crop-production

May 15, 2024

1 LOADING DATA

[2]:
```
import numpy as np
import pandas as pd
import plotly.express as px
import plotly.graph_objects as go
import matplotlib.pyplot as plt
import plotly as py
from plotly import tools
import os
import seaborn as sns
```

[3]:
```
import numpy as np
import pandas as pd
crop_data=pd.read_csv(r"Crop Production data.csv")
crop_data
```

[3]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production
0	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	Arecanut	1254.0	2000.0
1	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	Other Kharif pulses	2.0	1.0
2	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	Rice	102.0	321.0
3	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	Banana	176.0	641.0
4	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	Cashewnut	720.0	165.0
…	…	…	…	…	…	…	…
246086	West Bengal	PURULIA	2014	Summer			
246087	West Bengal	PURULIA	2014	Summer			
246088	West Bengal	PURULIA	2014	Whole Year			
246089	West Bengal	PURULIA	2014	Winter			
246090	West Bengal	PURULIA	2014	Winter			

```
246086                Rice     306.0       801.0
246087             Sesamum     627.0       463.0
246088           Sugarcane     324.0     16250.0
246089                Rice  279151.0    597899.0
246090             Sesamum     175.0        88.0

[246091 rows x 7 columns]
```

[4]:
```
crop_data.shape
```

[4]:
```
(246091, 7)
```

2 data cleaning

[5]:
```
crop_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 246091 entries, 0 to 246090
Data columns (total 7 columns):
 #   Column         Non-Null Count   Dtype
---  ------         --------------   -----
 0   State_Name     246091 non-null  object
 1   District_Name  246091 non-null  object
 2   Crop_Year      246091 non-null  int64
 3   Season         246091 non-null  object
 4   Crop           246091 non-null  object
 5   Area           246091 non-null  float64
 6   Production     242361 non-null  float64
dtypes: float64(2), int64(1), object(4)
memory usage: 13.1+ MB
```

[6]:
```
crop_data.isnull().sum()
```

[6]:
```
State_Name          0
District_Name       0
Crop_Year           0
Season              0
Crop                0
Area                0
Production       3730
dtype: int64
```

[7]:
```
crop_data.dropna(inplace=True)
```

[8]:
```
crop_data.isnull().sum()
```

[8]:
```
State_Name       0
District_Name    0
Crop_Year        0
Season           0
Crop             0
Area             0
Production       0
dtype: int64
```

3 STATE NAMES

[9]:
```
unique_state= crop_data['State_Name'].unique()
print(unique_state)
```

```
['Andaman and Nicobar Islands' 'Andhra Pradesh' 'Arunachal Pradesh'
 'Assam' 'Bihar' 'Chandigarh' 'Chhattisgarh' 'Dadra and Nagar Haveli'
 'Goa' 'Gujarat' 'Haryana' 'Himachal Pradesh' 'Jammu and Kashmir '
 'Jharkhand' 'Karnataka' 'Kerala' 'Madhya Pradesh' 'Maharashtra' 'Manipur'
 'Meghalaya' 'Mizoram' 'Nagaland' 'Odisha' 'Puducherry' 'Punjab'
 'Rajasthan' 'Sikkim' 'Tamil Nadu' 'Telangana ' 'Tripura' 'Uttar Pradesh'
 'Uttarakhand' 'West Bengal']
```

[10]:
```
unique_state= crop_data['Crop_Year'].unique()
print(unique_state)
```

```
[2000 2001 2002 2003 2004 2005 2006 2010 1997 1998 1999 2007 2008 2009
 2011 2012 2013 2014 2015]
```

4 DISTRICT NAMES

[11]:
```
unique_district=crop_data['District_Name'].unique()
print(unique_district)
```

```
['NICOBARS' 'NORTH AND MIDDLE ANDAMAN' 'SOUTH ANDAMANS' 'ANANTAPUR'
 'CHITTOOR' 'EAST GODAVARI' 'GUNTUR' 'KADAPA' 'KRISHNA' 'KURNOOL'
 'PRAKASAM' 'SPSR NELLORE' 'SRIKAKULAM' 'VISAKHAPATANAM' 'VIZIANAGARAM'
 'WEST GODAVARI' 'ANJAW' 'CHANGLANG' 'DIBANG VALLEY' 'EAST KAMENG'
 'EAST SIANG' 'KURUNG KUMEY' 'LOHIT' 'LONGDING' 'LOWER DIBANG VALLEY'
 'LOWER SUBANSIRI' 'NAMSAI' 'PAPUM PARE' 'TAWANG' 'TIRAP' 'UPPER SIANG'
 'UPPER SUBANSIRI' 'WEST KAMENG' 'WEST SIANG' 'BAKSA' 'BARPETA'
 'BONGAIGAON' 'CACHAR' 'CHIRANG' 'DARRANG' 'DHEMAJI' 'DHUBRI' 'DIBRUGARH'
 'DIMA HASAO' 'GOALPARA' 'GOLAGHAT' 'HAILAKANDI' 'JORHAT' 'KAMRUP'
 'KAMRUP METRO' 'KARBI ANGLONG' 'KARIMGANJ' 'KOKRAJHAR' 'LAKHIMPUR'
 'MARIGAON' 'NAGAON' 'NALBARI' 'SIVASAGAR' 'SONITPUR' 'TINSUKIA'
 'UDALGURI' 'ARARIA' 'ARWAL' 'AURANGABAD' 'BANKA' 'BEGUSARAI' 'BHAGALPUR'
 'BHOJPUR' 'BUXAR' 'DARBHANGA' 'GAYA' 'GOPALGANJ' 'JAMUI' 'JEHANABAD'
```

