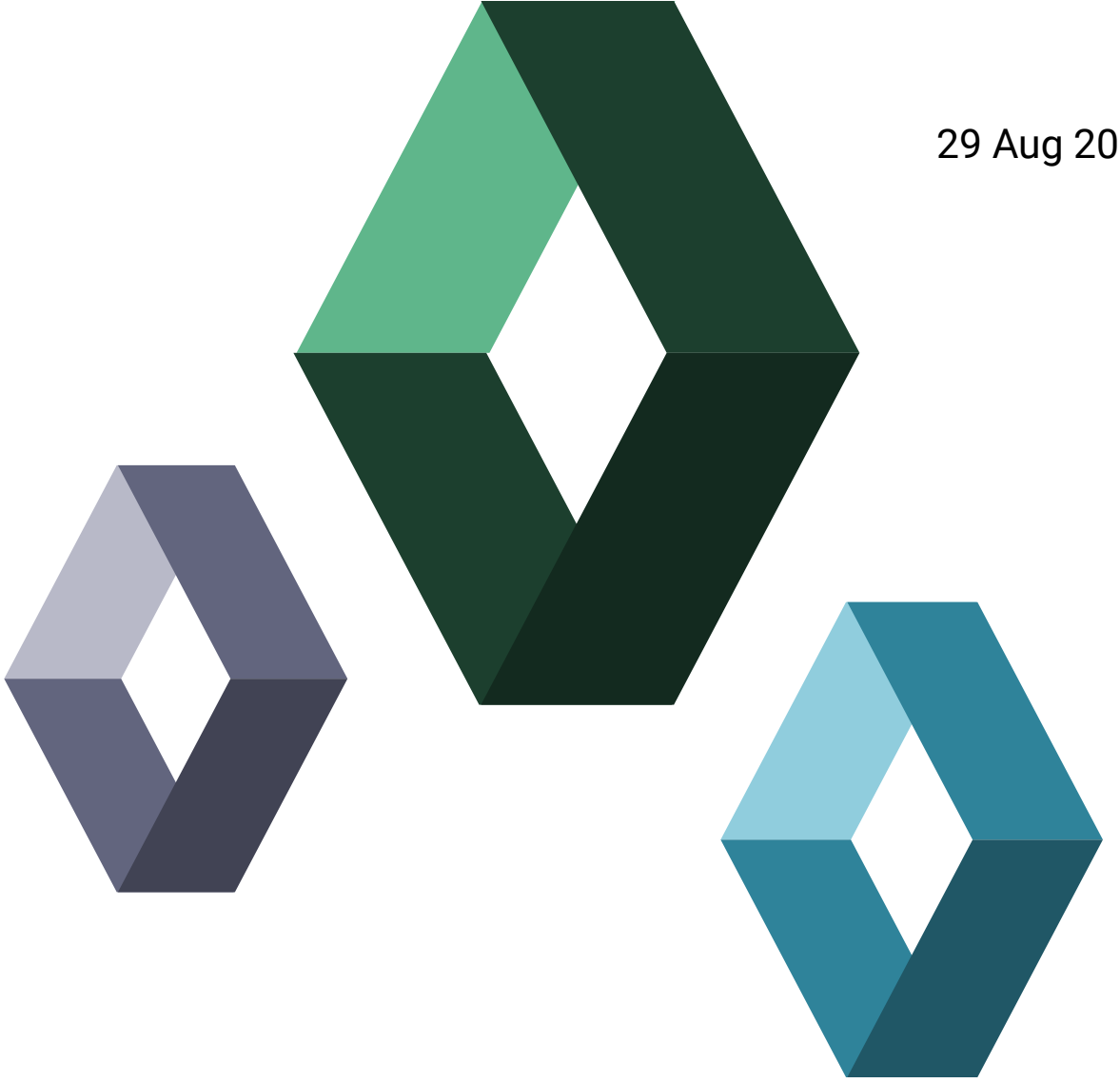
29 Aug 2023



PROJECT

[GROW AGRO]

Analyzing Agriculture in India and making strategic decisions based on it according to population

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1. Agricultural Landscape Analysis:

i)The major crops grown and regions specializing in each crop:

Certainly, here are some major crops grown in India along with the regions that specialize in each crop:

1. Rice:
   - Major Regions: Punjab, Haryana, Uttar Pradesh, West Bengal, Andhra Pradesh, Tamil Nadu, Odisha.

2. .Wheat:.
   - Major Regions: Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Rajasthan.

3. .Sugarcane:.
   - Major Regions: Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh.

4. .Cotton:.
   - Major Regions: Gujarat, Maharashtra, Telangana, Andhra Pradesh, Punjab, Haryana.

5. .Tea:.
   - Major Regions: Assam, West Bengal, Tamil Nadu, Kerala, Himachal Pradesh.

6. .Coffee:.
   - Major Regions: Karnataka (Coorg), Kerala (Wayanad), Tamil Nadu (Nilgiris).

7. .Oilseeds (Mustard, Groundnut, Soybean, Sunflower, etc.):.
   - Major Regions: Rajasthan, Madhya Pradesh, Gujarat, Andhra Pradesh, Maharashtra.

8. Pulses (Lentils, Chickpeas, etc.):
   - Major Regions: Madhya Pradesh, Uttar Pradesh, Maharashtra, Rajasthan.

9. Fruits (Mangoes, Bananas, Citrus, etc.):
   - Major Regions: Mangoes (Maharashtra, Andhra Pradesh, Uttar Pradesh), Bananas (Maharashtra, Tamil Nadu, Gujarat), Citrus (Maharashtra, Andhra Pradesh).

10. Vegetables (Potatoes, Onions, Tomatoes, etc.):
   - Major Regions: Potatoes (Uttar Pradesh, West Bengal), Onions (Maharashtra, Karnataka), Tomatoes (Andhra Pradesh, Karnataka).

11. Spices (Chilies, Turmeric, Cardamom, etc.):
   - Major Regions: Chilies (Andhra Pradesh, Telangana, Karnataka), Turmeric (Andhra Pradesh, Telangana, Tamil Nadu), Cardamom (Kerala, Tamil Nadu).

12. Jute:
   - Major Regions: West Bengal, Bihar, Assam, Odisha.

13.Cashews:
   - Major Regions: Kerala, Karnataka, Goa, Maharashtra, Tamil Nadu, Andhra Pradesh, Odisha.

14. Rubber:
   - Major Regions: Kerala, Tamil Nadu, Karnataka, northeastern states.

The crop specialization can change due to various factors such as climate, government policies, and technological advancements. The above information is based on general trends and historical production data, but for the most up-to-date and specific information, it's recommended to consult current agricultural sources and reports.

ii)Analyze the contribution of agriculture to the economy, including GDP and employment in India

Agriculture has historically been a significant contributor to India's economy in terms of both GDP and employment. However, over the years, the relative importance of agriculture has been decreasing as the economy diversifies into other sectors. Let's analyze the contribution of agriculture to India's economy in terms of GDP and employment:

1. GDP Contribution:

- Agriculture's contribution to India's Gross Domestic Product (GDP) has been declining over the decades. In the early years after independence, agriculture

contributed a substantial share of the GDP.

- As of my last knowledge update in September 2021, agriculture's contribution to India's GDP was around 15-17%. This figure has been gradually declining due to the growth of other sectors like services and industry.
- The declining contribution to GDP is partly due to lower productivity growth in agriculture compared to other sectors and the increased urbanization and industrialization of the economy.

2. Employment Contribution:

- Agriculture remains a major employer in India, providing livelihoods for a significant portion of the population. A large proportion of India's workforce is engaged in agriculture-related activities, including farming, forestry, and fishing.
- The agriculture sector supports a high level of employment due to the presence of small and marginal farmers, who often rely on subsistence farming.
- It's estimated that around 40-50% of India's workforce is employed in the agriculture sector, making it the largest employment sector in the country.

3. Challenges and Concerns:

- Despite its significant employment contribution, agriculture in India faces several challenges, including low productivity, lack of modern technology adoption, land fragmentation, water scarcity, and climate change impacts.
- The sector is characterized by small landholdings, which often results in low economies of scale and limited access to credit and technology.

4. Policy Initiatives:

- The Indian government has implemented various policy initiatives to support the agricultural sector, such as subsidies, rural infrastructure development, crop insurance schemes, and efforts to improve access to credit for farmers.
- Programs like the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) aim to provide employment opportunities in rural areas, reducing the dependency on agriculture for livelihoods.

5. Future Trends:

- As the Indian economy continues to grow and diversify, the share of agriculture in both GDP and employment is likely to continue declining.
- The focus will shift towards enhancing agricultural productivity, improving supply chains, and promoting sustainable farming practices to ensure food security for a growing population.

It's important to note that the information provided is based on data available up until September 2021. For the most up-to-date information, it's recommended to consult recent reports from reputable sources such as the Reserve Bank of India, the Ministry of Agriculture, and international organizations like the World Bank and FAO.

iii)Evaluating the state of agricultural infrastructure, including irrigation systems, transportation, and storage facilities of India

As of my last knowledge update in September 2021, I can provide an evaluation of the

state of agricultural infrastructure in India, including irrigation systems, transportation, and storage facilities. Please note that there might have been developments or changes since that time. Here's an overview:

1. Irrigation Systems:

- Irrigation is crucial for ensuring consistent agricultural productivity, especially in a country like India with diverse climatic conditions.
- India has made efforts to expand its irrigation infrastructure through various projects and initiatives, such as the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) aimed at improving water use efficiency.
- While there has been progress, there are still challenges related to equitable distribution of water, outdated infrastructure, and inefficient water management practices.
- Many small and marginal farmers still rely on rainfall, leading to vulnerability in case of droughts.

