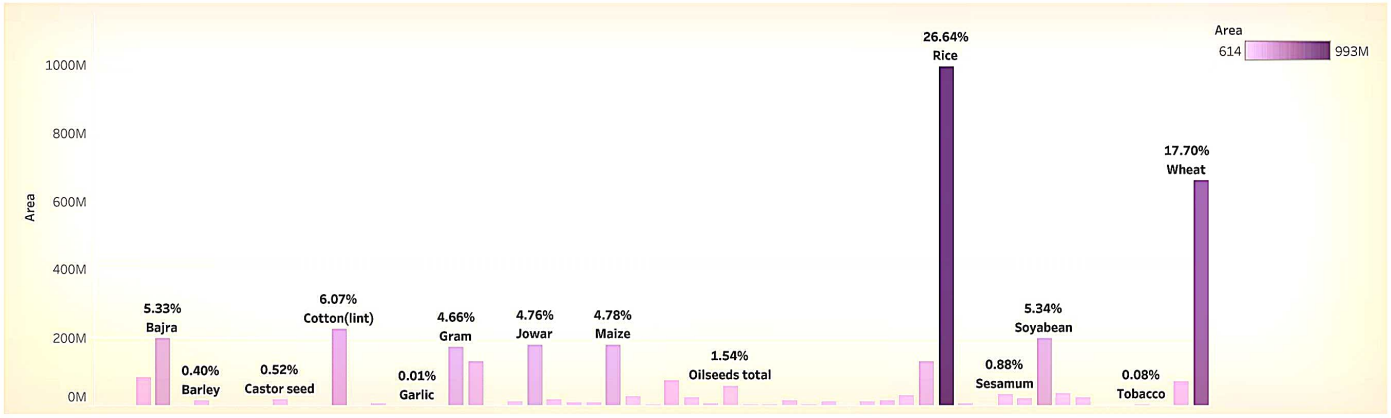

1997-98
Kharif
8,764
1998-99
Kharif
8,869
1999-00
Kharif
7,237
2000-01
Kharif
7,380
2001-02
Kharif
7,239
2002-03
2003-04
Kharif
7,714
2004-05
Kharif
10,749
2005-06
Rabi
6,641
Kharif
10,911
2006-07
Rabi
8,687
Kharif
12,046
2007-08
Rabi
8,103
Kharif
12,883
2008-09
Rabi
9,676
Kharif
13,397
2009-10
Rabi
10,587
Kharif
12,276
2010-11
Rabi
10,408
Kharif
14,445
2011-12
Rabi
12,590
Kharif
15,194
2012-13
Rabi
12,023
Kharif
15,257
2013-14
Rabi
13,784
Kharif
17,543
2014-15
Rabi
13,045
Kharif
18,385
2015-16
Rabi
12,839
Kharif
17,548
2016-17
Rabi
16,800
Kharif
20,630
2017-18
Rabi
17,285
Kharif
27,914
2018-19
Rabi
17,349
Kharif
27,767
2019-20
Rabi
18,624
Kharif
26,457
2020-21
Year
All
Season
Autumn
Kharif
nan
Rabi
Summer
Winter


Soyabean
Jowar
Maize
Bajra
Gram
Wheat
18.98%
Urad
Rice
28.44%
Area
71,063,534
996M