'KAIMUR (BHABUA)' 'KATIHAR' 'KHAGARIA' 'KISHANGANJ' 'LAKHISARAI'
'MADHEPURA' 'MADHUBANI' 'MUNGER' 'MUZAFFARPUR' 'NALANDA' 'NAWADA'
'PASHCHIM CHAMPARAN' 'PATNA' 'PURBI CHAMPARAN' 'PURNIA' 'ROHTAS'
'SAHARSA' 'SAMASTIPUR' 'SARAN' 'SHEIKHPURA' 'SHEOHAR' 'SITAMARHI' 'SIWAN'
'SUPAUL' 'VAISHALI' 'CHANDIGARH' 'BALOD' 'BALODA BAZAR' 'BALRAMPUR'
'BASTAR' 'BEMETARA' 'BIJAPUR' 'BILASPUR' 'DANTEWADA' 'DHAMTARI' 'DURG'
'GARIYABAND' 'JANJGIR-CHAMPA' 'JASHPUR' 'KABIRDHAM' 'KANKER' 'KONDAGAON'
'KORBA' 'KOREA' 'MAHASAMUND' 'MUNGELI' 'NARAYANPUR' 'RAIGARH' 'RAIPUR'
'RAJNANDGAON' 'SUKMA' 'SURAJPUR' 'SURGUJA' 'DADRA AND NAGAR HAVELI'
'NORTH GOA' 'SOUTH GOA' 'AHMADABAD' 'AMRELI' 'ANAND' 'BANAS KANTHA'
'BHARUCH' 'BHAVNAGAR' 'DANG' 'DOHAD' 'GANDHINAGAR' 'JAMNAGAR' 'JUNAGADH'
'KACHCHH' 'KHEDA' 'MAHESANA' 'NARMADA' 'NAVSARI' 'PANCH MAHALS' 'PATAN'
'PORBANDAR' 'RAJKOT' 'SABAR KANTHA' 'SURAT' 'SURENDRANAGAR' 'TAPI'
'VADODARA' 'VALSAD' 'AMBALA' 'BHIWANI' 'FARIDABAD' 'FATEHABAD' 'GURGAON'
'HISAR' 'JHAJJAR' 'JIND' 'KAITHAL' 'KARNAL' 'KURUKSHETRA' 'MAHENDRAGARH'
'MEWAT' 'PALWAL' 'PANCHKULA' 'PANIPAT' 'REWARI' 'ROHTAK' 'SIRSA'
'SONIPAT' 'YAMUNANAGAR' 'CHAMBA' 'HAMIRPUR' 'KANGRA' 'KINNAUR' 'KULLU'
'LAHUL AND SPITI' 'MANDI' 'SHIMLA' 'SIRMAUR' 'SOLAN' 'UNA' 'ANANTNAG'
'BADGAM' 'BANDIPORA' 'BARAMULLA' 'DODA' 'GANDERBAL' 'JAMMU' 'KARGIL'
'KATHUA' 'KISHTWAR' 'KULGAM' 'KUPWARA' 'LEH LADAKH' 'POONCH' 'PULWAMA'
'RAJAURI' 'RAMBAN' 'REASI' 'SAMBA' 'SHOPIAN' 'SRINAGAR' 'UDHAMPUR'
'BOKARO' 'CHATRA' 'DEOGHAR' 'DHANBAD' 'DUMKA' 'EAST SINGHBUM' 'GARHWA'
'GIRIDIH' 'GODDA' 'GUMLA' 'HAZARIBAGH' 'JAMTARA' 'KHUNTI' 'KODERMA'
'LATEHAR' 'LOHARDAGA' 'PAKUR' 'PALAMU' 'RAMGARH' 'RANCHI' 'SAHEBGANJ'
'SARAIKELA KHARSAWAN' 'SIMDEGA' 'WEST SINGHBHUM' 'BAGALKOT'
'BANGALORE RURAL' 'BELGAUM' 'BELLARY' 'BENGALURU URBAN' 'BIDAR'
'CHAMARAJANAGAR' 'CHIKBALLAPUR' 'CHIKMAGALUR' 'CHITRADURGA'
'DAKSHIN KANNAD' 'DAVANGERE' 'DHARWAD' 'GADAG' 'GULBARGA' 'HASSAN'
'HAVERI' 'KODAGU' 'KOLAR' 'KOPPAL' 'MANDYA' 'MYSORE' 'RAICHUR'
'RAMANAGARA' 'SHIMOGA' 'TUMKUR' 'UDUPI' 'UTTAR KANNAD' 'YADGIR'
'ALAPPUZHA' 'ERNAKULAM' 'IDUKKI' 'KANNUR' 'KASARAGOD' 'KOLLAM' 'KOTTAYAM'
'KOZHIKODE' 'MALAPPURAM' 'PALAKKAD' 'PATHANAMTHITTA' 'THIRUVANANTHAPURAM'
'THRISSUR' 'WAYANAD' 'AGAR MALWA' 'ALIRAJPUR' 'ANUPPUR' 'ASHOKNAGAR'
'BALAGHAT' 'BARWANI' 'BETUL' 'BHIND' 'BHOPAL' 'BURHANPUR' 'CHHATARPUR'
'CHHINDWARA' 'DAMOH' 'DATIA' 'DEWAS' 'DHAR' 'DINDORI' 'GUNA' 'GWALIOR'
'HARDA' 'HOSHANGABAD' 'INDORE' 'JABALPUR' 'JHABUA' 'KATNI' 'KHANDWA'
'KHARGONE' 'MANDLA' 'MANDSAUR' 'MORENA' 'NARSINGHPUR' 'NEEMUCH' 'PANNA'
'RAISEN' 'RAJGARH' 'RATLAM' 'REWA' 'SAGAR' 'SATNA' 'SEHORE' 'SEONI'
'SHAHDOL' 'SHAJAPUR' 'SHEOPUR' 'SHIVPURI' 'SIDHI' 'SINGRAULI' 'TIKAMGARH'
'UJJAIN' 'UMARIA' 'VIDISHA' 'AHMEDNAGAR' 'AKOLA' 'AMRAVATI' 'BEED'
'BHANDARA' 'BULDHANA' 'CHANDRAPUR' 'DHULE' 'GADCHIROLI' 'GONDIA'
'HINGOLI' 'JALGAON' 'JALNA' 'KOLHAPUR' 'LATUR' 'MUMBAI' 'NAGPUR' 'NANDED'
'NANDURBAR' 'NASHIK' 'OSMANABAD' 'PALGHAR' 'PARBHANI' 'PUNE' 'RAIGAD'
'RATNAGIRI' 'SANGLI' 'SATARA' 'SINDHUDURG' 'SOLAPUR' 'THANE' 'WARDHA'
'WASHIM' 'YAVATMAL' 'BISHNUPUR' 'CHANDEL' 'CHURACHANDPUR' 'IMPHAL EAST'
'IMPHAL WEST' 'SENAPATI' 'TAMENGLONG' 'THOUBAL' 'UKHRUL'
'EAST GARO HILLS' 'EAST JAINTIA HILLS' 'EAST KHASI HILLS'
'NORTH GARO HILLS' 'RI BHOI' 'SOUTH GARO HILLS' 'SOUTH WEST GARO HILLS'

'SOUTH WEST KHASI HILLS' 'WEST GARO HILLS' 'WEST JAINTIA HILLS'
'WEST KHASI HILLS' 'AIZAWL' 'CHAMPHAI' 'KOLASIB' 'LAWNGTLAI' 'LUNGLEI'
'MAMIT' 'SAIHA' 'SERCHHIP' 'DIMAPUR' 'KIPHIRE' 'KOHIMA' 'LONGLENG'
'MOKOKCHUNG' 'MON' 'PEREN' 'PHEK' 'TUENSANG' 'WOKHA' 'ZUNHEBOTO' 'ANUGUL'
'BALANGIR' 'BALESHWAR' 'BARGARH' 'BHADRAK' 'BOUDH' 'CUTTACK' 'DEOGARH'
'DHENKANAL' 'GAJAPATI' 'GANJAM' 'JAGATSINGHAPUR' 'JAJAPUR' 'JHARSUGUDA'
'KALAHANDI' 'KANDHAMAL' 'KENDRAPARA' 'KENDUJHAR' 'KHORDHA' 'KORAPUT'
'MALKANGIRI' 'MAYURBHANJ' 'NABARANGPUR' 'NAYAGARH' 'NUAPADA' 'PURI'
'RAYAGADA' 'SAMBALPUR' 'SONEPUR' 'SUNDARGARH' 'KARAIKAL' 'MAHE'
'PONDICHERRY' 'YANAM' 'AMRITSAR' 'BARNALA' 'BATHINDA' 'FARIDKOT'
'FATEHGARH SAHIB' 'FAZILKA' 'FIROZEPUR' 'GURDASPUR' 'HOSHIARPUR'
'JALANDHAR' 'KAPURTHALA' 'LUDHIANA' 'MANSA' 'MOGA' 'MUKTSAR' 'NAWANSHAHR'
'PATHANKOT' 'PATIALA' 'RUPNAGAR' 'S.A.S NAGAR' 'SANGRUR' 'TARN TARAN'
'AJMER' 'ALWAR' 'BANSWARA' 'BARAN' 'BARMER' 'BHARATPUR' 'BHILWARA'
'BIKANER' 'BUNDI' 'CHITTORGARH' 'CHURU' 'DAUSA' 'DHOLPUR' 'DUNGARPUR'
'GANGANAGAR' 'HANUMANGARH' 'JAIPUR' 'JAISALMER' 'JALORE' 'JHALAWAR'
'JHUNJHUNU' 'JODHPUR' 'KARAULI' 'KOTA' 'NAGAUR' 'PALI' 'PRATAPGARH'
'RAJSAMAND' 'SAWAI MADHOPUR' 'SIKAR' 'SIROHI' 'TONK' 'UDAIPUR'
'EAST DISTRICT' 'NORTH DISTRICT' 'SOUTH DISTRICT' 'WEST DISTRICT'
'ARIYALUR' 'COIMBATORE' 'CUDDALORE' 'DHARMAPURI' 'DINDIGUL' 'ERODE'
'KANCHIPURAM' 'KANNIYAKUMARI' 'KARUR' 'KRISHNAGIRI' 'MADURAI'
'NAGAPATTINAM' 'NAMAKKAL' 'PERAMBALUR' 'PUDUKKOTTAI' 'RAMANATHAPURAM'
'SALEM' 'SIVAGANGA' 'THANJAVUR' 'THE NILGIRIS' 'THENI' 'THIRUVALLUR'
'THIRUVARUR' 'TIRUCHIRAPPALLI' 'TIRUNELVELI' 'TIRUPPUR' 'TIRUVANNAMALAI'
'TUTICORIN' 'VELLORE' 'VILLUPURAM' 'VIRUDHUNAGAR' 'ADILABAD' 'HYDERABAD'
'KARIMNAGAR' 'KHAMMAM' 'MAHBUBNAGAR' 'MEDAK' 'NALGONDA' 'NIZAMABAD'
'RANGAREDDI' 'WARANGAL' 'DHALAI' 'GOMATI' 'KHOWAI' 'NORTH TRIPURA'
'SEPAHIJALA' 'SOUTH TRIPURA' 'UNAKOTI' 'WEST TRIPURA' 'AGRA' 'ALIGARH'
'ALLAHABAD' 'AMBEDKAR NAGAR' 'AMETHI' 'AMROHA' 'AURAIYA' 'AZAMGARH'
'BAGHPAT' 'BAHRAICH' 'BALLIA' 'BANDA' 'BARABANKI' 'BAREILLY' 'BASTI'
'BIJNOR' 'BUDAUN' 'BULANDSHAHR' 'CHANDAULI' 'CHITRAKOOT' 'DEORIA' 'ETAH'
'ETAWAH' 'FAIZABAD' 'FARRUKHABAD' 'FATEHPUR' 'FIROZABAD'
'GAUTAM BUDDHA NAGAR' 'GHAZIABAD' 'GHAZIPUR' 'GONDA' 'GORAKHPUR' 'HAPUR'
'HARDOI' 'HATHRAS' 'JALAUN' 'JAUNPUR' 'JHANSI' 'KANNAUJ' 'KANPUR DEHAT'
'KANPUR NAGAR' 'KASGANJ' 'KAUSHAMBI' 'KHERI' 'KUSHI NAGAR' 'LALITPUR'
'LUCKNOW' 'MAHARAJGANJ' 'MAHOBA' 'MAINPURI' 'MATHURA' 'MAU' 'MEERUT'
'MIRZAPUR' 'MORADABAD' 'MUZAFFARNAGAR' 'PILIBHIT' 'RAE BARELI' 'RAMPUR'
'SAHARANPUR' 'SAMBHAL' 'SANT KABEER NAGAR' 'SANT RAVIDAS NAGAR'
'SHAHJAHANPUR' 'SHAMLI' 'SHRAVASTI' 'SIDDHARTH NAGAR' 'SITAPUR'
'SONBHADRA' 'SULTANPUR' 'UNNAO' 'VARANASI' 'ALMORA' 'BAGESHWAR' 'CHAMOLI'
'CHAMPAWAT' 'DEHRADUN' 'HARIDWAR' 'NAINITAL' 'PAURI GARHWAL'
'PITHORAGARH' 'RUDRA PRAYAG' 'TEHRI GARHWAL' 'UDAM SINGH NAGAR'
'UTTAR KASHI' '24 PARAGANAS NORTH' '24 PARAGANAS SOUTH' 'BANKURA'
'BARDHAMAN' 'BIRBHUM' 'COOCHBEHAR' 'DARJEELING' 'DINAJPUR DAKSHIN'
'DINAJPUR UTTAR' 'HOOGHLY' 'HOWRAH' 'JALPAIGURI' 'MALDAH'
'MEDINIPUR EAST' 'MEDINIPUR WEST' 'MURSHIDABAD' 'NADIA' 'PURULIA']