2. Transportation:

- Efficient transportation is essential for linking agricultural production areas with markets and consumers.
- India has a vast and diverse transportation network that includes roads, railways, and waterways. However, rural areas often face connectivity challenges, impacting the timely movement of agricultural produce.
- Improvement in rural road connectivity and transportation infrastructure has been a focus, but more investment is needed to enhance connectivity in remote

areas.

3. Storage Facilities:

- Proper storage facilities are crucial for reducing post-harvest losses and ensuring food security.
- India has a mix of traditional and modern storage facilities. Traditional methods include granaries and storage pits, while modern methods involve warehouses and cold storage units.
- Post-harvest losses are still significant due to inadequate storage infrastructure, lack of proper cold chain facilities, and issues with pest management and spoilage.

4. Challenges and Initiatives:

- Inadequate investment in agricultural infrastructure, including irrigation, transportation, and storage, has been a challenge.
- Inefficient use of water resources, especially in regions with water scarcity, needs to be addressed through better water management practices.
- The government has initiated various programs to improve agricultural infrastructure, such as the National Mission for Sustainable Agriculture (NMSA) and the National Agriculture Market (eNAM) to enhance marketing infrastructure.

5. Future Outlook:

- The Indian government recognizes the need to modernize agricultural infrastructure to support the growing agricultural sector and ensure food security

for a growing population.

- Investments in irrigation, transportation, and storage facilities are likely to continue as part of broader rural development and agricultural improvement strategies.

It's important to note that the information provided is based on data available until September 2021. For the most up-to-date and detailed evaluation of India's agricultural infrastructure, it's recommended to consult recent reports and publications from government agencies, international organizations, and research institutions focused on agriculture and rural development.

iv)Considering the impact of climate change and its effects on crop patterns and productivity of india

Climate change is having significant impacts on crop patterns and productivity in India. Rising temperatures, changing precipitation patterns, and increased frequency of extreme weather events are all affecting agricultural systems and the livelihoods of farmers. Here are some key ways in which climate change is impacting crop patterns and productivity in India:

1. Altered Crop Growing Seasons:

- Changes in temperature and precipitation are causing shifts in the timing of planting and harvesting seasons. In some cases, traditional cropping calendars are becoming less reliable.
- Crops that were traditionally grown during certain seasons may face challenges due to changing temperature and rainfall patterns.

2. Water Scarcity and Droughts:

- Erratic rainfall patterns and prolonged droughts are leading to water scarcity, affecting irrigation and crop growth.
- Water stress can impact both rainfed and irrigated agriculture, leading to reduced yields and crop failures.

3. Increased Pest and Disease Pressure:

- Warmer temperatures and altered humidity levels can create favorable conditions for the proliferation of pests and diseases.
- Crop pests and diseases that were once limited to specific regions may expand their range due to changing climatic conditions.

4. Heat Stress and Yield Reductions:

- Extreme heat events can lead to heat stress in crops, negatively affecting pollination, flowering, and overall growth.
- High temperatures can cause yield reductions and even complete crop failures in some cases.

5. Shifts in Crop Suitability Zones:

- Changes in temperature and precipitation patterns may lead to shifts in the suitable areas for specific crops.
- Some crops may no longer be viable in their traditional growing areas, while new areas may become suitable for different crops.

6. Impact on Livelihoods and Food Security:

- Climate change-induced crop failures can threaten the livelihoods of small and marginal farmers who heavily depend on agriculture.
- Reduced crop yields can lead to food insecurity and higher food prices, affecting vulnerable populations.

7. Need for Adaptation Strategies:

- Farmers need to adopt climate-resilient agricultural practices, such as selecting heat-tolerant and drought-resistant crop varieties, improving water management, and adopting conservation agriculture techniques.
- Government policies and support are crucial in promoting and disseminating climate-smart agricultural practices.

8. Research and Technology Development:

- Research is essential for developing crop varieties that can withstand the changing climate conditions, resist pests and diseases, and maintain high yields under stress.
- Technologies like precision agriculture and remote sensing can help monitor and manage crops in changing conditions.

9. International Collaboration:

- Climate change impacts on agriculture are not confined by national borders. International collaboration is crucial for sharing knowledge and best practices to

mitigate these impacts.

Addressing the impacts of climate change on crop patterns and productivity requires a multi-pronged approach involving farmers, researchers, governments, and international organizations. Adaptation strategies, investment in resilient agricultural practices, and efforts to reduce greenhouse gas emissions are all essential components of a comprehensive response to climate change in the agricultural sector.

2. Population Analysis:

i)Examining the current population size and distribution across urban and rural areas in india

As of my last knowledge update in September 2021, I can provide an overview of the current population size and distribution across urban and rural areas in India. Please note that there might have been changes since that time. Here's the information available up to 2021:

Population Size:

India is the second most populous country in the world, with a population that has been steadily increasing. As of 2021, the estimated population of India was around 1.3 billion people.

Urban Population:

India has been undergoing rapid urbanization, with a significant portion of its population moving to urban areas in search of better economic opportunities and improved living standards. Major cities like Mumbai, Delhi, Bangalore, and Kolkata are among the most

populous urban centers in the country.

Rural Population:

Despite urbanization, a substantial portion of India's population still resides in rural areas. Agriculture remains a major source of livelihood for many in rural communities.

Population Distribution Trends:

The urbanization rate in India has been steadily increasing over the years. People are moving from rural areas to urban centers in search of employment, education, and improved facilities. This migration is driven by factors such as industrialization, urban job opportunities, and access to services.

Challenges and Implications:

The rapid growth of urban population poses challenges such as inadequate urban infrastructure, congestion, housing shortages, and pressure on basic services. In rural areas, challenges include limited access to quality healthcare, education, and employment opportunities, as well as issues related to agricultural productivity and rural development.

Government Initiatives:

The Indian government has launched various initiatives to address the challenges of urbanization and rural development. Programs like the Pradhan Mantri Awas Yojana (PMAY) aim to provide affordable housing in urban areas, while initiatives like the National Rural Employment Guarantee Act (NREGA) aim to provide employment opportunities in rural areas.

Future Trends:

Urbanization is expected to continue, driven by factors such as industrial growth and changing lifestyles. It's important for urban planning and policies to focus on sustainable urban development, infrastructure improvement, and efficient service delivery. At the same time, rural development efforts need to focus on improving agricultural productivity, access to education and healthcare, and creating employment opportunities.

ii)Analyze demographic trends, including age structure, population growth rates, and migration patterns of india

As of my last knowledge update in September 2021, here's an analysis of demographic trends in India, including age structure, population growth rates, and migration patterns. Please note that there might have been developments or changes since that time:

1. Age Structure:

India has a diverse age structure with a significant portion of its population in younger age groups. The age structure has implications for the workforce, education, healthcare, and social services.

- **Youth Population:** India has a large youth population, with a substantial percentage of its inhabitants below the age of 30. This youthful demographic presents both opportunities and challenges. On one hand, it offers a potential demographic dividend if the youth can be provided with quality education and employment opportunities. On the other hand, failure to harness this potential

could lead to issues of unemployment and social unrest.

- **Aging Population:** While the youth population is significant, India is also experiencing an aging population. Life expectancy has been increasing due to improvements in healthcare, leading to a larger elderly population. This presents challenges related to healthcare, social security, and pension systems.

2. Population Growth Rates:

India's population growth rate has been gradually declining, but the country still experiences significant population growth due to its large base population.

- **Declining Growth Rate:** The population growth rate has been on a downward trajectory due to factors like increased awareness about family planning, improvements in healthcare, and changing socio-economic conditions. However, the absolute numbers of population increase are still substantial due to the large base population.
- **Urbanization and Family Planning:** Urbanization often leads to lower birth rates due to factors like increased education, employment opportunities, and access to family planning services. Family planning programs and education are crucial in further reducing the population growth rate.

3. Migration Patterns:

Migration is an important demographic trend in India, impacting both rural and urban areas.

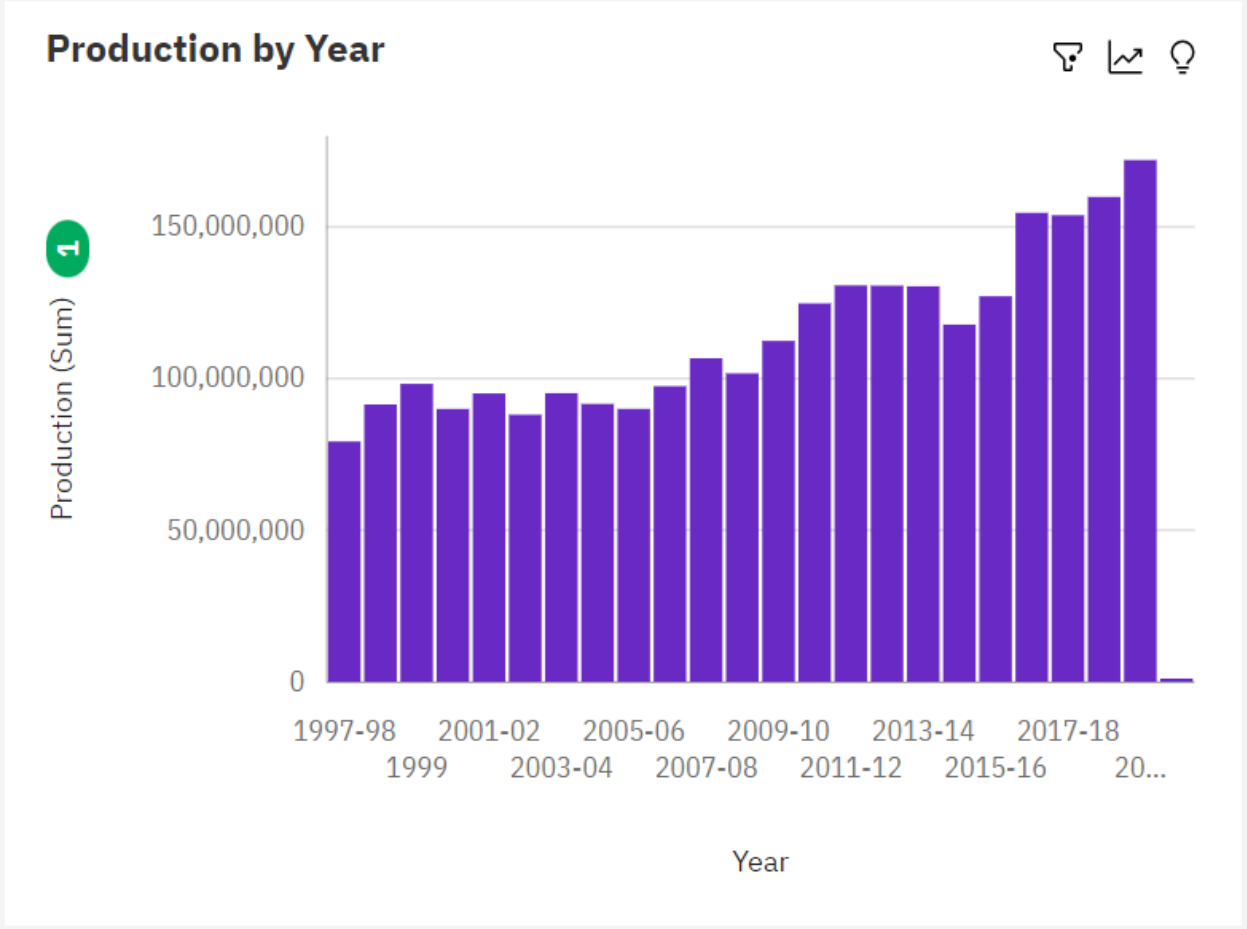
- **Rural to Urban Migration:** The process of urbanization has led to significant rural-to-urban migration as people seek better job opportunities, education, and