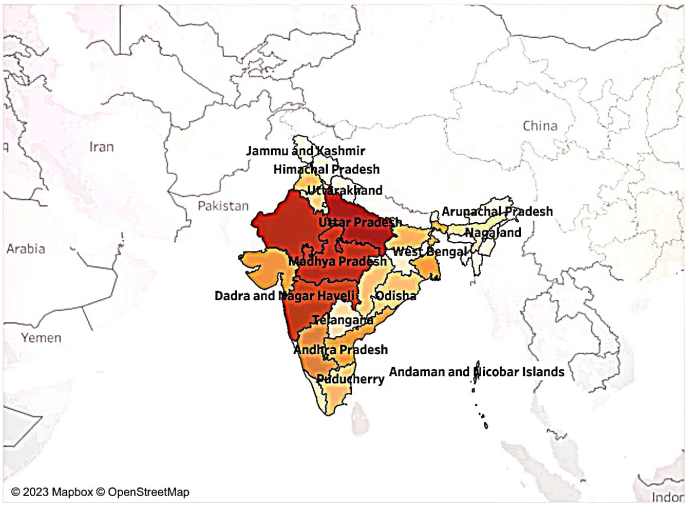

1997-98
1998-99
9.2%
32.6%
1999-00
7.5%
12.8%
0.5%
2000-01
-1.6%
-0.3%
2001-02
4.5%
0.1%
8.3%
2002-03
-3.2%
2003-04
-16.5%
22.9%
2004-05
-4.1%
-4.3%
2005-06
24.3%
6.4%
2006-07
17.2%
2.9%
2007-08
2.8%
2.0%
3.1%
2008-09
2.2%
-17.8%
2.4%
2009-10
-0.9%
2.6%
-8.7%
2010-11
15.5%
16.9%
8.3%
2011-12
10.3%
2.8%
9.1%
2012-13
-2.9%
-1.8%
2.4%
2013-14
2.9%
7.9%
3.5%
2014-15
4.5%
3.0%
2015-16
11.2%
-11.2%
-11.3%
2016-17
20.2%
-5.5%
16.8%
2017-18
-1.7%
18.0%
-0.6%
2018-19
7.1%
5.4%
0.4%
2019-20
10.8%
-8.2%
13.4%
2020-21
Crop
Rice
Sugarcane
Wheat


Cowpea(Lobia)
Coconut
Niger seed
Sannhamp
Moth
Oilseeds total
Turmeric
Jowar
Cotton(lint)
Onion
Gram
Potato
Safflower
Black pepper
Horse-gram
Cardamom
Jute
Small millets
Dry chillies
Other Rabi pulses
Ginger
Peas & beans (Pulses)
Soyabean
Sugarcane
Sesamum
Arhar/Tur
Dry Ginger
Moong(Green Gram)
Wheat
Ragi
Rapeseed &Mustard
Linseed
Other Kharif pulses
Maize
Sweet potato
Urad
Castor seed
Cashewnut
Groundnut
Tobacco
Mesta
Garlic
Rice
Sunflower
Barley
Guar seed
Other Cereals
Other Summer Pulses
Banana
other oilseeds
Masoor
Arecanut
Bajra
Tapioca
Coriander
Khesari

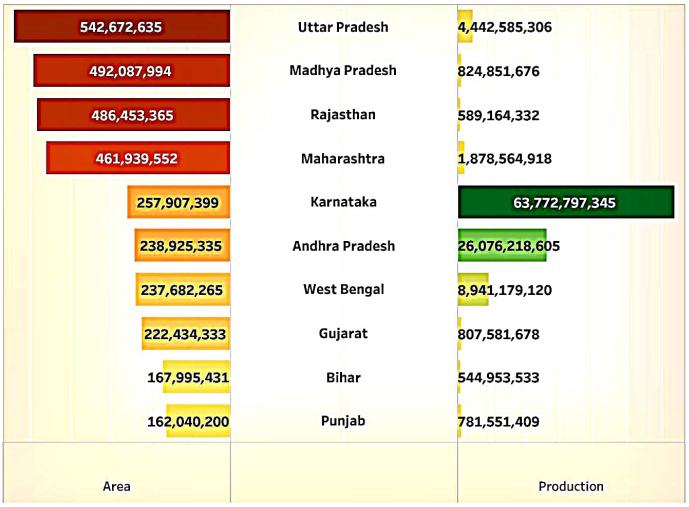

Winter
587,750,325
Autumn
84,641,434
Rabi
3,150,456,464
Total Production
9,688,954,548
Kharif
5,622,340,392
Season
Autumn
Kharif
Rabi
Summer
Winter


Area
614
993M
1000M
800M
600M
400M
200M
0M
Area
5.33%
Bajra
0.40%
Barley
0.52%
Castor seed
6.07%
Cotton(lint)
0.01%
Garlic
4.66%
Gram
4.76%
Jowar
4.78%
Maize
1.54%
Oilseeds total
26.64%
Rice
0.88%
Sesamum
5.34%
Soyabean
0.08%
Tobacco
17.70%
Wheat