5 district names which are in each state

[12]:
```
import pandas as pd


crop_data = pd.read_csv("Crop Production data.csv")


crop_data.columns = crop_data.columns.str.lower()


unique_states = crop_data['state_name'].unique()

for state_name in unique_states:

    state_data = crop_data[crop_data['state_name'] == state_name]


    unique_districts = state_data['district_name'].unique()


    print(f"District Names for {state_name}:")
    for district in unique_districts:
        print(district)
    print()
```

```
District Names for Andaman and Nicobar Islands:
NICOBARS
NORTH AND MIDDLE ANDAMAN
SOUTH ANDAMANS

District Names for Andhra Pradesh:
ANANTAPUR
CHITTOOR
EAST GODAVARI
GUNTUR
KADAPA
KRISHNA
KURNOOL
PRAKASAM
SPSR NELLORE
SRIKAKULAM
VISAKHAPATANAM
VIZIANAGARAM
WEST GODAVARI

District Names for Arunachal Pradesh:
ANJAW
```

CHANGLANG
DIBANG VALLEY
EAST KAMENG
EAST SIANG
KURUNG KUMEY
LOHIT
LONGDING
LOWER DIBANG VALLEY
LOWER SUBANSIRI
NAMSAI
PAPUM PARE
TAWANG
TIRAP
UPPER SIANG
UPPER SUBANSIRI
WEST KAMENG
WEST SIANG

District Names for Assam:
BAKSA
BARPETA
BONGAIGAON
CACHAR
CHIRANG
DARRANG
DHEMAJI
DHUBRI
DIBRUGARH
DIMA HASAO
GOALPARA
GOLAGHAT
HAILAKANDI
JORHAT
KAMRUP
KAMRUP METRO
KARBI ANGLONG
KARIMGANJ
KOKRAJHAR
LAKHIMPUR
MARIGAON
NAGAON
NALBARI
SIVASAGAR
SONITPUR
TINSUKIA
UDALGURI

District Names for Bihar:

ARARIA
ARWAL
AURANGABAD
BANKA
BEGUSARAI
BHAGALPUR
BHOJPUR
BUXAR
DARBHANGA
GAYA
GOPALGANJ
JAMUI
JEHANABAD
KAIMUR (BHABUA)
KATIHAR
KHAGARIA
KISHANGANJ
LAKHISARAI
MADHEPURA
MADHUBANI
MUNGER
MUZAFFARPUR
NALANDA
NAWADA
PASHCHIM CHAMPARAN
PATNA
PURBI CHAMPARAN
PURNIA
ROHTAS
SAHARSA
SAMASTIPUR
SARAN
SHEIKHPURA
SHEOHAR
SITAMARHI
SIWAN
SUPAUL
VAISHALI

District Names for Chandigarh:
CHANDIGARH

District Names for Chhattisgarh:
BALOD
BALODA BAZAR
BALRAMPUR
BASTAR
BEMETARA

BIJAPUR
BILASPUR
DANTEWADA
DHAMTARI
DURG
GARIYABAND
JANJGIR-CHAMPA
JASHPUR
KABIRDHAM
KANKER
KONDAGAON
KORBA
KOREA
MAHASAMUND
MUNGELI
NARAYANPUR
RAIGARH
RAIPUR
RAJNANDGAON
SUKMA
SURAJPUR
SURGUJA

District Names for Dadra and Nagar Haveli:
DADRA AND NAGAR HAVELI

District Names for Goa:
NORTH GOA
SOUTH GOA

District Names for Gujarat:
AHMADABAD
AMRELI
ANAND
BANAS KANTHA
BHARUCH
BHAVNAGAR
DANG
DOHAD
GANDHINAGAR
JAMNAGAR
JUNAGADH
KACHCHH
KHEDA
MAHESANA
NARMADA
NAVSARI
PANCH MAHALS

PATAN
PORBANDAR
RAJKOT
SABAR KANTHA
SURAT
SURENDRANAGAR
TAPI
VADODARA
VALSAD

District Names for Haryana:
AMBALA
BHIWANI
FARIDABAD
FATEHABAD
GURGAON
HISAR
JHAJJAR
JIND
KAITHAL
KARNAL
KURUKSHETRA
MAHENDRAGARH
MEWAT
PALWAL
PANCHKULA
PANIPAT
REWARI
ROHTAK
SIRSA
SONIPAT
YAMUNANAGAR

District Names for Himachal Pradesh:
BILASPUR
CHAMBA
HAMIRPUR
KANGRA
KINNAUR
KULLU
LAHUL AND SPITI
MANDI
SHIMLA
SIRMAUR
SOLAN
UNA

District Names for Jammu and Kashmir :

ANANTNAG
BADGAM
BANDIPORA
BARAMULLA
DODA
GANDERBAL
JAMMU
KARGIL
KATHUA
KISHTWAR
KULGAM
KUPWARA
LEH LADAKH
POONCH
PULWAMA
RAJAURI
RAMBAN
REASI
SAMBA
SHOPIAN
SRINAGAR
UDHAMPUR

District Names for Jharkhand:
BOKARO
CHATRA
DEOGHAR
DHANBAD
DUMKA
EAST SINGHBUM
GARHWA
GIRIDIH
GODDA
GUMLA
HAZARIBAGH
JAMTARA
KHUNTI
KODERMA
LATEHAR
LOHARDAGA
PAKUR
PALAMU
RAMGARH
RANCHI
SAHEBGANJ
SARAIKELA KHARSAWAN
SIMDEGA
WEST SINGHBHUM

District Names for Karnataka:
BAGALKOT
BANGALORE RURAL
BELGAUM
BELLARY
BENGALURU URBAN
BIDAR
BIJAPUR
CHAMARAJANAGAR
CHIKBALLAPUR
CHIKMAGALUR
CHITRADURGA
DAKSHIN KANNAD
DAVANGERE
DHARWAD
GADAG
GULBARGA
HASSAN
HAVERI
KODAGU
KOLAR
KOPPAL
MANDYA
MYSORE
RAICHUR
RAMANAGARA
SHIMOGA
TUMKUR
UDUPI
UTTAR KANNAD
YADGIR

District Names for Kerala:
ALAPPUZHA
ERNAKULAM
IDUKKI
KANNUR
KASARAGOD
KOLLAM
KOTTAYAM
KOZHIKODE
MALAPPURAM
PALAKKAD
PATHANAMTHITTA
THIRUVANANTHAPURAM
THRISSUR
WAYANAD

District Names for Madhya Pradesh:
AGAR MALWA
ALIRAJPUR
ANUPPUR
ASHOKNAGAR
BALAGHAT
BARWANI
BETUL
BHIND
BHOPAL
BURHANPUR
CHHATARPUR
CHHINDWARA
DAMOH
DATIA
DEWAS
DHAR
DINDORI
GUNA
GWALIOR
HARDA
HOSHANGABAD
INDORE
JABALPUR
JHABUA
KATNI
KHANDWA
KHARGONE
MANDLA
MANDSAUR
MORENA
NARSINGHPUR
NEEMUCH
PANNA
RAISEN
RAJGARH
RATLAM
REWA
SAGAR
SATNA
SEHORE
SEONI
SHAHDOL
SHAJAPUR
SHEOPUR
SHIVPURI
SIDHI