improved living conditions in cities. This migration has implications for urban infrastructure, housing, and services.

- **Interstate Migration:** India also experiences interstate migration, with people moving from one state to another for economic reasons. States with better economic prospects often attract migrants from less developed regions.
- **International Migration:** While international migration is not as prevalent as internal migration, there are Indians who migrate abroad for work and education. This can have remittance benefits for the country's economy.

4. Implications and Challenges:

- **Workforce Dynamics:** The youthful population can contribute to a growing workforce if appropriate skill development and job opportunities are provided. However, failure to provide employment opportunities could lead to unemployment and social unrest.
- **Urbanization Challenges:** Rapid urbanization can strain urban infrastructure, housing, and services. Adequate urban planning is essential to accommodate the influx of people into cities.
- **Aging Population:** The aging population presents challenges related to healthcare and social security. Preparing for the needs of an aging population is important.
- **Education and Healthcare:** Demographic trends have implications for education and healthcare services. Ensuring quality education and accessible healthcare is crucial to harnessing the potential of the youth population and supporting the elderly.



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5. Government Policies and Initiatives:

The Indian government has implemented various policies and programs to address demographic trends and challenges. These include family planning initiatives, skill development programs, rural development schemes, and efforts to improve healthcare and education access.

iii)Identify population segments with different dietary preferences and nutritional

needs of india

India is known for its cultural diversity, which is reflected in the dietary preferences and nutritional needs of its population. There are various population segments with distinct dietary patterns and nutritional requirements based on factors such as regional cuisine, religion, socio-economic status, and lifestyle. Here are some of the notable population segments with different dietary preferences and nutritional needs in India:

1. **Vegetarians:**

   India has a significant vegetarian population due to cultural, religious, and ethical reasons. Many Hindus, Jains, and Buddhists follow vegetarian diets. Their diets mainly consist of plant-based foods, including grains, legumes, vegetables, fruits, nuts, and dairy products. Nutritional needs for vegetarians often involve ensuring adequate protein, iron, calcium, vitamin B12, and omega-3 fatty acids intake.
2. **Non-Vegetarians:**

   While a large portion of the Indian population follows vegetarian diets, there is also a substantial non-vegetarian population. They consume meat, poultry, fish, and other animal products. Non-vegetarian diets can provide essential nutrients like high-quality protein, iron, zinc, and vitamin B12.
3. **Vegans:**

   A smaller segment of the population follows vegan diets, which exclude all animal products, including dairy and honey. Vegans need to pay special attention to their nutrient intake, ensuring proper sources of protein, vitamin B12, calcium, iron, and omega-3 fatty acids.
4. **Religious and Cultural Dietary Practices:**

   Different religious and cultural groups have specific dietary practices. For

example, Muslims observe halal dietary laws, which influence their choices of meat and food preparation. Sikhs often consume vegetarian diets, emphasizing the consumption of grains, legumes, and dairy. Festivals and religious observances also impact dietary choices during specific times of the year.

5. **Regional Cuisine:**

   India's diverse regions have unique culinary traditions and food preferences. For instance, South Indian cuisine is characterized by rice, lentils, and coconut-based dishes, while North Indian cuisine includes flatbreads, curries, and dairy-rich foods. The nutritional content of regional diets can vary widely.

6. **Tribal Communities:**

   Tribal communities across India have their own dietary practices based on the resources available in their local ecosystems. These diets may include locally grown grains, vegetables, wild plants, and forest foods. Nutritional needs for these communities require a focus on maintaining dietary diversity and addressing potential nutrient deficiencies.

7. **Urban and Rural Differences:**

   Urban populations often have greater access to processed and convenience foods, which can lead to dietary imbalances if not carefully managed. In contrast, rural populations might have a more traditional diet based on locally grown foods, although access to certain nutrients can still be a challenge.

8. **Socio-Economic Variability:**

   Socio-economic status also plays a role in dietary preferences. Affluent individuals may have access to a wider variety of foods, while lower-income individuals might have more limited options.

9. **Lifestyle Choices:**

   Changing lifestyles, including sedentary behavior and increased consumption of processed foods and sugary beverages, have led to concerns about rising rates of obesity and diet-related non-communicable diseases.

It's important to acknowledge and respect the dietary preferences and nutritional needs of different population segments in India. Public health initiatives and nutrition education should be tailored to address the specific requirements of these segments, promoting balanced diets and good health.

3. Food Security and Nutrition:

i)Assess the availability, accessibility, and affordability of food for different population segments in india

Assessing the availability, accessibility, and affordability of food for different population segments in India involves considering factors such as income levels, geographical location, urbanization, government policies, and social disparities. As of my last knowledge update in September 2021, here's an assessment of these factors:

1. Availability:

- Food availability is influenced by agricultural productivity, distribution networks, and food supply chains.
- Some regions may have better access to locally grown foods, while others rely on food transported from distant areas.

- Agricultural productivity and storage facilities impact the availability of perishable and non-perishable foods.

2. Accessibility:

- Accessibility refers to the physical and economic ability to obtain food.
- Urban areas often have better access to a variety of food options due to proximity to markets and supermarkets.
- Rural areas might face challenges related to limited transportation options and lack of nearby markets.

3. Affordability:

- Food affordability is a critical concern, especially for low-income populations.
- The cost of food relative to income determines whether individuals and families can afford a balanced and nutritious diet.
- Rising food prices can disproportionately affect vulnerable populations.

4. Income Disparities:

- Income disparities in India impact the purchasing power of different population segments.
- Low-income households may struggle to afford nutritious foods, leading to reliance on cheaper, energy-dense but nutrient-poor options.

5. Urban vs. Rural Disparities:

- Urban areas generally have more diverse food options due to the presence of

supermarkets and restaurants. However, the cost of living in cities can also impact affordability.

- Rural areas may have limited access to diverse food choices, and traditional diets might be more prevalent.

6. Government Policies:

- The Indian government has implemented various programs to ensure food security for different population segments.
- The Public Distribution System (PDS) provides subsidized food grains to economically weaker sections of society.
- The Mid-Day Meal Scheme aims to provide nutritious meals to schoolchildren.

7. Nutritional Disparities:

- While food might be available and accessible, nutritional disparities exist due to dietary choices, cultural preferences, and lack of awareness.
- Certain segments might have limited access to nutrient-rich foods like fruits, vegetables, and proteins.

8. Non-Food Factors:

- Access to clean water, sanitation, and healthcare also influence nutritional outcomes.
- Poor sanitation and hygiene practices can lead to health issues that impact food utilization.

9. Global and Local Influences:

- Global trade and market fluctuations can impact food prices and availability.
- Local climate events, such as droughts or floods, can disrupt agricultural production and food supply.

10. Changing Lifestyle Patterns:

- Changing lifestyles, especially in urban areas, have led to increased consumption of processed and unhealthy foods, contributing to diet-related health issues.

Efforts to address these challenges include improving agricultural productivity, enhancing distribution networks, promoting nutrition education, and implementing social welfare programs to ensure food security for marginalized populations. However, ongoing monitoring, research, and policy adjustments are crucial to ensuring that all segments of the population have access to safe, nutritious, and affordable food. For the most up-to-date and detailed information, it's recommended to consult recent reports from government agencies, international organizations, and research institutions focused on food security and nutrition in India.

ii)Identify regions and population groups that are vulnerable to food insecurity in india

Food insecurity in India can affect various regions and population groups due to factors such as poverty, lack of access to resources, climatic variations, and social disparities. As of my last knowledge update in September 2021, here are some regions and population groups that are particularly vulnerable to food insecurity in India:

1. Rural Areas:

- Many rural areas in India experience food insecurity due to limited access to resources, including land, water, and modern agricultural techniques.
- Small and marginal farmers often face challenges related to low agricultural productivity, lack of irrigation, and inadequate infrastructure.