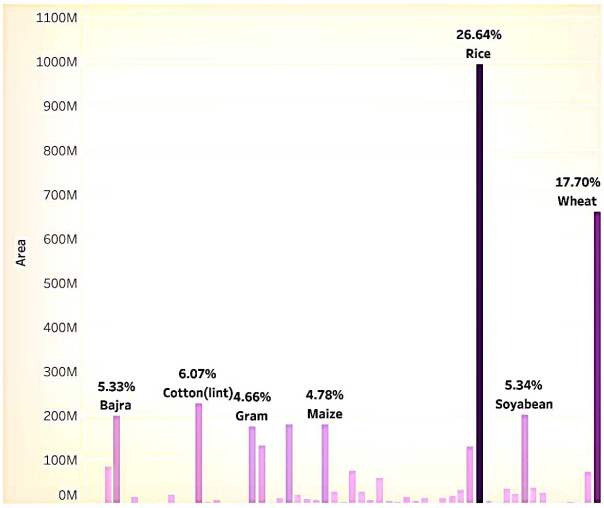
Statewise Agricultural Land



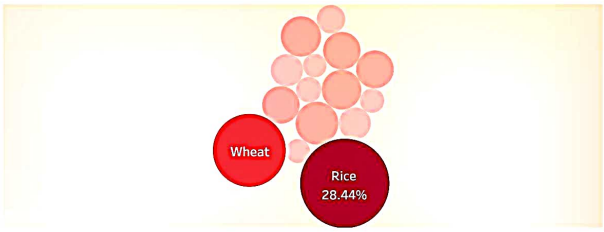
Area Vs Production



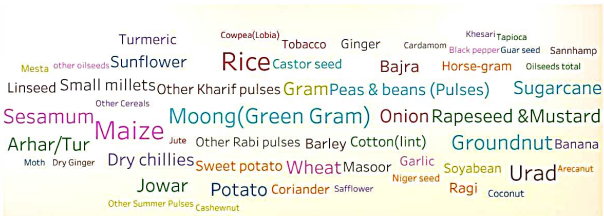
Season Based cultivation area



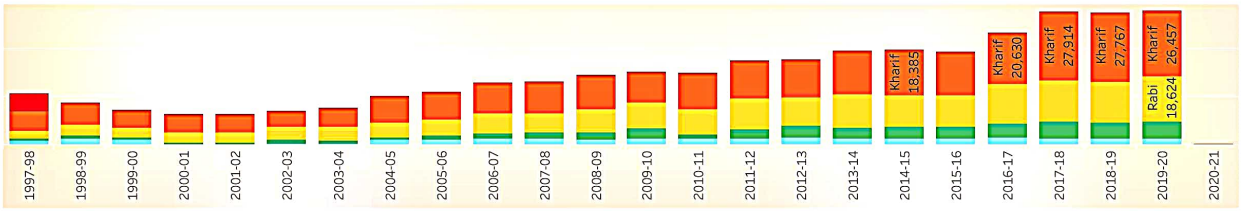
Crop Platation by Area



Crop(Plantation by cound)