SINGRAULI
TIKAMGARH
UJJAIN
UMARIA
VIDISHA

District Names for Maharashtra:
AHMEDNAGAR
AKOLA
AMRAVATI
AURANGABAD
BEED
BHANDARA
BULDHANA
CHANDRAPUR
DHULE
GADCHIROLI
GONDIA
HINGOLI
JALGAON
JALNA
KOLHAPUR
LATUR
MUMBAI
NAGPUR
NANDED
NANDURBAR
NASHIK
OSMANABAD
PALGHAR
PARBHANI
PUNE
RAIGAD
RATNAGIRI
SANGLI
SATARA
SINDHUDURG
SOLAPUR
THANE
WARDHA
WASHIM
YAVATMAL

District Names for Manipur:
BISHNUPUR
CHANDEL
CHURACHANDPUR
IMPHAL EAST

IMPHAL WEST
SENAPATI
TAMENGLONG
THOUBAL
UKHRUL

District Names for Meghalaya:
EAST GARO HILLS
EAST JAINTIA HILLS
EAST KHASI HILLS
NORTH GARO HILLS
RI BHOI
SOUTH GARO HILLS
SOUTH WEST GARO HILLS
SOUTH WEST KHASI HILLS
WEST GARO HILLS
WEST JAINTIA HILLS
WEST KHASI HILLS

District Names for Mizoram:
AIZAWL
CHAMPHAI
KOLASIB
LAWNGTLAI
LUNGLEI
MAMIT
SAIHA
SERCHHIP

District Names for Nagaland:
DIMAPUR
KIPHIRE
KOHIMA
LONGLENG
MOKOKCHUNG
MON
PEREN
PHEK
TUENSANG
WOKHA
ZUNHEBOTO

District Names for Odisha:
ANUGUL
BALANGIR
BALESHWAR
BARGARH
BHADRAK

BOUDH
CUTTACK
DEOGARH
DHENKANAL
GAJAPATI
GANJAM
JAGATSINGHAPUR
JAJAPUR
JHARSUGUDA
KALAHANDI
KANDHAMAL
KENDRAPARA
KENDUJHAR
KHORDHA
KORAPUT
MALKANGIRI
MAYURBHANJ
NABARANGPUR
NAYAGARH
NUAPADA
PURI
RAYAGADA
SAMBALPUR
SONEPUR
SUNDARGARH

District Names for Puducherry:
KARAIKAL
MAHE
PONDICHERRY
YANAM

District Names for Punjab:
AMRITSAR
BARNALA
BATHINDA
FARIDKOT
FATEHGARH SAHIB
FAZILKA
FIROZEPUR
GURDASPUR
HOSHIARPUR
JALANDHAR
KAPURTHALA
LUDHIANA
MANSA
MOGA
MUKTSAR

NAWANSHAHR
PATHANKOT
PATIALA
RUPNAGAR
S.A.S NAGAR
SANGRUR
TARN TARAN

District Names for Rajasthan:
AJMER
ALWAR
BANSWARA
BARAN
BARMER
BHARATPUR
BHILWARA
BIKANER
BUNDI
CHITTORGARH
CHURU
DAUSA
DHOLPUR
DUNGARPUR
GANGANAGAR
HANUMANGARH
JAIPUR
JAISALMER
JALORE
JHALAWAR
JHUNJHUNU
JODHPUR
KARAULI
KOTA
NAGAUR
PALI
PRATAPGARH
RAJSAMAND
SAWAI MADHOPUR
SIKAR
SIROHI
TONK
UDAIPUR

District Names for Sikkim:
EAST DISTRICT
NORTH DISTRICT
SOUTH DISTRICT
WEST DISTRICT

District Names for Tamil Nadu:
ARIYALUR
COIMBATORE
CUDDALORE
DHARMAPURI
DINDIGUL
ERODE
KANCHIPURAM
KANNIYAKUMARI
KARUR
KRISHNAGIRI
MADURAI
NAGAPATTINAM
NAMAKKAL
PERAMBALUR
PUDUKKOTTAI
RAMANATHAPURAM
SALEM
SIVAGANGA
THANJAVUR
THE NILGIRIS
THENI
THIRUVALLUR
THIRUVARUR
TIRUCHIRAPPALLI
TIRUNELVELI
TIRUPPUR
TIRUVANNAMALAI
TUTICORIN
VELLORE
VILLUPURAM
VIRUDHUNAGAR

District Names for Telangana :
ADILABAD
HYDERABAD
KARIMNAGAR
KHAMMAM
MAHBUBNAGAR
MEDAK
NALGONDA
NIZAMABAD
RANGAREDDI
WARANGAL

District Names for Tripura:
DHALAI

GOMATI
KHOWAI
NORTH TRIPURA
SEPAHIJALA
SOUTH TRIPURA
UNAKOTI
WEST TRIPURA

District Names for Uttar Pradesh:
AGRA
ALIGARH
ALLAHABAD
AMBEDKAR NAGAR
AMETHI
AMROHA
AURAIYA
AZAMGARH
BAGHPAT
BAHRAICH
BALLIA
BALRAMPUR
BANDA
BARABANKI
BAREILLY
BASTI
BIJNOR
BUDAUN
BULANDSHAHR
CHANDAULI
CHITRAKOOT
DEORIA
ETAH
ETAWAH
FAIZABAD
FARRUKHABAD
FATEHPUR
FIROZABAD
GAUTAM BUDDHA NAGAR
GHAZIABAD
GHAZIPUR
GONDA
GORAKHPUR
HAMIRPUR
HAPUR
HARDOI
HATHRAS
JALAUN
JAUNPUR

JHANSI
KANNAUJ
KANPUR DEHAT
KANPUR NAGAR
KASGANJ
KAUSHAMBI
KHERI
KUSHI NAGAR
LALITPUR
LUCKNOW
MAHARAJGANJ
MAHOBA
MAINPURI
MATHURA
MAU
MEERUT
MIRZAPUR
MORADABAD
MUZAFFARNAGAR
PILIBHIT
PRATAPGARH
RAE BARELI
RAMPUR
SAHARANPUR
SAMBHAL
SANT KABEER NAGAR
SANT RAVIDAS NAGAR
SHAHJAHANPUR
SHAMLI
SHRAVASTI
SIDDHARTH NAGAR
SITAPUR
SONBHADRA
SULTANPUR
UNNAO
VARANASI

District Names for Uttarakhand:
ALMORA
BAGESHWAR
CHAMOLI
CHAMPAWAT
DEHRADUN
HARIDWAR
NAINITAL
PAURI GARHWAL
PITHORAGARH
RUDRA PRAYAG

```
TEHRI GARHWAL
UDAM SINGH NAGAR
UTTAR KASHI

District Names for West Bengal:
24 PARAGANAS NORTH
24 PARAGANAS SOUTH
BANKURA
BARDHAMAN
BIRBHUM
COOCHBEHAR
DARJEELING
DINAJPUR DAKSHIN
DINAJPUR UTTAR
HOOGHLY
HOWRAH
JALPAIGURI
MALDAH
MEDINIPUR EAST
MEDINIPUR WEST
MURSHIDABAD
NADIA
PURULIA
```

6 crops in each state

[13]:
```python
import pandas as pd

# Assuming 'crop_data' DataFrame is already defined and populated

crop_data.columns = crop_data.columns.str.lower()

unique_states = crop_data['state_name'].unique()

for state_name in unique_states:
    state_data = crop_data[crop_data['state_name'] == state_name]
    unique_crops = state_data['crop'].unique()

    print(f"Crops growing in {state_name}:")
    for crop_name in unique_crops:
        print(crop_name)
    print()
```

```
Crops growing in Andaman and Nicobar Islands:
Arecanut
Other Kharif pulses
```

Rice
Banana
Cashewnut
Coconut
Dry ginger
Sugarcane
Sweet potato
Tapioca
Black pepper
Dry chillies
other oilseeds
Turmeric
Maize
Moong(Green Gram)
Urad
Arhar/Tur
Groundnut
Sunflower

Crops growing in Andhra Pradesh:
Arhar/Tur
Bajra
Castor seed
Cotton(lint)
Dry chillies
Groundnut
Horse-gram
Jowar
Korra
Maize
Moong(Green Gram)
Other Kharif pulses
Ragi
Rice
Sugarcane
Sunflower
Tobacco
Gram
Wheat
Masoor
Sesamum
Urad
Linseed
Safflower
Onion
other misc. pulses
Samai
Small millets