2. Tribal Communities:

- Tribal communities, especially those in remote and hilly areas, may have limited access to mainstream economic opportunities and modern agriculture.
- Traditional food sources might be affected by changing ecological conditions, leading to decreased availability of forest foods and disruptions in their dietary patterns.

3. Rainfed Regions:

- Regions dependent on rainfall for agriculture can face food insecurity during droughts or irregular monsoons.
- Crop failures due to weather variations can lead to reduced food production and incomes for farmers.

4. Dryland Areas:

- Dryland regions, characterized by low and erratic rainfall, face challenges in sustaining agricultural production.
- Dependence on rainfed farming makes these areas vulnerable to climate-related

shocks.

5. Coastal Communities:

- Coastal communities, dependent on fishing as a primary source of livelihood, can face food insecurity due to overfishing, environmental degradation, and changing sea conditions affecting fish stocks.

6. Urban Slums:

- Rapid urbanization has led to the growth of informal settlements or slums where access to clean water, sanitation, and nutritious food is limited.
- High population density, inadequate infrastructure, and lack of economic opportunities can contribute to food insecurity.

7. Scheduled Castes and Scheduled Tribes:

- Historically marginalized communities such as Scheduled Castes (Dalits) and Scheduled Tribes (Adivasis) often face systemic discrimination and limited access to resources.
- These communities can experience higher levels of poverty and reduced access to education, healthcare, and nutritious food.

8. Women and Children:

- Women and children are particularly vulnerable to food insecurity due to their nutritional needs and roles within households.
- Malnutrition among women can lead to poor maternal and child health

outcomes.

9. Climate-Prone Regions:

- Areas prone to climate-related events like floods, cyclones, and droughts can experience sudden disruptions in food supply and livelihoods.

10. Conflict-Affected Areas:

- Conflict-affected regions may experience disruptions in food supply chains, displacement, and loss of livelihoods.

Efforts to address food insecurity in these regions and among vulnerable populations involve a combination of policies and interventions such as improving agricultural practices, enhancing access to credit and markets, promoting nutrition education, developing social safety nets, and implementing disaster preparedness measures. It's important to note that addressing food insecurity is a complex and multidimensional challenge that requires collaboration among government agencies, NGOs, international organizations, and local communities. For the most current and detailed information, refer to recent reports from reputable sources such as government agencies, the World Food Programme, and research institutions focused on food security in India.

Analyze dietary patterns and nutritional deficiencies prevalent among the population in india

Dietary patterns and nutritional deficiencies prevalent among the population in India can vary widely due to factors such as cultural diversity, socio-economic status, access to

resources, and regional differences. As of my last knowledge update in September 2021, here's an analysis of some common dietary patterns and nutritional deficiencies observed in India:

1. Vegetarian and Plant-Based Diets:

- Many Indians follow vegetarian or plant-based diets due to cultural, religious, and ethical reasons. These diets often rely heavily on grains, legumes, vegetables, and dairy products.
- Nutritional Advantages: Plant-based diets can be rich in fiber, vitamins, and antioxidants.
- Nutritional Concerns: Vegetarians may need to pay special attention to getting adequate protein, vitamin B12, iron, zinc, and omega-3 fatty acids from plant sources.

2. Protein Deficiency:

- Protein deficiency is common, especially among vulnerable populations like children, pregnant women, and elderly individuals.
- Nutritional Impact: Protein deficiency can lead to stunted growth, impaired immune function, and reduced muscle mass.

3. Iron Deficiency Anemia:

- Iron deficiency anemia is a significant public health concern in India, affecting a large portion of the population, particularly women and children.
- Nutritional Impact: Iron deficiency anemia can lead to fatigue, weakness,

impaired cognitive function, and compromised immunity.

4. Micronutrient Deficiencies:

- Deficiencies in vitamins and minerals such as vitamin A, vitamin D, calcium, and iodine are prevalent.
- Nutritional Impact: Micronutrient deficiencies can lead to impaired vision, bone health issues, cognitive impairment, and thyroid problems.

5. Imbalance of Nutrient-Dense Foods:

- Some dietary patterns in India lack diversity and rely heavily on staple foods like rice and wheat, often with limited consumption of fruits, vegetables, and protein-rich foods.
- Nutritional Impact: This imbalance can lead to inadequate intake of essential nutrients and compromised overall health.

6. Overconsumption of Processed Foods:

- Urbanization and changing lifestyles have led to increased consumption of processed and fast foods high in sugars, unhealthy fats, and sodium.
- Nutritional Impact: Overconsumption of these foods contributes to obesity, diabetes, cardiovascular diseases, and other diet-related health issues.

7. Dual Burden of Malnutrition:

- India faces the "dual burden" of malnutrition, with undernutrition coexisting with rising rates of overweight and obesity.

- Nutritional Impact: This situation presents complex challenges for health systems, as they need to address both undernutrition and non-communicable diseases.

8. Maternal and Child Nutrition:

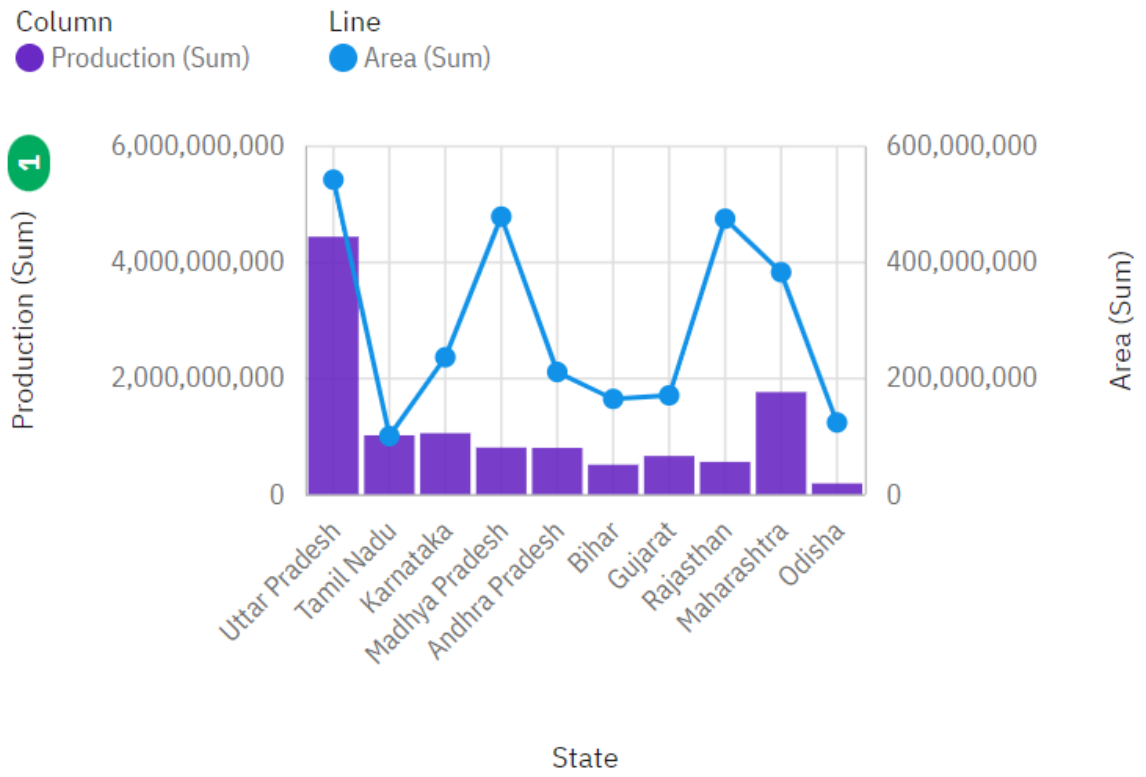
- Malnutrition during pregnancy and early childhood has long-term consequences on growth, cognitive development, and future health.
- Nutritional Impact: Poor maternal nutrition can lead to low birth weight, stunting, and increased vulnerability to diseases.

9. Dietary Transitions:

- Dietary patterns are shifting due to urbanization, globalization, and increased access to processed and convenience foods.
- Nutritional Impact: These transitions can lead to a decline in traditional diets and the consumption of nutrient-poor foods.

Addressing these dietary patterns and nutritional deficiencies requires a multi-faceted approach that includes public health campaigns, nutrition education, fortification of staple foods, improved access to diverse and nutritious foods, and policies that support healthy eating habits. Collaboration among government agencies, healthcare providers, NGOs, educational institutions, and the private sector is essential to promote better nutrition and improve the overall health and well-being of the population. For the most up-to-date information on dietary patterns and nutritional deficiencies in India, consult recent reports from government agencies and reputable research institutions focused on nutrition and public health.