Yield by Season

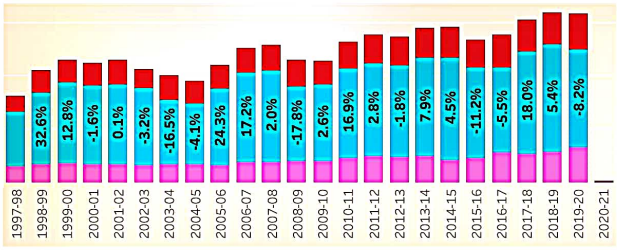


Year
All

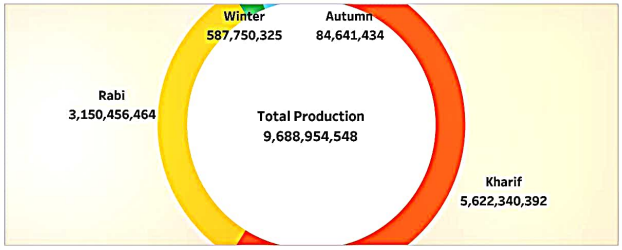
Crop
- Rice
- Sugarcane
- Wheat

Season
- Autumn
- Kharif
- Rabi
- Summer
- Winter

Major Crops

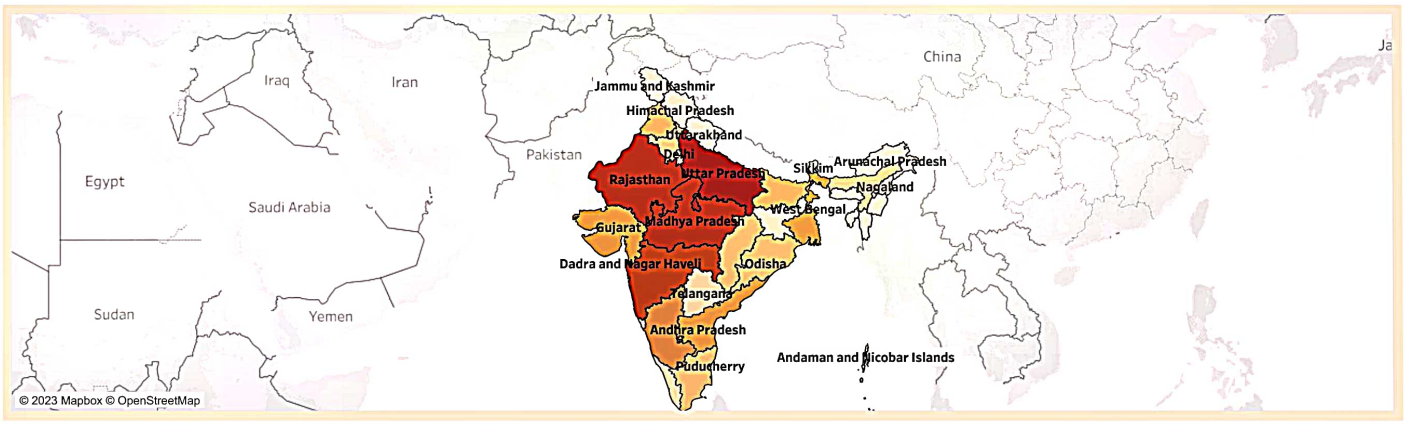


Season Wise Production



Story 1

Indian states visualation area	Area vs production	yiled by seasin	crops platation	Major crops	crop(plantation by count	season wise production	season based calculation area

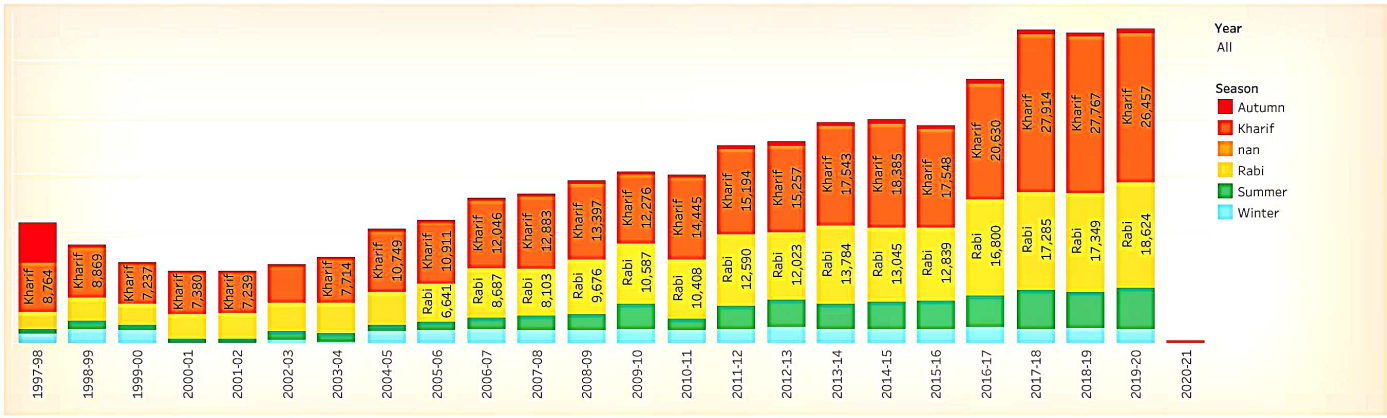


Story 1

Indian states visualation area | Area vs production | yiled by seasin | crops platation | Major crops | crop(plantation by count | season wise production | season based calculation area