Arecanut
Banana
Coconut
Coriander
Potato
Sweet potato
Turmeric
Other Rabi pulses
Soyabean
Beans & Mutter(Vegetable)
Bhindi
Brinjal
Citrus Fruit
Cucumber
Grapes
Mango
Orange
other fibres
Other Fresh Fruits
Other Vegetables
Papaya
Pome Fruit
Tomato
Rapeseed &Mustard
Mesta
Cowpea(Lobia)
other oilseeds
Lemon
Pome Granet
Sapota
Cabbage
Cashewnut
Tapioca
Peas (vegetable)
Niger seed
Bottle Gourd
Dry ginger
Sannhamp
Varagu
Garlic
Ginger

Crops growing in Arunachal Pradesh:
Maize
Rice
Small millets
Wheat
Dry chillies

Dry ginger
Potato
Sugarcane
Turmeric
Oilseeds total
Sesamum
Soyabean
Sunflower
Groundnut
Rapeseed &Mustard
Pulses total

Crops growing in Assam:
Rice
Arhar/Tur
Castor seed
Cotton(lint)
Jute
Maize
Mesta
Niger seed
Sesamum
Small millets
Gram
Linseed
Masoor
Moong(Green Gram)
Other Rabi pulses
Peas & beans (Pulses)
Rapeseed &Mustard
Urad
Wheat
Banana
Dry chillies
Onion
Potato
Sugarcane
Sweet potato
Tapioca
Tobacco
Turmeric
Arecanut
Coconut
Black pepper
Dry ginger
Blackgram
Paddy
Orange

Papaya
Ginger
Pineapple
other misc. pulses

Crops growing in Bihar:
Rice
Arhar/Tur
Dry ginger
Groundnut
Jute
Maize
Mesta
Other Kharif pulses
Sesamum
Barley
Gram
Linseed
Other Rabi pulses
Rapeseed &Mustard
Sunflower
Wheat
Banana
Coriander
Dry chillies
Garlic
Onion
Potato
Ragi
Sannhamp
Sugarcane
Sweet potato
Turmeric
Blackgram
Small millets
Bajra
Horse-gram
Jowar
Moong(Green Gram)
Urad
Khesari
Masoor
Peas & beans (Pulses)
Tobacco
Safflower
Castor seed
Niger seed
Cotton(lint)

Crops growing in Chandigarh:
Arhar/Tur
Maize
Moong(Green Gram)
Rice
Urad
Gram
Masoor
Rapeseed &Mustard
Wheat
Onion
Potato
Sunflower

Crops growing in Chhattisgarh:
Arhar/Tur
Horse-gram
Jowar
Maize
Mesta
Moong(Green Gram)
Other Kharif pulses
Ragi
Rice
Sesamum
Small millets
Soyabean
Sunflower
Urad
Barley
Gram
Khesari
Linseed
Masoor
Other Rabi pulses
Peas & beans (Pulses)
Rapeseed &Mustard
Safflower
Wheat
Banana
Coriander
Dry chillies
Dry ginger
Onion
Sannhamp
Sugarcane
Sweet potato

Niger seed
Turmeric
Castor seed
Groundnut
Potato
Garlic
Bajra
Cotton(lint)
Jute
Tobacco
Guar seed
Papaya
Coconut
other misc. pulses

Crops growing in Dadra and Nagar Haveli:
Arhar/Tur
Coconut
Groundnut
Jowar
Maize
Niger seed
Other Kharif pulses
Ragi
Rice
Sannhamp
Small millets
Other Rabi pulses
Banana
Coriander
Gram
Rapeseed &Mustard
Sesamum
Sugarcane
Sunflower
Wheat
Urad

Crops growing in Goa:
Groundnut
Other Kharif pulses
Other Rabi pulses
Ragi
Rice
Black pepper
Cashewnut
Coconut
Sugarcane

```
Arecanut
Banana
Mango
Other Fresh Fruits
Other Vegetables
Pineapple

Crops growing in Gujarat:
Arhar/Tur
Bajra
Dry chillies
Groundnut
Jowar
Moong(Green Gram)
Moth
Other Kharif pulses
Urad
Gram
Rapeseed &Mustard
Wheat
Banana
Castor seed
Cotton(lint)
Maize
Potato
Pulses total
Rice
Sesamum
Sugarcane
Tobacco
Other Cereals & Millets
Small millets
Oilseeds total
Onion
Guar seed
other oilseeds
Garlic
Other  Rabi pulses
Ragi
Soyabean

Crops growing in Haryana:
Bajra
Maize
Other Kharif pulses
Rice
Other  Rabi pulses
Wheat
```

Sugarcane
Arhar/Tur
Cotton(lint)
Groundnut
Jowar
Moth
Sesamum
Urad
Barley
Gram
Masoor
Peas & beans (Pulses)
Rapeseed &Mustard
Sunflower
Dry chillies
Onion
Potato
Garlic
Turmeric
Moong(Green Gram)
Sweet potato
Horse-gram
Other Fresh Fruits
Other Vegetables
other oilseeds
Sannhamp
Coriander
Soyabean
Dry ginger
Castor seed
Guar seed
Banana
Grapes
Mango
Tobacco
Jute

Crops growing in Himachal Pradesh:
Arhar/Tur
Bajra
Groundnut
Horse-gram
Maize
Rice
Sesamum
Small millets
Soyabean
Urad

Barley
Gram
Masoor
Potato
Rapeseed &Mustard
Wheat
Cotton(lint)
Dry chillies
Dry ginger
Garlic
Turmeric
Moong(Green Gram)
Peas & beans (Pulses)
Sugarcane
Jowar
Other Kharif pulses
Other Rabi pulses
Sannhamp
Sweet potato
Tobacco
Onion
Ragi
Ginger
Moth
Coriander
Linseed

Crops growing in Jammu and Kashmir :
Maize
Rice
Wheat
Cond-spcs other
Rapeseed &Mustard
Dry chillies
Moong(Green Gram)
Urad
Onion
Potato
Moth
Other Kharif pulses
Beans & Mutter(Vegetable)
Other Fresh Fruits
Other Vegetables
Peas & beans (Pulses)
Other Cereals & Millets
Garlic
Sannhamp
Linseed

```
Other  Rabi pulses
Barley
Bajra
Gram
other oilseeds
Small millets
Masoor
Sesamum
Horse-gram
Groundnut
Jowar
Sugarcane
Tobacco
Cotton(lint)
Dry ginger
Turmeric
Coriander
Arhar/Tur
Ginger
Turnip
Carrot
Redish

Crops growing in Jharkhand:
Maize
Wheat
Rice
Gram
Rapeseed &Mustard
Potato
Ragi
Arhar/Tur
Onion
Masoor
Sugarcane
Barley

Crops growing in Karnataka:
Arhar/Tur
Bajra
Castor seed
Cotton(lint)
Groundnut
Horse-gram
Jowar
Maize
Moong(Green Gram)
Niger seed
```

Onion
Rapeseed &Mustard
Rice
Sesamum
Soyabean
Sunflower
Gram
Linseed
Safflower
Wheat
Arecanut
Coconut
Coriander
Dry chillies
Garlic
Turmeric
Mesta
Other Kharif pulses
Small millets
Other Rabi pulses
Banana
Sugarcane
Sweet potato
Sannhamp
Arcanut (Processed)
Atcanut (Raw)
Brinjal
Citrus Fruit
Grapes
Mango
Other Fresh Fruits
Papaya
Pome Fruit
Tomato
Urad
Cashewnut
Tobacco
Cowpea(Lobia)
Black pepper
Dry ginger
Paddy
Peas & beans (Pulses)
Potato
Ragi
Tapioca
Beans & Mutter(Vegetable)
Cashewnut Processed
Cashewnut Raw

Cardamom

Crops growing in Kerala:
Arecanut
Black pepper
Cashewnut
Coconut
Tapioca
Rice
Sesamum
Banana
Dry ginger
Sugarcane
Sweet potato
Turmeric
Rubber
Bhindi
Bitter Gourd
Brinjal
Cashewnut Raw
Drum Stick
Jack Fruit
Mango
Other Fresh Fruits
other oilseeds
Other Vegetables
Papaya
Pineapple
Snak Guard
Small millets
Ragi
Potato
Cowpea(Lobia)
Moong(Green Gram)
Pump Kin
Dry chillies
Tea
Jowar
Cardamom
Garlic
Coffee
Other Cereals & Millets
Cotton(lint)
Arhar/Tur
Maize
Wheat
Onion
Blackgram