Area and Production by State



In [1]:

```
import pandas as pd,os
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
import warnings
warnings.filterwarnings('ignore')
```

In [2]:

```
print( os.listdir( ) )
```

['.ipynb_checkpoints ' , 'India Agriculture Crop Production.csv' , 'Untitled.ipynb']

In [5]:

```
# Loading dataset
crop_df = pd.read_csv('India Agriculture Crop Production.csv')
```

In [6]:

```
1  crop_df.head( )
```

Out [6]:

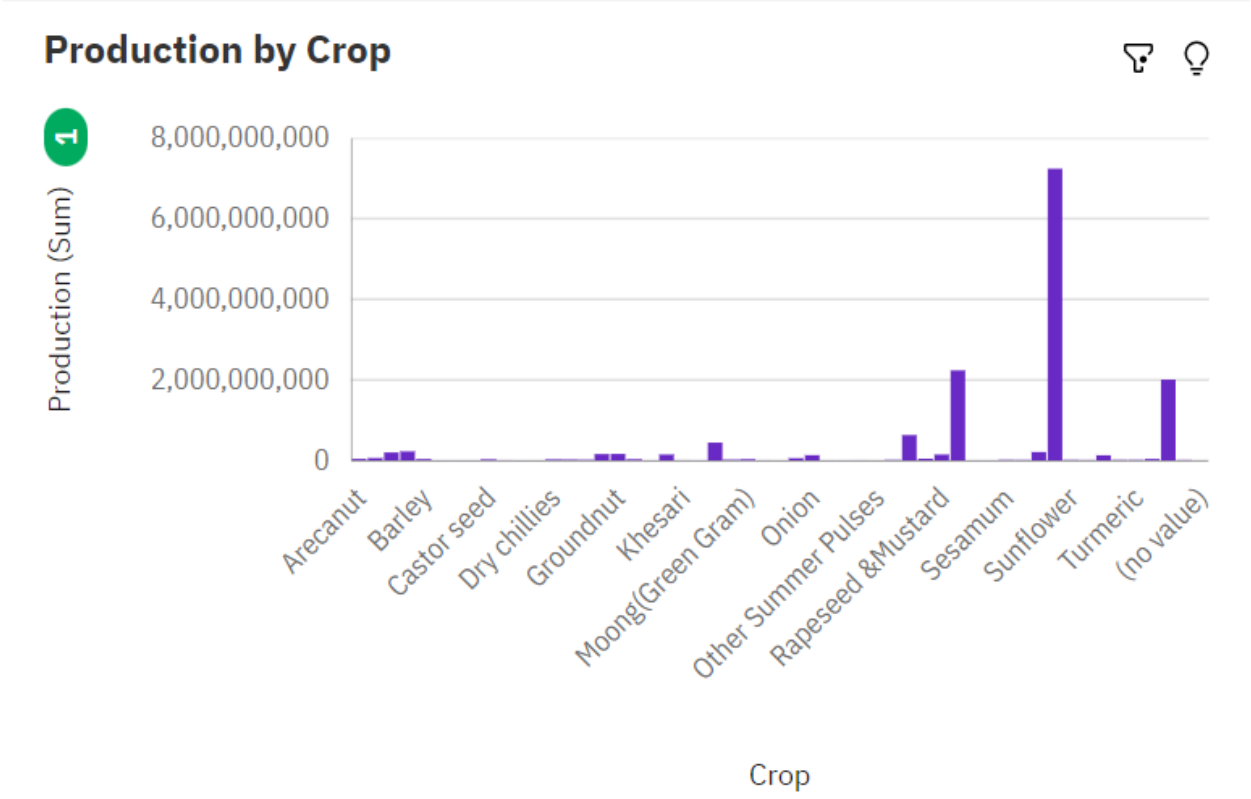
	State	District	Crop	Year	Season	Area	Area Units	Production	Production Units
0	Andaman and Nicobar Islands	NICOBARS	Arecanut	2001-02	Kharif	1254.0	Hectare	2061.0	Tonnes
1	Andaman and Nicobar Islands	NICOBARS	Arecanut	2002-03	Whole Year	1258.0	Hectare	2083.0	Tonnes
2	Andaman and Nicobar Islands	NICOBARS	Arecanut	2003-04	Whole Year	1261.0	Hectare	1525.0	Tonnes
3	Andaman and Nicobar Islands	NORTH AND MIDDLE ANDAMAN	Arecanut	2001-02	Kharif	3100.0	Hectare	5239.0	Tonnes
4	Andaman and Nicobar Islands	SOUTH ANDAMANS	Arecanut	2002-03	Whole Year	3105.0	Hectare	5267.0	Tonnes

In [7]:

```
# checking nullvalues count from dataset
crop_df.isnull( ).sum( )
```

Out [7]:

State	0
District	0
Crop	32
Year	0
Season	1
Area	33
Area Units	0
Production	4993
Production Units	0
Yield	33
dtype:	int64



In [8]:

```
# we have approx 243000 rows and out of that 3730 were null
(1.53%) so we decided to drop
crop_df.dropna(inplace = True)
```

In [9]:

```
# after dropping null values there is no null value in dataset
crop_df.isnull( ).sum( )
```

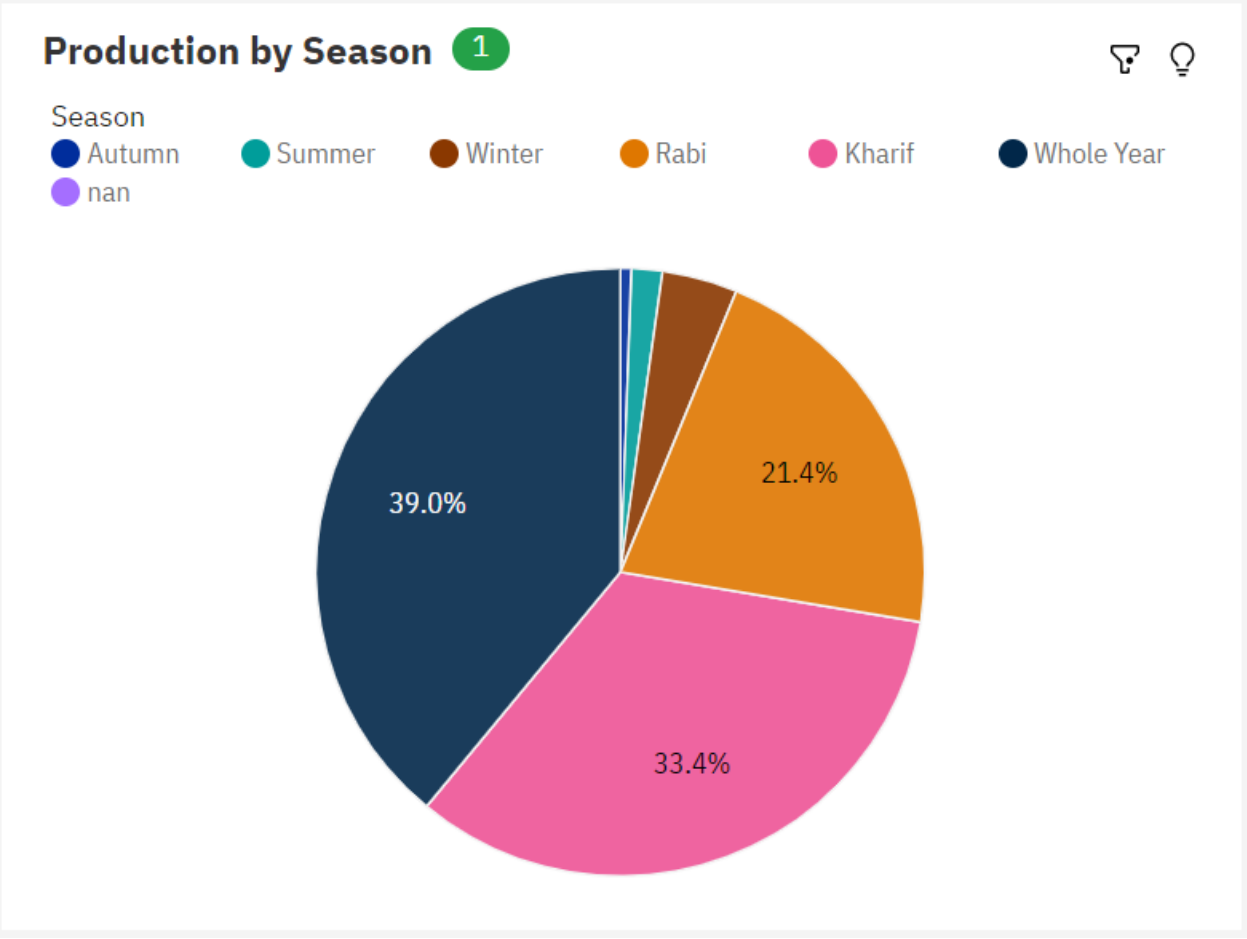
Out[9]:

State	0
District	0

```
Crop                0
Year                0
Season              0
Area                0
Area Units          0
Production          0
Production Units    0
Yield               0
dtype:    int64
```

In [10]:

```
1  # checking unique type of season
2  crop_df.Season.unique( )
```



Out [10]:

```
array([' Kharif ', ' Whole Year ', ' Rabi ', ' Autumn ', ' Summer ', ' Winter '], dtype = object)
```

In [11]:

```
# here we remove unwanted white spaces from season column
crop_df[ ' Season ' ] = crop_df[ ' Season ' ].apply( lambda x: x.strip( ) )
crop_df[ ' Crop ' ] = crop_df[ ' Crop ' ].apply( lambda x: x.strip( ) )
crop_df[ ' State ' ] = crop_df[ 'Season' ].apply( lambda x: x.strip( ) )
```

In [12]:

```
# after removing white spaces
crop_df.Season.unique( )
```

Out[12]:

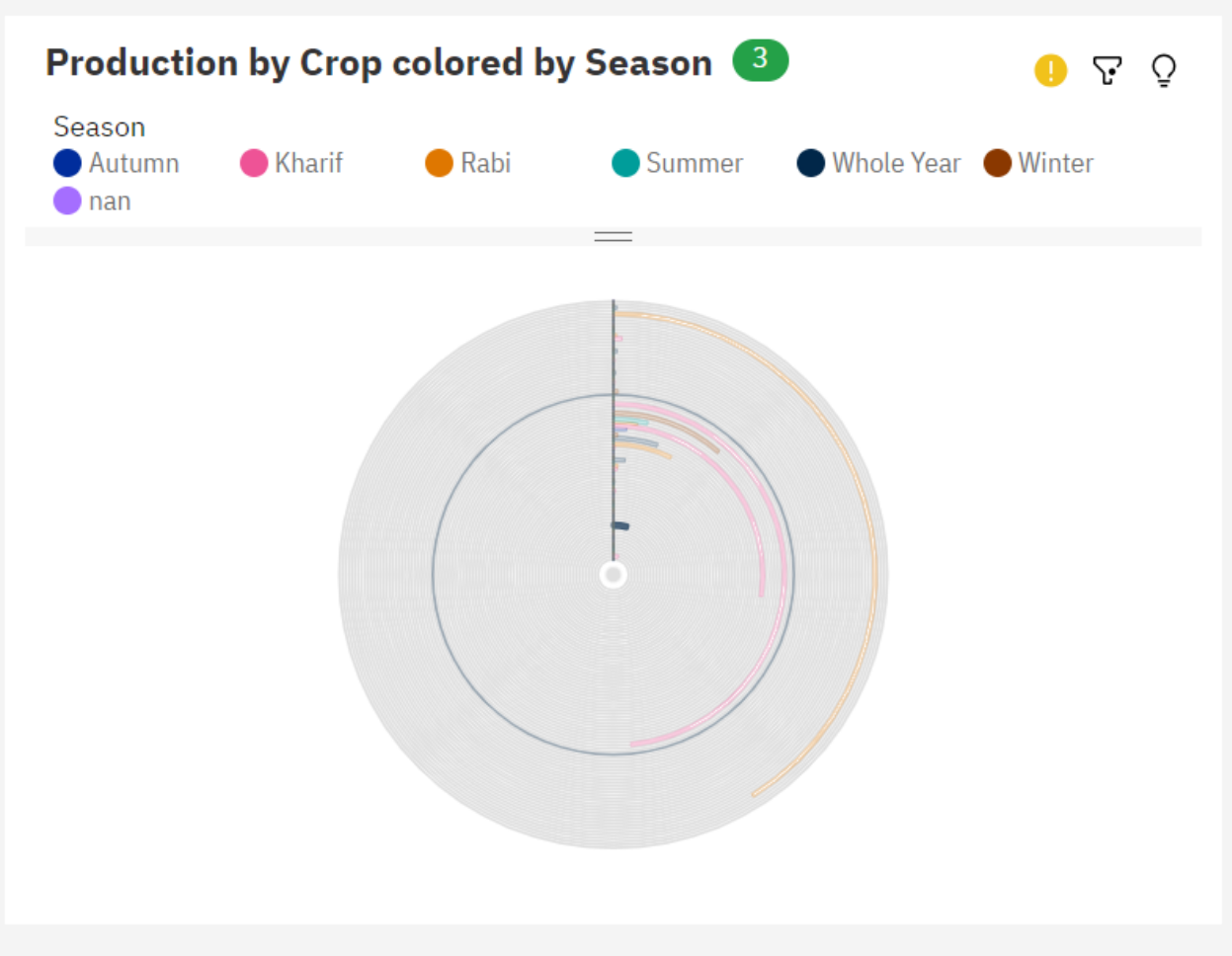
```
array( [ ' Kharif ', ' Whole Year ', ' Rabi ', ' Autumn ', ' Summer ', ' Winter '], dtype = object)
```

In [13]:

```
# checking  the  values counts of each season
crop_df[' Season '].value_counts( )
```

Out[13]:

```
Kharif          136165
Rabi             99805
Whole Year       67265
Summer           21974
Winter            8238
Autumn            6967
Name:  Season , dtype:  int64
```



In [14]:

```
' ' ' since there are Three types of crop out of which two are mainly seasonal Rabi and Kharib 5 crops season were present in our dataset. We got to know that summer and Autumn synonym of Rabi so we decided to replace with their original name which is Kharif Rabi ' ' '
crop_df[ ' Season ' ] = crop_df[ ' Season ' ].apply(lambda x : x.replace( ( ' Autumn ' , ' Kharif ' ) )
crop_df[ ' Season ' ] = crop_df[ ' Season ' ].apply(lambda x : x.replace( ( ' Summer ' , ' Kharif ' ) )
crop_df[ ' Season ' ] = crop_df[ ' Season ' ].apply(lambda x : x.replace( ( ' Winter ' , ' Rabi ' ) )
```

In [15]:

```
# checking values counts of season after replacing with their original name
crop_df[ ' Season ' ].value_counts( )
```

Out[15]:

```
Kharif          165106
Rabi            108043
Whole Year       67265
Name: Season, dtype:
```

In [16]:

```
# we have observed that amny values of production were 0 since it is representing product
# so we decided drop all rows whose production values are zero

crop_df.drop( crop_df[ crop_df [ ' Production ' ] == 0 ].index , inplace = True )

print( f' After removing the row which has 0 production : {crop_df.shape[ 0 ] } ' )
```

```
7
8  After removing the row which has 0 Production  :  339390
```

In [17]:

```
1  # checking unique crops names
2  # we observed that many crops were presented with their syononame
   some decided all syononame
3  # Like paddy and rice are same so we replace paddy with Rice
4  # also number of rows of crops sub-category were very less
5
6  crop_df.Crop.unique( )
```

Out [17]:

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

In [18]:

```
1  # we have replaced kapas to cotton etc.
2  crop_df[ ' crop ' ] = crop_df[ 'crop ' ].apply( lambda x:
   x.replace( ' Kapas ' , ' Cotton(lint) ' ) . replace( '
   Cotton(lint) ' , ' Cotton ' ) )
3  crop_df.replace ( ' Jute & mesta ' , ' Jute ' , inplace = True )
4  crop_df.replace ( ' Mesta ' , ' Jute ' , inplace = True )
```

In [19]:

```
# we have replace sub-category of pulses with pulse
crop_df[' Crop ' ] = crop_df [ ' Crop'].apply(lambda
x:x.replace('OtherKharifpulses','pulses')
.replace('Other Rabi pulses','pulses')
.replace('Peas & beans (Pulses)','pulses')
.replace('Pulses total','pulses')
.replace('other misc. pulses','pulses')
.replace('Moong(Green Gram)','pulses')
.replace('Urad','pulses')
.replace('Arhar/Tur','pulses')
.replace('Bean','pulses')
.replace('Ricebean (nagadal)','pulses')
.replace('Lentil','pulses')
.replace('Masoor','pulses')
.replace('Khesari','pulses')
.replace('Horse-gram','pulses')
.replace('Rajmash Kholar','pulses'))
```

In [20]:

```
# we have corrected spelling mistake

crop_df [ ' crop ' ] = crop_df [ ' crop ' ].apply(lambda x:x

.replace ( ' Atcanut ( Raw ) ' , ' Arecanut ' )

.replace ( ' Arcanut (Processed ) ' , ' Arecanut ' )

.replace ( ' Arecanut ' , ' Arecanut ' ) )
```

In [21]:

```
# we have replaced varienty of spices with othe spices

```

```
crop_df [ ' Crop ' ] = crop_df [ ' Crop ' ].apply(lambda x : x
.replace('Black pepper','Other Spices')
.replace('Cardamom','Other Spices')
.replace('Perilla','Other Spices'))
```

In [22]:

```
#since number of rows for every fruits category were very less so
we decided to megre al
crop_df [ ' Crop ' ] = crop_df[ ' Crop ' ].apply(lambda x:x
.replace('Papaya','Fruits')
.replace('Mango','Fruits')
.replace('Orange','Fruits')
.replace('Other Fresh Fruits','Fruits')
.replace('Pineapple','Fruits').
.replace('Citrus Fruit','Fruits')
.replace('Pome Fruit','Fruits')
.replace('Pome Granet','Fruits')
.replace('Grapes','Fruits')
.replace('Jack Fruit','Fruits')
.replace('Sapota','Fruits')
.replace('Lemon','Fruits'))
```

In [23]:

```
# we have replace sub-category with their main-category
crop_df [ ' Crop ' ] = crop_df [ ' Crop ' ].apply( lambda x:x
.replace('Ginger','Dryginger'))
crop_df [ ' Crop ' ] = crop_df [ ' Crop ' ].apply(lambda x:x
.replace('Turnip','Onion'))
crop_df [ ' Crop ' ] = crop_df [ ' Crop ' ].apply(lambda x:x
.replace('Cashewnut Raw','Cashewnut')
.replace('Cashewnut Processed','Cashewnut'))
```

In [24]:

```
# we have replace sub-category of gram with their main - category

crop_df [ ' Crop ' ] = crop_df [ ' Crop ' ].apply(lambda x:x
.replace( ' black gram ' , ' gram ' )
.replace( ' Moth ' , ' gram ')
.replace( ' Blackgram ' , ' gram ' ) )
```

In [25]:

```
# we have replace sub - category of gram with their main -
category
crop_df [ ' Crop ' ] = crop_df [ ' Crop ' ].apply(lambda x:x
.replace( ' Oilseeds total ' , ' other oilseeds ' )
.replace( ' Niger seed ' , ' other oilseeds ' ) )
```

In [26]:

```
# we have replace sub - category of milltes with their main -
category
crop_df [ ' Crop ' ] = crop_df [ ' Crop ' ].apply( lambda x:x
.replace( ' Other Cereals & Millets ' , ' Bajra ' )
.replace( ' Samai ' , ' Bajra ' )
```

```
    .replace( ' Small millets ' , ' Bajra ' )
6
    .replace( ' Ragi ' , ' Bajra ' )
7
    .replace( ' Varagu ' , ' Bajra ' )
8
    .replace( ' Jobster ' , ' Bajra ' ) )
```

In [27]:

```
1  #we have replace sub - category of Vegetables with their main -
   category
2  crop_df[ ' Crop ' ] = crop_df[ ' Crop ' ].apply(lambda x:x
   .replace('Coriander','Other Vegetables')
   .replace('pulsess & Mutter(Vegetable)','OtherVegetable')
   .replace('Bhindi','OtherVegetables')
   .replace('Tomato','Other Vegetables')
   .replace('Cowpea(Lobia)','Other Vegetables')
   .replace('Cabbage','Other Vegetables')
   .replace('Carrot','Other Vegetables')
   .replace('Drum Stick','Other Vegetables')
   .replace'Redish','Other Vegetables')
   .replace('Cauliflower','Other Vegetables')
   .replace('Colocosia','OtherVegetables')
   .replace('Brinjal','Other Vegetables')
   .replace('Bottle Gourd','Other Vegetables')
   .replace('Bitter Gourd','Other Vegetables') )
```