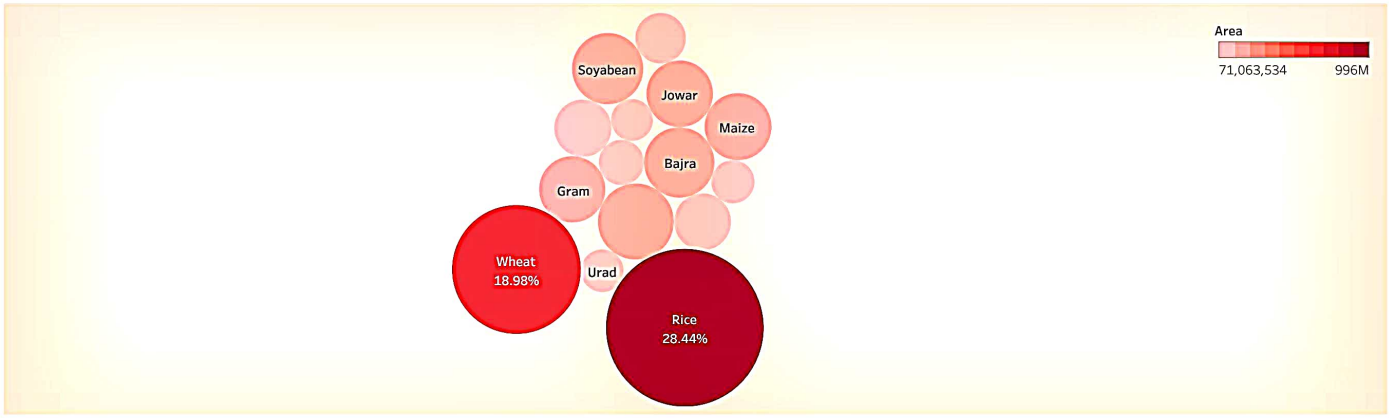
Story 1

Indian states visualation area | Area vs production | yiled by seasin | crops platation | Major crops | crop(plantation by count | season wise production | season based calculation area



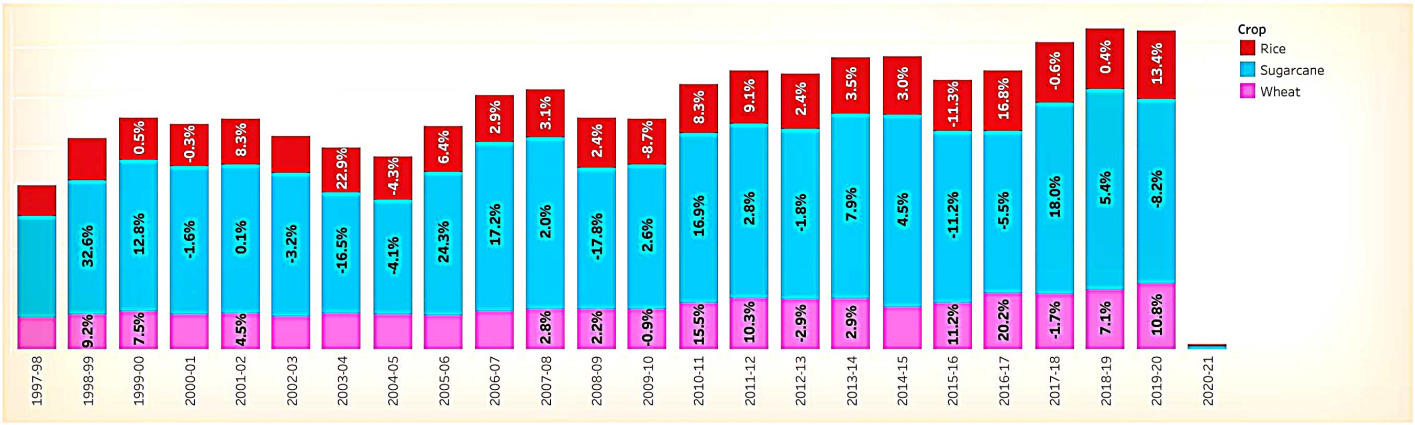
Story 1

Indian states visualation area	Area vs production	yiled by seasin	crops platation	Major crops	crop(plantation by count	season wise production	season based calculation area