Horse-gram
Tobacco
Groundnut
Soyabean

Crops growing in Madhya Pradesh:
Arhar/Tur
Bajra
Barley
Groundnut
Jowar
Maize
Moong(Green Gram)
Other Kharif pulses
Rice
Sannhamp
Soyabean
Urad
Gram
Linseed
Masoor
Other Rabi pulses
Peas & beans (Pulses)
Rapeseed &Mustard
Wheat
Coriander
Dry chillies
Dry ginger
Garlic
Onion
Potato
Sesamum
Sugarcane
Sweet potato
Castor seed
Cotton(lint)
Horse-gram
Small millets
Turmeric
Mesta
Niger seed
other misc. pulses
Banana
Beans & Mutter(Vegetable)
Bhindi
Brinjal
Cabbage
Cauliflower

Mango
Other Vegetables
Tomato
Jute
Sunflower
Khesari
Cowpea(Lobia)
Tobacco
Orange
Other Citrus Fruit
Other Fresh Fruits
Papaya
Pome Fruit
Safflower
Paddy
Ragi
Citrus Fruit
Water Melon
Grapes
Cashewnut

Crops growing in Maharashtra:
Maize
Arhar/Tur
Bajra
Gram
Jowar
Moong(Green Gram)
Pulses total
Ragi
Rice
Sugarcane
Total foodgrain
Urad
Other Rabi pulses
Wheat
Cotton(lint)
Castor seed
Groundnut
Niger seed
Other Cereals & Millets
Other Kharif pulses
Sesamum
Soyabean
Sunflower
Linseed
Rapeseed &Mustard
Safflower

Small millets
other oilseeds
Banana
Grapes
Mango
Onion
Tomato
Tobacco

Crops growing in Manipur:
Onion
Rice
Sugarcane
Dry chillies
Jute
Turmeric
Peas & beans (Pulses)
Potato
Rapeseed &Mustard
Dry ginger
Banana
Other Kharif pulses
Beans & Mutter(Vegetable)
Bhindi
Brinjal
Cabbage
Carrot
Cauliflower
Citrus Fruit
Jack Fruit
Mango
Other Fresh Fruits
Other Vegetables
Papaya
Pineapple
Pome Fruit
Redish
Tapioca
Tomato
Bitter Gourd
Bottle Gourd
Orange
Sweet potato
Soyabean
Maize
Sesamum
Cashewnut
Kapas

Cotton(lint)
Rubber
Arhar/Tur

Crops growing in Meghalaya:
Arhar/Tur
Cotton(lint)
Dry ginger
Jute
Maize
Mesta
Rice
Sesamum
Small millets
Soyabean
Castor seed
Gram
Other Rabi pulses
Pulses total
Rapeseed &Mustard
Tobacco
Wheat
Arecanut
Banana
Dry chillies
Potato
Sugarcane
Sweet potato
Tapioca
Turmeric
Kapas
Cashewnut
Citrus Fruit
Papaya
Pineapple
Black pepper
Coriander
Garlic
Masoor
Peas & beans (Pulses)
Cowpea(Lobia)
Total foodgrain
Oilseeds total
Linseed

Crops growing in Mizoram:
Arhar/Tur
Coconut

Groundnut
Kapas
Maize
Peas & beans (Pulses)
Rapeseed &Mustard
Sesamum
Soyabean
Tobacco
Wheat
Rice
Sugarcane
Tapioca
Cotton(lint)
Other Kharif pulses
other oilseeds
Potato
Other Rabi pulses
Masoor
Moong(Green Gram)
Urad
Gram
Sunflower

Crops growing in Nagaland:
Arhar/Tur
Bajra
Castor seed
Cotton(lint)
Groundnut
Jowar
Jute
Maize
Moong(Green Gram)
Niger seed
Other Kharif pulses
Rice
Sesamum
Small millets
Soyabean
Sunflower
Barley
Gram
Linseed
Other Rabi pulses
Peas & beans (Pulses)
Rapeseed &Mustard
Wheat
Potato

Sugarcane
Tea
Masoor
Cardamom
Dry ginger
Urad
Dry chillies
Tapioca
Turmeric
Mesta
Ragi
Horse-gram
Ginger
Sweet potato
Blackgram
Colocosia
Cowpea(Lobia)
Lentil
Oilseeds total
Bean
Jobster
Perilla
Rajmash Kholar
Ricebean (nagadal)

Crops growing in Odisha:
Arhar/Tur
Groundnut
Maize
Paddy
Ragi
Sesamum
Urad
Wheat
Potato
Horse-gram
Sugarcane
Moong(Green Gram)
Rice
Rapeseed &Mustard
Castor seed
Cotton(lint)
Dry chillies
Dry ginger
Mesta
Small millets
Sweet potato
Turmeric

Coriander
Garlic
Gram
Niger seed
Sunflower
Onion
Sannhamp
Tobacco
Other Kharif pulses
Other Rabi pulses
Safflower
Jute
Jowar
Linseed
Masoor
Bajra
Soyabean

Crops growing in Puducherry:
Dry chillies
Rice
Sesamum
Sugarcane
Groundnut
Cotton(lint)
Bajra
Dry ginger
Jowar
Moong(Green Gram)
Other Rabi pulses
Rapeseed &Mustard
Urad
Banana
Cashewnut
Coconut
Tapioca
Ragi
Brinjal
Mango
Sunflower
Paddy
Arecanut
Black pepper
Onion
Small millets
Other Cereals & Millets
Other Kharif pulses
Sweet potato

```
Turmeric
Coriander

Crops growing in Punjab:
Arhar/Tur
Bajra
Maize
Rice
Sesamum
Urad
Gram
Masoor
Rapeseed &Mustard
Wheat
Cotton(lint)
Moong(Green Gram)
Sugarcane
Peas & beans (Pulses)
Other  Rabi pulses
Sunflower
Guar seed
Barley
Groundnut
Moth
Jowar
Linseed

Crops growing in Rajasthan:
Bajra
Cotton(lint)
Groundnut
Jowar
Maize
Onion
Rice
Sesamum
Sugarcane
Barley
Gram
Linseed
Rapeseed &Mustard
Wheat
Arhar/Tur
Castor seed
Moong(Green Gram)
Moth
Other Kharif pulses
Sannhamp
```

Soyabean
Urad
Masoor
Other Rabi pulses
Peas & beans (Pulses)
Coriander
Dry chillies
Garlic
Potato
Sweet potato
Guar seed
Tapioca
Small millets
Sunflower
Citrus Fruit
Mango
Other Fresh Fruits
Other Vegetables
Pome Fruit
other oilseeds
Tobacco
Banana
Papaya
Water Melon
Dry ginger
Oilseeds total
other fibres
Grapes
Turmeric
Mesta
Orange

Crops growing in Sikkim:
Maize
Oilseeds total
Rice
Small millets
Soyabean
Urad
Barley
Other Rabi pulses
Rapeseed &Mustard
Wheat
Pulses total
Total foodgrain
Other Kharif pulses
other oilseeds
Other Cereals & Millets

Other Fresh Fruits
Other Vegetables
Potato

Crops growing in Tamil Nadu:
Rice
Arhar/Tur
Bajra
Banana
Cashewnut
Castor seed
Coconut
Coriander
Cotton(lint)
Dry chillies
Groundnut
Jowar
Maize
Moong(Green Gram)
Onion
Ragi
Sugarcane
Sunflower
Sweet potato
Tapioca
Turmeric
Urad
Small millets
Sesamum
Horse-gram
Tobacco
Black pepper
Cardamom
Gram
Pulses total
Total foodgrain
Wheat
Sannhamp
Korra
Samai
Guar seed
Other Cereals & Millets
Other Kharif pulses
Rapeseed &Mustard
Varagu
Arecanut
Ash Gourd
Beans & Mutter(Vegetable)

Beet Root
Bhindi
Bitter Gourd
Bottle Gourd
Brinjal
Cauliflower
Citrus Fruit
Cucumber
Drum Stick
Garlic
Grapes
Jack Fruit
Lab-Lab
Mango
Orange
Other Citrus Fruit
Other Fresh Fruits
Other Vegetables
Papaya
Pome Fruit
Pome Granet
Redish
Ribed Guard
Snak Guard
Tomato
Water Melon
Yam
Cabbage
Pump Kin
Dry ginger
Soyabean
Potato
Carrot
Pineapple
Mesta
Apple
Peach
Pear
Plums
Turnip
Jute
Litchi
Niger seed
Ber

Crops growing in Telangana :
Arhar/Tur
Castor seed

Cotton(lint)
Dry chillies
Jowar
Maize
Moong(Green Gram)
Other Kharif pulses
Rice
Sesamum
Sugarcane
Sunflower
Urad
Gram
Groundnut
Horse-gram
Other Rabi pulses
Wheat
Bajra
Tobacco
Masoor
Linseed
Rapeseed &Mustard
Safflower
Onion
other misc. pulses
Samai
Small millets
Varagu
Banana
Cashewnut
Coriander
Potato
Sweet potato
Turmeric
Ragi
Soyabean
other oilseeds
Beans & Mutter(Vegetable)
Bhindi
Bottle Gourd
Brinjal
Cabbage
Citrus Fruit
Cucumber
Mango
Orange
other fibres
Other Fresh Fruits
Other Vegetables