In [28]:

```
1  # we have replace sub - category with their main - category
2  crop_df[ ' Crop ' ] = crop_df[ ' Crop ' ].apply(lambda
   x:x.replace( ' Niger seeds ' , ' Sesamum ' ) )
3  crop_df[ ' Crop ' ] = crop_df[ ' Crop ' ].apply(lambda
   x:x.replace( ' Korra ' , ' Total Foodgrain ' ) )
4  crop_df[ ' Crop ' ] = crop_df[ ' Crop ' ].apply(lambda
   x:x.replace( ' Paddy ' , ' Rice ' ) )
```

In [29]:

```
1  # we have observed some crops rows are very very less so it won't
   make any sense to visualization
```

```
crop_df.drop( crop_df[ crop_df[ ' Crop ' ] == ' Tea ' ].index , inplace = True )
crop_df.drop( crop_df[ crop_df[ ' Crop ' ] == ' Coffee ' ].index , inplace = True )
crop_df.drop( crop_df[ crop_df[ ' Crop ' ] == ' Rubber ' ].index , inplace = True )
crop_df.drop( crop_df[ crop_df[ ' Crop ' ] == ' Cond-spcs other ' ].index , inplace = True )
```

In [30]:

```
# checking unique crops types after replacement
crop_df.Crop.unique( )
```

Out[30]:
array(['Arecanut', 'Banana', 'Other Spices', 'Cashewnut', 'Coconut', 'Dry chillies', 'Dry ginger', 'pulses', 'other oilseeds', 'Rice', 'Sugarcane', 'Sweet potato', 'Bajra', 'Castor seed', 'Other Vegetables', 'Cotton', 'Gram', 'Groundnut', 'Jowar', 'Linseed', 'Maize', 'Jute', 'Onion', 'Other Rabi pulses', 'Potato', 'Rapeseed &Mustard', 'Safflower', 'Sesamum', 'Soyabean', 'Sunflower', 'Tapioca', 'Tobacco', 'Turmeric', 'Wheat', 'Barley', 'Garlic', 'Sannhamp', 'Guar seed', 'gram', 'Other Cereals', 'Dry Dry ginger', 'Other Summer Pulses'], dtype=object)

In [31]:

```
# saving cleaned data file
crop_df . to_csv( ' Indis Agriculture Crop Production.csv ' )
```

In [32] :

```
crop_df
```

Out [32]:

	State	District	Crop	Year	Season	Area	Area Units	Production	Produ
0	Andaman and Nicobar Islands	NICOBARS	Arecanut	2001-02	Kharif	1254.0	Hectare	2061.0	T
1	Andaman and Nicobar Islands	NICOBARS	Arecanut	2002-03	Whole Year	1258.0	Hectare	2083.0	T
2	Andaman and Nicobar Islands	NICOBARS	Arecanut	2003-04	Whole Year	1261.0	Hectare	1525.0	T
3	Andaman and Nicobar Islands	NORTH AND MIDDLE ANDAMAN	Arecanut	2001-02	Kharif	3100.0	Hectare	5239.0	T
4	Andaman and Nicobar Islands	SOUTH ANDAMANS	Arecanut	2002-03	Whole Year	3105.0	Hectare	5267.0	T
...	...	...	...	...	...	...	...	...	
345370	West Bengal	PURBA BARDHAMAN	Wheat	2000-01	Rabi	6310.0	Hectare	15280.0	T
345371	West Bengal	PURULIA	Wheat	1997-98	Rabi	1895.0	Hectare	2760.0	T
345372	West Bengal	PURULIA	Wheat	1998-99	Rabi	3736.0	Hectare	5530.0	T
345373	West Bengal	PURULIA	Wheat	1999-00	Rabi	2752.0	Hectare	6928.0	T
345374	West Bengal	PURULIA	Wheat	2000-01	Rabi	2979.0	Hectare	7430.0	T

339390 rows × 10 columns

In [33]:

```
# to find outlier we created new column Production_area_factor
crop_df [ ' Production_area_factor ' ] = crop_df [ ' Production ' ] / crp_df [ ' Area ' ]
```

In [34]:

```
# checking newly created column
crop_df
```

Out [34]:

	State	District	Crop	Year	Season	Area	Area Units	Production	Produ
0	Andaman and Nicobar Islands	NICOBARS	Arecanut	2001-02	Kharif	1254.0	Hectare	2061.0	T
1	Andaman and Nicobar Islands	NICOBARS	Arecanut	2002-03	Whole Year	1258.0	Hectare	2083.0	T
2	Andaman and Nicobar Islands	NICOBARS	Arecanut	2003-04	Whole Year	1261.0	Hectare	1525.0	T
3	Andaman and Nicobar Islands	NORTH AND MIDDLE ANDAMAN	Arecanut	2001-02	Kharif	3100.0	Hectare	5239.0	T
4	Andaman and Nicobar Islands	SOUTH ANDAMANS	Arecanut	2002-03	Whole Year	3105.0	Hectare	5267.0	T
...	...	...	...	...	...	...	...	...	
345370	West Bengal	PURBA BARDHAMAN	Wheat	2000-01	Rabi	6310.0	Hectare	15280.0	T
345371	West Bengal	PURULIA	Wheat	1997-98	Rabi	1895.0	Hectare	2760.0	T
345372	West Bengal	PURULIA	Wheat	1998-99	Rabi	3736.0	Hectare	5530.0	T
345373	West Bengal	PURULIA	Wheat	1999-00	Rabi	2752.0	Hectare	6928.0	T
345374	West Bengal	PURULIA	Wheat	2000-01	Rabi	2979.0	Hectare	7430.0	T

339390 rows × 11 columns

In [35]:

```
Q1 = crop_df [ ' Area ' ].quantile( 0.25 )
Q2 = crop_df [ ' Area ' ].quantile( 0.75 )
```

```
3  Q1 , Q3
```

Out [35]:
(80.0 , 4290.0)
In [36]:

```
1  IQR = Q3 - Q1
```

In [37]:

```
1  lower_limit = Q1 - 1.5 * IQR
2  upper_limit = Q3 + 1.5 * IQR
3  lower_limit , upper_limit
```

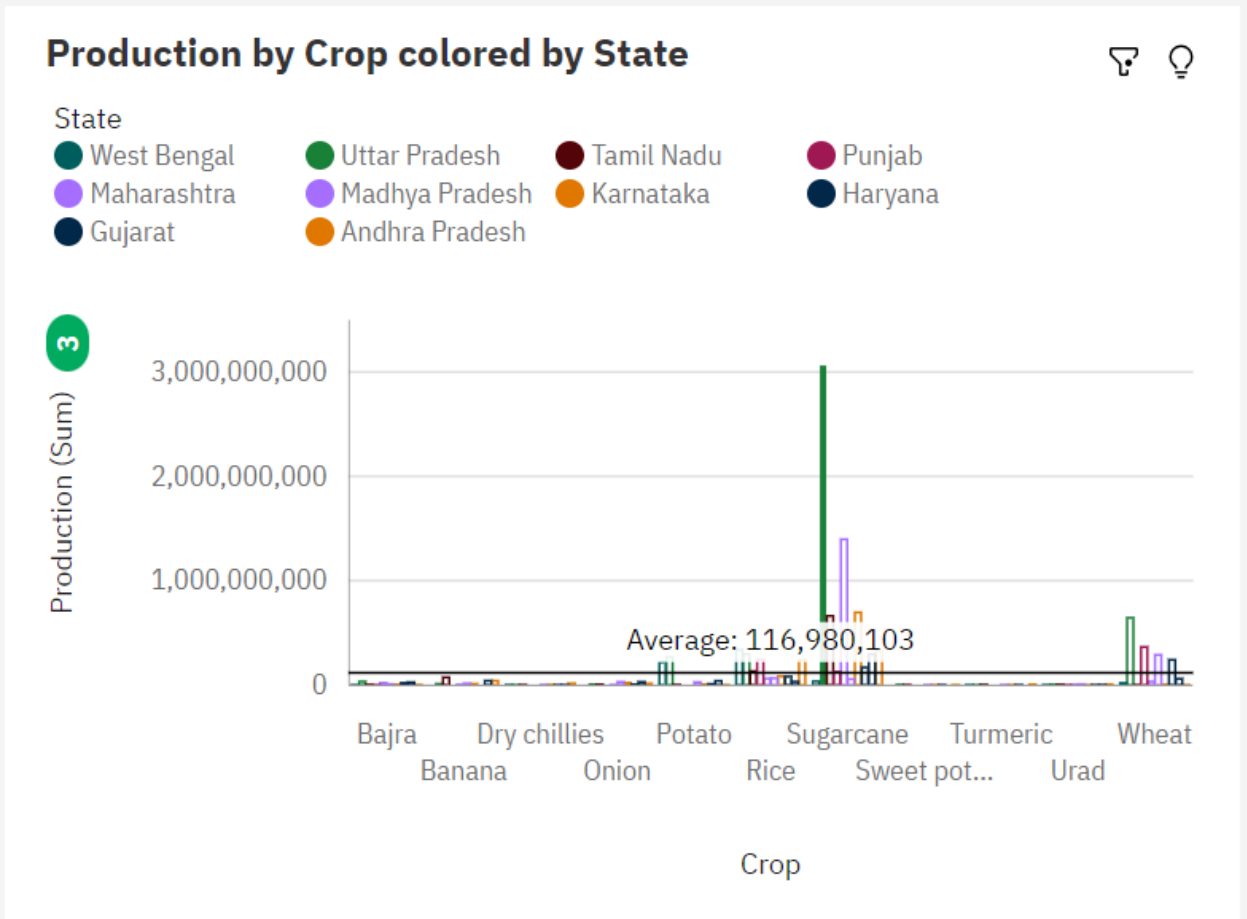
Out [37]:
(-6235.0 , 10605.0)