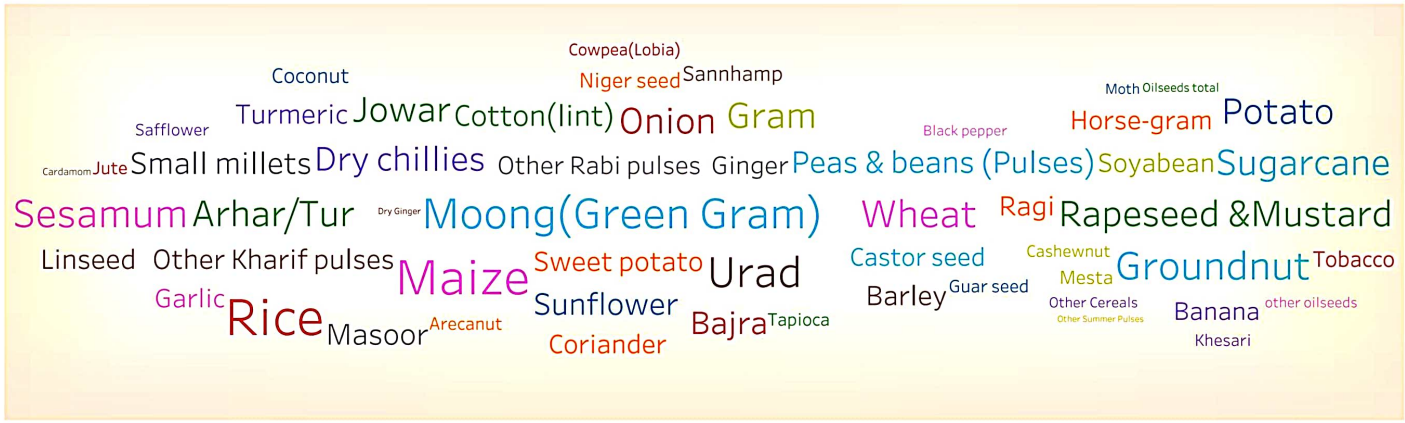
Story 1

Indian states visualation area | Area vs production | yiled by seasin | crops platation | **Major crops** | crop(plantation by count | season wise production | season based calculation area