Pome Fruit
Tomato
Garlic
Mesta
Cowpea(Lobia)
Ginger
Dry ginger
Grapes
Coconut
Papaya
Tapioca
Korra
Peas (vegetable)
Niger seed
Other Dry Fruit

Crops growing in Tripura:
Arhar/Tur
Cotton(lint)
Groundnut
Jute
Maize
Mesta
Moong(Green Gram)
Other Kharif pulses
Rice
Sesamum
Urad
Gram
Masoor
Other Rabi pulses
Peas & beans (Pulses)
Rapeseed &Mustard
Wheat
Sugarcane
Jute & mesta
Oilseeds total
Potato
other oilseeds

Crops growing in Uttar Pradesh:
Arhar/Tur
Bajra
Groundnut
Jowar
Maize
Moong(Green Gram)
Moth

Oilseeds total
Onion
Rice
Sesamum
Soyabean
Total foodgrain
Urad
Barley
Gram
Masoor
Peas & beans (Pulses)
Rapeseed &Mustard
Sunflower
Wheat
Potato
Sugarcane
Cotton(lint)
Castor seed
Linseed
Sannhamp
Jute
Turmeric
Dry chillies
Garlic
Guar seed
Sweet potato
Coriander
Dry ginger
Other Kharif pulses
Other Rabi pulses
Tobacco
Banana
Small millets
Ragi
Ginger

Crops growing in Uttarakhand:
Arhar/Tur
Horse-gram
Maize
Other Cereals & Millets
Other Kharif pulses
Potato
Ragi
Rice
Sesamum
Small millets
Soyabean

Urad
Barley
Masoor
other oilseeds
Peas & beans (Pulses)
Rapeseed &Mustard
Wheat
Dry ginger
Garlic
Onion
Gram
Sunflower
Groundnut
Tobacco
Dry chillies
Other Rabi pulses
Ginger
Turmeric
Pulses total
Total foodgrain
Lentil
Bajra
Sugarcane
Linseed
Moth
Moong(Green Gram)
Jowar
Sannhamp

Crops growing in West Bengal:
Rice
Jute
Mesta
Urad
Gram
Khesari
Masoor
Moong(Green Gram)
Oilseeds total
Wheat
Arecanut
Arhar/Tur
Coconut
Dry chillies
Groundnut
Linseed
Maize
Potato

```
Pulses total
Rapeseed &Mustard
Sesamum
Sugarcane
Turmeric
Dry ginger
Sunflower
Peas & beans (Pulses)
Cotton(lint)
Safflower
Garlic
Barley
Bajra
Horse-gram
Other Kharif pulses
Soyabean
Jowar
Niger seed
Sannhamp
Small millets
Tobacco
Ragi
Other  Rabi pulses
Cardamom
Castor seed
Moth
```

[14]:
```
import pandas as pd
import matplotlib.pyplot as plt


crop_data = pd.read_csv("Crop Production data.csv")
crop_data
```

[14]:

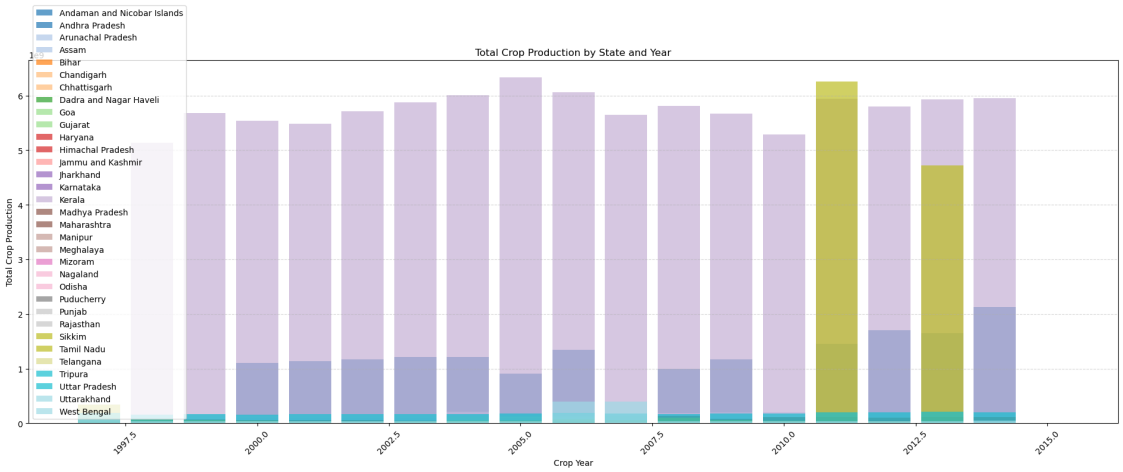
	State_Name	District_Name	Crop_Year	Season	\
0	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	
1	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	
2	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	
3	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	
4	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	
…	…	…	…	…	
246086	West Bengal	PURULIA	2014	Summer	
246087	West Bengal	PURULIA	2014	Summer	
246088	West Bengal	PURULIA	2014	Whole Year	
246089	West Bengal	PURULIA	2014	Winter	
246090	West Bengal	PURULIA	2014	Winter	

```
                     Crop      Area  Production
0                 Arecanut    1254.0      2000.0
1       Other Kharif pulses       2.0         1.0
2                     Rice     102.0       321.0
3                   Banana     176.0       641.0
4                Cashewnut     720.0       165.0
…                      …       …           …
246086                Rice     306.0       801.0
246087             Sesamum     627.0       463.0
246088           Sugarcane     324.0     16250.0
246089                Rice  279151.0    597899.0
246090             Sesamum     175.0        88.0

[246091 rows x 7 columns]
```

7 contribution of crops by each state in every year

[15]:
```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

crop_data = pd.read_csv("Crop Production data.csv")
crop_data.columns = crop_data.columns.str.strip().str.lower()

state_year_production = crop_data.groupby(['state_name',␣
 ↪'crop_year'])['production'].sum().reset_index()

unique_states = state_year_production['state_name'].unique()
num_states = len(unique_states)

color_palette = plt.cm.tab20
state_colors = color_palette(np.linspace(0, 1, num_states))

plt.figure(figsize=(19, 8))

for i, state_name in enumerate(unique_states):
    state_data = state_year_production[state_year_production['state_name'] ==␣
 ↪state_name]
    plt.bar(state_data['crop_year'], state_data['production'],␣
 ↪label=state_name, alpha=0.7, color=state_colors[i])

plt.xlabel('Crop Year')
plt.ylabel('Total Crop Production')
plt.title('Total Crop Production by State and Year')
plt.xticks(rotation=45)
```

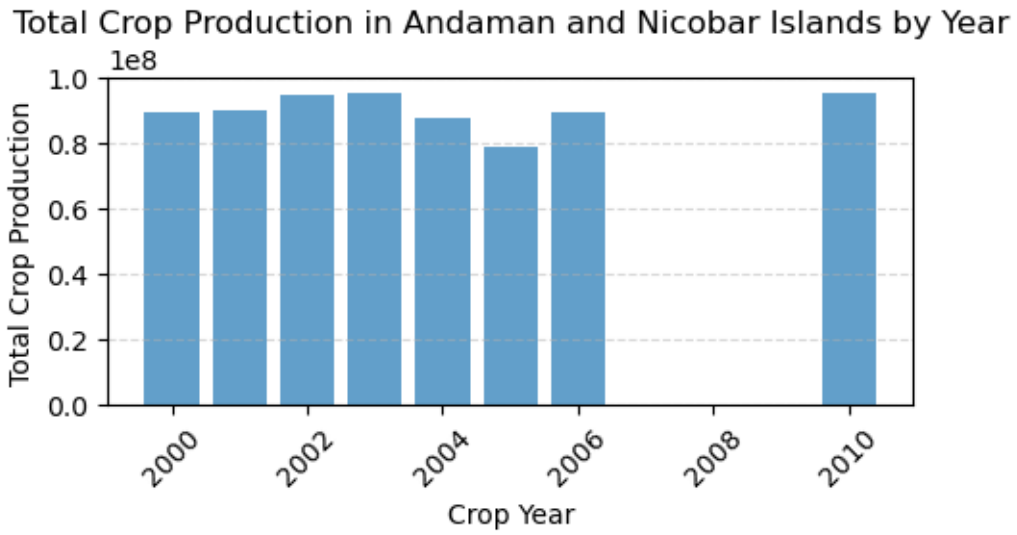
```
plt.legend()
plt.grid(axis='y', linestyle='--', alpha=0.5)
plt.tight_layout()
plt.show()
```