In [38]:

```
1  area_outlier = crop_df [ ( crop_df [ 'Area ' ] < lower_limit )  |
   (crop_df [ ' Area ' ] > upper_limit )
```

In [39]:

```
1  area_outlier[ ' Crop ' ] .value_counts( )
```


Production by Crop colored by State
State
West Bengal
Uttar Pradesh
Tamil Nadu
Punjab
Maharashtra
Madhya Pradesh
Karnataka
Haryana
Gujarat
Andhra Pradesh
3
Production (Sum)
3,000,000,000
2,000,000,000
1,000,000,000
0
Average: 116,980,103
Bajra
Dry chillies
Potato
Sugarcane
Turmeric
Wheat
Banana
Onion
Rice
Sweet pot...
Urad
Crop

Out [39]:

```
Rice                  12526
Wheat                  7247
pulses                 6562
Maize                  4032
Bajra                  3183
Gram                   2955
Jowar                  2564
Rapeseed &Mustard      2266
Cotton                 2264
Groundnut              1994
Sugarcane              1857
Soyabean               1624
Sesamum                 874
Coconut                 818
Potato                  603
Sunflower               573
Guar seed               486
Jute                    392
Castor seed             384
other oilseeds          381
Barley                  268
Dry chillies            259
Other Rabi pulses       242
Cashewnut               225
Arecanut                223
Tobacco                 216
Other Vegetables        184
Safflower               174
gram                    170
Onion                   168
Linseed                 142
Tapioca                 124
Other Spices            104
Banana                   82
Garlic                   68
Turmeric                 50
Other Cereals            39
Dry ginger                7
Name: Crop, dtype: int64
```

In [40]:

```
#since india very big country for better visualization we will
divide states name in four
# details of these zones are mentioned below
```

In [41]:

```
West_India=['Maharashtra','Goa','Gujarat','Dadra and Nagar
Haveli']
East_India=['Arunachal
Pradesh','Assam','Manipur','Meghalaya','Mizoram','Nagaland','Sikk
im']
North_India=['Jammu and Kashmir ','Himachal
Pradesh','Punjab','Uttarakhand','Haryana','Rajasthan']
South_India=['Andhra Pradesh','Karnataka','Kerala','Tamil
Nadu','Telangana','Puducherry']
```

In [42]:

```
# creating a list for zones
zone = [ ]
for df in crop_df[ ' State ' ]:
      if df in West_India:
            zone.append( ' West India ' )
      elif df in East_India:
            zone.append( ' East India ' )
      elif df in North_India:
            zone.append( ' North India ' )
      elif df in South_India:
            zone.append( ' South India ' )
      else:
            zone.append( ' Union Territory ' )
```

In [43]:

```
# creating new column
crop_df [ ' zone ' ] = zone
```

In [44]:

```
crop_df . head( )
```

Out [44]:

	State	District	Crop	Year	Season	Area	Area Units	Production	Production Units
0	Andaman and Nicobar Islands	NICOBARS	Arecanut	2001-02	Kharif	1254.0	Hectare	2061.0	Tonnes
1	Andaman and Nicobar Islands	NICOBARS	Arecanut	2002-03	Whole Year	1258.0	Hectare	2083.0	Tonnes
2	Andaman and Nicobar Islands	NICOBARS	Arecanut	2003-04	Whole Year	1261.0	Hectare	1525.0	Tonnes
3	Andaman and Nicobar Islands	NORTH AND MIDDLE ANDAMAN	Arecanut	2001-02	Kharif	3100.0	Hectare	5239.0	Tonnes
4	Andaman and Nicobar Islands	SOUTH ANDAMANS	Arecanut	2002-03	Whole Year	3105.0	Hectare	5267.0	Tonnes

In [45]:

```
1  crop_df[ ' zone ' ].value_counts( )
```

Out [45]:

North India 130478
EastIndia 99502
South India 71912
West India 32185
Union Territory 5313
Name: zone , dtype: int64

In [47]:

```
1  # checking value counts of year in dataset
2  crop_df[ ' Year ' ].value_counts( )
```

Out [47]:

2019-20 18988
2018-19 18046
2017-18 17780

```
2016-17    17260
2015-16    16196
2013-14    15961
2011-12    15827
2014-15    15361
2012-13    15042
2009-10    14949
2008-09    14813
2010-11    14622
2007-08    14411
2006-07    14313
2003-04    14268
2004-05    13867
2002-03    13831
2005-06    13775
2000-01    13337
2001-02    13085
1999-00    12776
1998-99    12014
1997-98     8549
2020-21      319
Name: Year ,  dtype: int64
```

In [49]:

```
# since the number of rows for year 2015 is very less so it will not give correct visualis
# so we decided to remove it from dataset
crop_df . drop( crop_df [ crop_df [ ' Year ' ] == 2015 ].index , inplace = True )
```

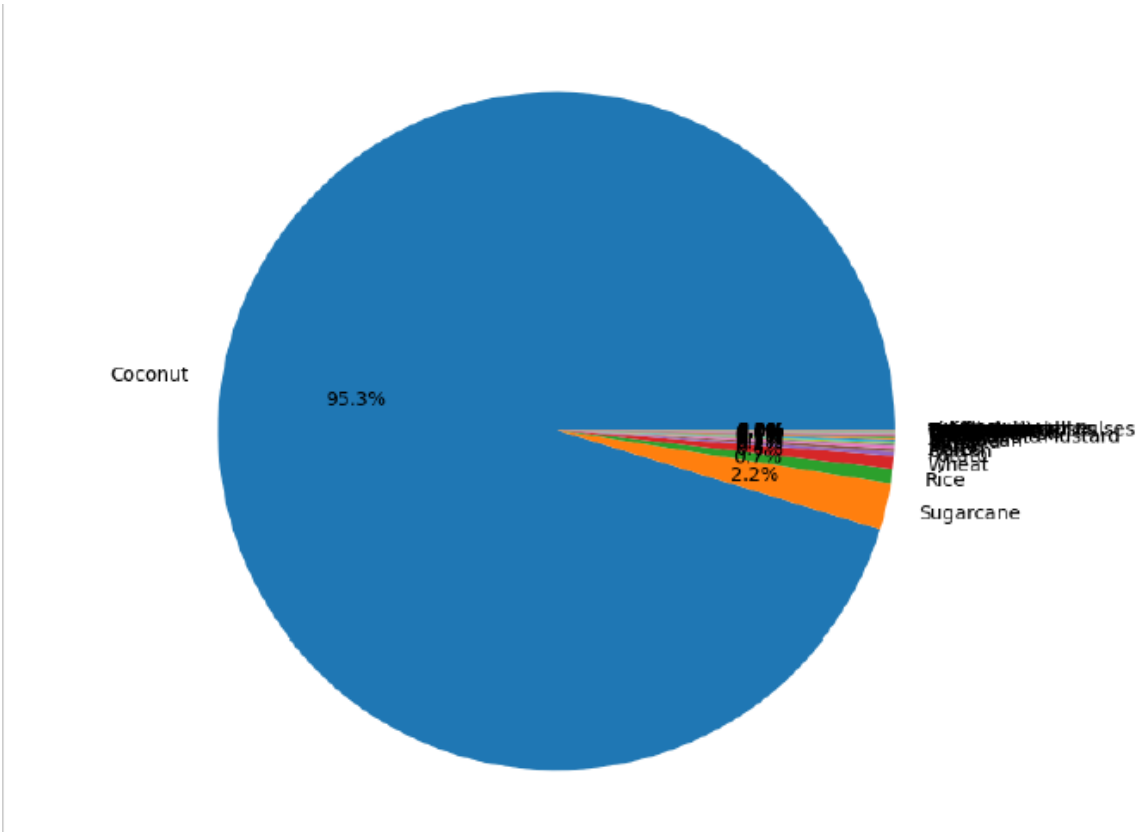
In [50]:

```
val = crop_df . groupby( ' Crop ' ).sum( ).sort_values( by = ' Production ' , ascending = False ) [ ' Production ' ]
lab = crop_df . groupby( ' Crop ' ).sum( ).sort_values( by = ' Production ' , ascending = False ) [ ' Production ' ]
```

In [51]:

```
# we plotted pie chart of production of different crops to check
```

```
    the outliers in crops
2  plt . figure( figsize = ( 10 , 8 ) )
3  plt.pie(val , label , autopct = '%0.1f%% ' )
4  plt.show( )
```



In [52]:

```
1 # we have observed that Production of coconut  is more than 92% of
   total production so we
2 # so we have detected to visualize coconut separately
3 coconut_df = crop_df [ crop_df [ ' Crop ' ] == ' Coconut ' ]
4 coconut_df . to_csv ( ' coconut_df.csv ' )
5 crop_df . drop ( crop_df [ ' Crop '] == 'Coconut ' ].index ,
   inplace = True )
```

In [53]:

```
1 # we plotted pie chart between total Production and different
   types of crops removed
2 val = crop_df . groupby( ' Crop ' ).sum( ).sort_values( by = '
```

```
    Production ' , ascending = False ) [ ' Production ' ]
3 lab = crop_df . groupby( ' Crop ' ).sum( ).sort_values( by = '
    Production ' , ascending = False ) [ ' Production ' ]
```

In [54]:

```
1 # we have observed that now our dataset Is balance
2 plt.figure ( figsize = ( 10 , 8 ) )
3 plt.pie ( val , labels = lab , autopct = '%0.1f%% ' )
4 plt.show( )
```