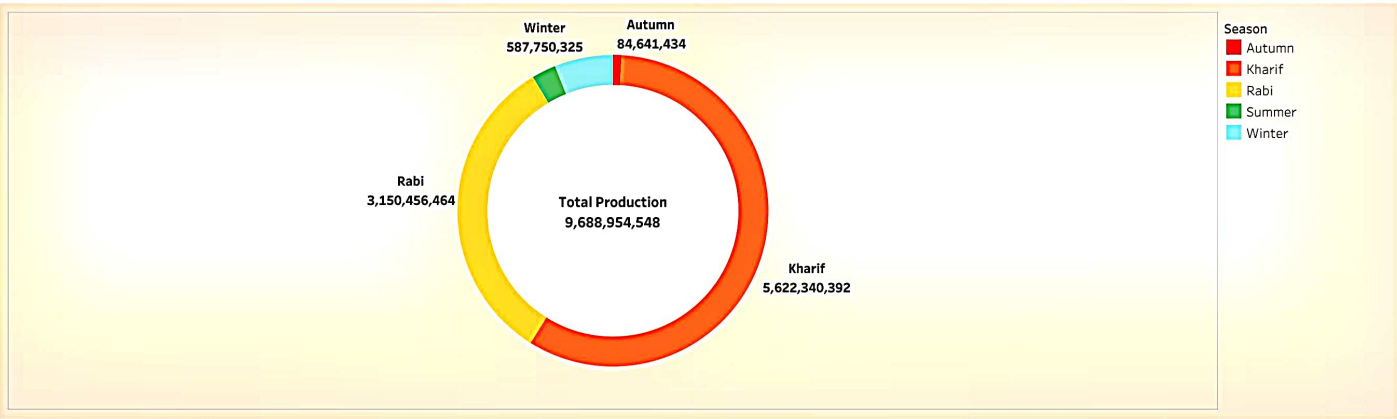
Story 1

Indian states visualation area	Area vs production	yiled by seasin	crops platation	Major crops	crop(plantation by count	season wise production	season based calculation area



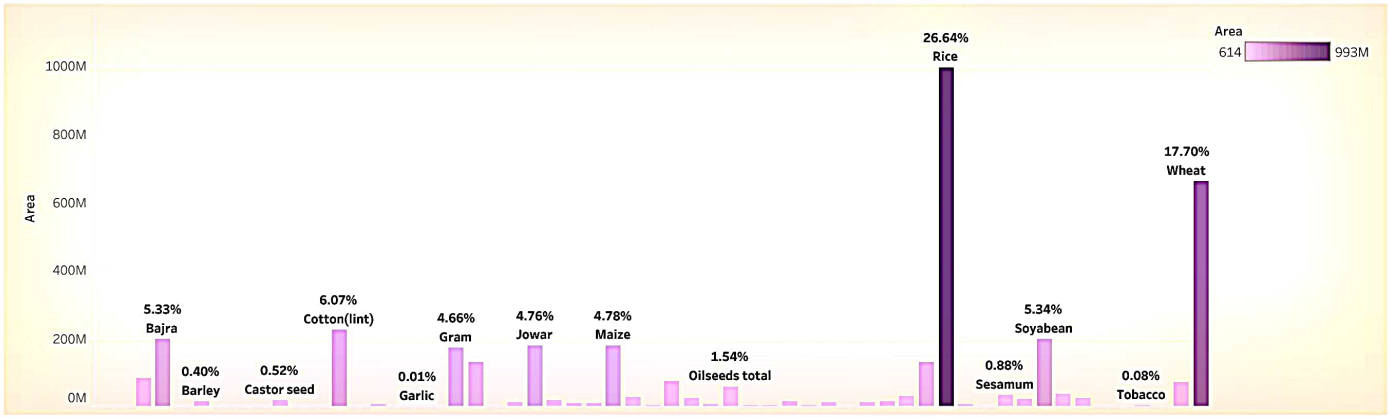
Story 1

Indian states visualation area	Area vs production	yiled by seasin	crops platation	Major crops	crop(plantation by count	season wise production	season based calculation area



Story 1

Indian states visualation area	Area vs production	yiled by seasin	crops platation	Major crops	crop(plantation by count	season wise production	season based calculation area



ADVANTAGES &DISADVANTAGES

ADVANTAGES OF INDIA'S AGRICULTURE

Indian agriculture offers several advantages, which contribute to its significance in the country's economy and the well-being of its population. Some of the key advantages of Indian agriculture include.

1. Diverse Agro-climatic Zones. India has a wide range of agro-climatic zones, which allows for the cultivation of a variety of crops and supports diverse farming practices.

2. Large Workforce. Indian agriculture provides employment to a substantial portion of the population, especially in rural areas, contributing to livelihoods and income generation.

3. Food Security. It plays a crucial role in ensuring food security by producing staple crops like rice, wheat, and pulses to meet the dietary needs of the population.

4. Crop Diversity. India produces a wide range of crops, including cereals, pulses, oilseeds, fruits, vegetables, and spices, contributing to dietary diversity and balanced nutrition.

5. Export Opportunities. The country is a major exporter of agricultural products, including rice, spices, cotton, and seafood, earning valuable foreign exchange.

6. Biodiversity. The country possesses a rich genetic diversity of crops and plant species, contributing to global biodiversity.

7. Smallholder Farming. While there are challenges, the prevalence of smallholder farming allows for more equitable distribution of income and resources.

8. Green Revolution. India's Green Revolution in the 1960s and 1970s led to increased crop yields and helped the country achieve self-sufficiency in food production.

9. Research and Innovation. India has a growing agricultural research sector, which is working on improving crop varieties, pest and disease management, and sustainable farming practices.

10. Rural Development. Agriculture plays a significant role in the development of rural areas, providing infrastructure, supporting local businesses, and creating a demand for services.

DISADVANTAGES OF INDIA'S AGRICULTURE

Indian agricultural crop production faces several disadvantages and challenges, which impact its efficiency, sustainability, and the livelihoods of those involved in the sector. Some of the notable disadvantages include:

1. Land Fragmentation. Indian agriculture is characterized by small landholdings, which can limit economies of scale, mechanization, and efficient land use.

2. Lack of Irrigation Infrastructure. Dependence on monsoon rains can lead to inconsistent and unreliable water supply for crops, affecting yields and cropping patterns.

3. Pest and Disease Management. Inadequate pest and disease control measures can lead to crop losses and increased use of chemical pesticides, which can have adverse environmental and health effects.

4. Soil Degradation. Overuse of land and improper soil management practices can lead to soil erosion, nutrient depletion, and reduced long-term productivity.

5. Water Scarcity. Many parts of India face water scarcity, which affects both crop production and livestock rearing.

6. Lack of Mechanization: Traditional farming methods and the limited use of modern machinery can result in labor-intensive and time-consuming farming practices.

7. Crop Insurance Challenges: The reach and effectiveness of crop insurance schemes can be limited, leaving farmers vulnerable to crop losses.

8. Aging Farming Population: The average age of farmers in India is increasing, which can hinder the adoption of new technologies and practices.

APPLICATIONS:

- India is the World's Second most populated County. And there is always a continuing demand for food to feed such a large population. As a result, there is a need for agriculture and a need for the Economy to be less reliant on the Agriculture sector.
- Agriculture supplies raw materials to various ago based industries like sugar, jute, cotton textile and vanaspati industries. Food processing in Industries are similarly dependent on agriculture. Therefore, the development of these industries entirely is dependent on agriculture.
- Agriculture has been practiced in India for thousands of years, and two-thirds, i.e., 60-70 percentage of India's Population, depend on agriculture for their livelihood. Agriculture is a primary activity in India that produces most of the food that people consume.

CONCULSION

In conclusion, Indian agriculture is at a crucial juncture with both opportunities and challenges. The sector's future depends on embracing modern technologies, sustainable practices, diversification, and climate resilience. Government support, education, and private sector involvement will play essential roles in the transformation of Indian agriculture. The

Indian economy is an agro-economy and depends highly on the Agricultural Sector. Despite just supporting the Indian Economy, the agricultural sector also supports the Industrial Sector and international trade in imports and exports. Although the contribution of the Agricultural Sector to the Indian Economy is reducing. It is the sector with the most number of people working in it around the country.

FUTURE SCOPS

The future of Indian Agriculture holds several key prospects and Challenges.

- Technological Advancements. Adoption of modern technologies like precision farming IT, and AI can boost productivity and efficiency.
- Sustainable Agriculture. Emphasizing sustainable practices to conserve resources, reduce environmental impact and ensure long-term food security.
- Diversification. Encouraging crop diversification beyond traditional staples to enhance income and nutrition.
- Market Access. Improved market access through digital platforms can benefit both farmers and consumers.
- Climate Resilience. Developing crops and practices that can with stand the changing climate, given India's vulnerability to climate change.
- Government Initiatives. Continued support through policies, subsidies and infrastructure development.
- Education and Training. Enhancing the skills and knowledge of farmers through education and training programs.
- Private Sector Participation. Increased involvement of the private sector can bring in investment and innovation.

- Export Opportunities: Exploring international markets for Indian agricultural products.
- Reducing Post-Harvest Losses: Implementing better storage and transportation facilities to reduce wastage.
- Organic Farming: The growing demand for organic produce presents opportunities for Indian farmers.
- Farmer Welfare: Addressing issues of farmer distress and income security.

To realize these prospects, India must navigate challenges like land fragmentation, water scarcity, and the need for significant investments in infrastructure and research and development.