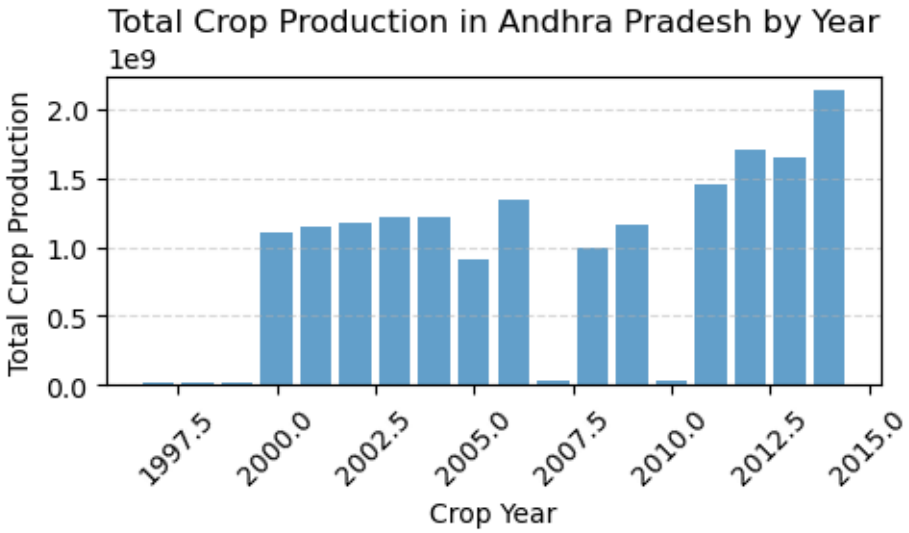


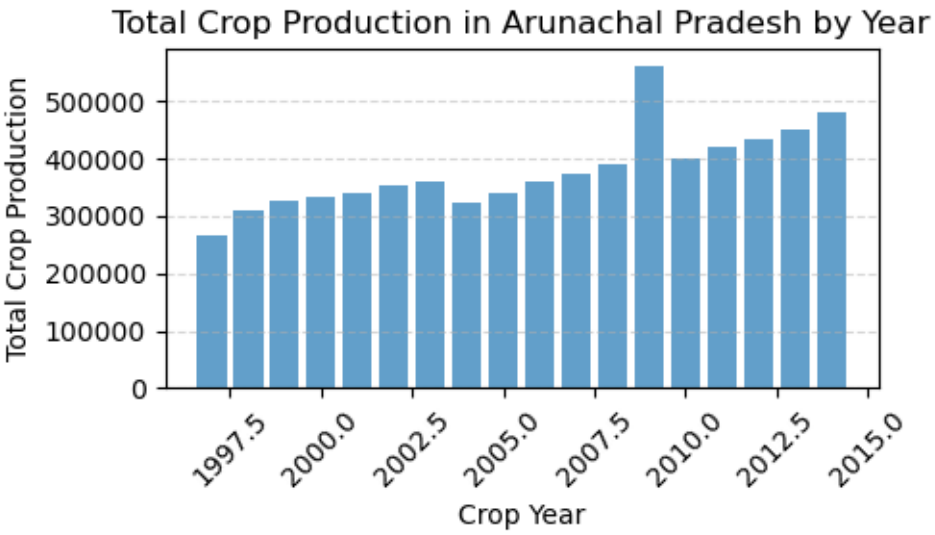
8 contribution of crops by each state in every year

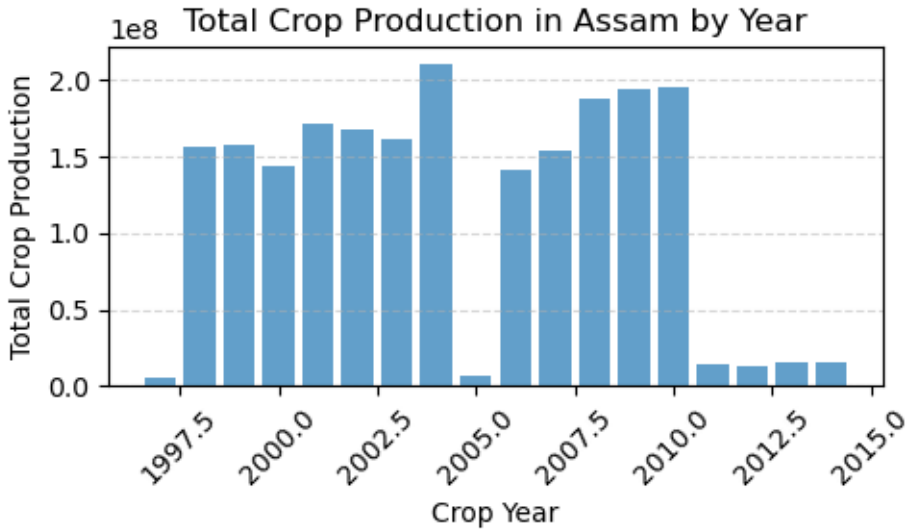
[16]:
```
import pandas as pd
import matplotlib.pyplot as plt

crop_data = pd.read_csv("Crop Production data.csv")
crop_data.columns = crop_data.columns.str.strip().str.lower()

state_year_production = crop_data.groupby(['state_name',␣
 ↪'crop_year'])['production'].sum().reset_index()

unique_states = state_year_production['state_name'].unique()

for state_name in unique_states:
    state_data = state_year_production[state_year_production['state_name'] ==␣
 ↪state_name]

    plt.figure(figsize=(5, 3))
    plt.bar(state_data['crop_year'], state_data['production'], alpha=0.7)

    plt.xlabel('Crop Year')
    plt.ylabel('Total Crop Production')
    plt.title(f'Total Crop Production in {state_name} by Year')
    plt.xticks(rotation=45)
    plt.grid(axis='y', linestyle='--', alpha=0.5)
```

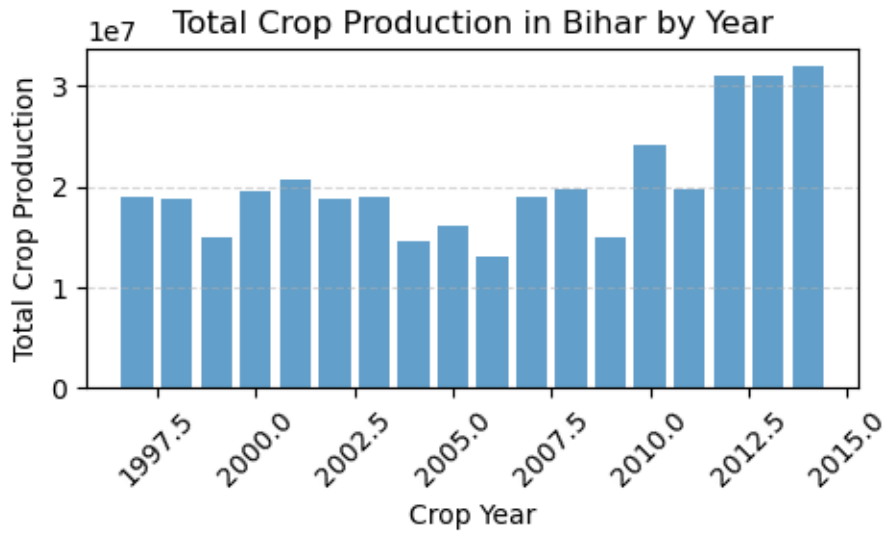
```
    plt.tight_layout()

    plt.savefig(f'{state_name}_crop_production.png')
    plt.show()
```

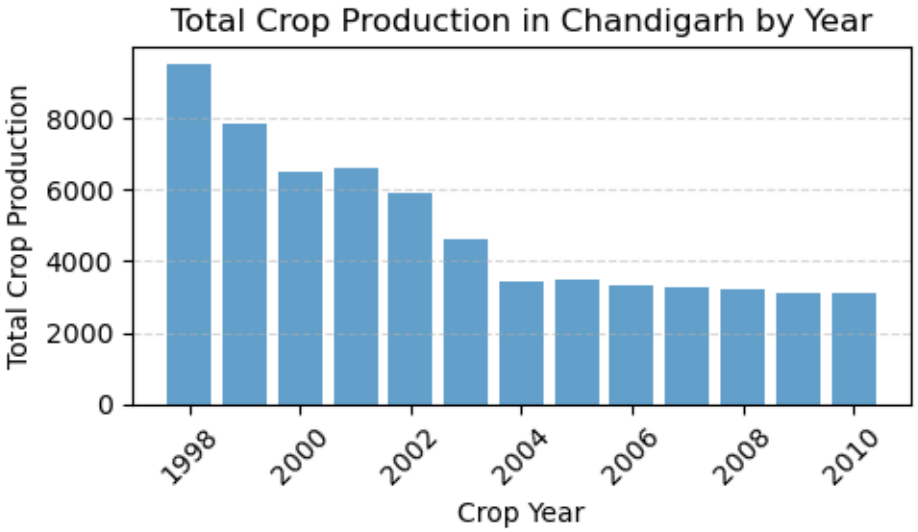


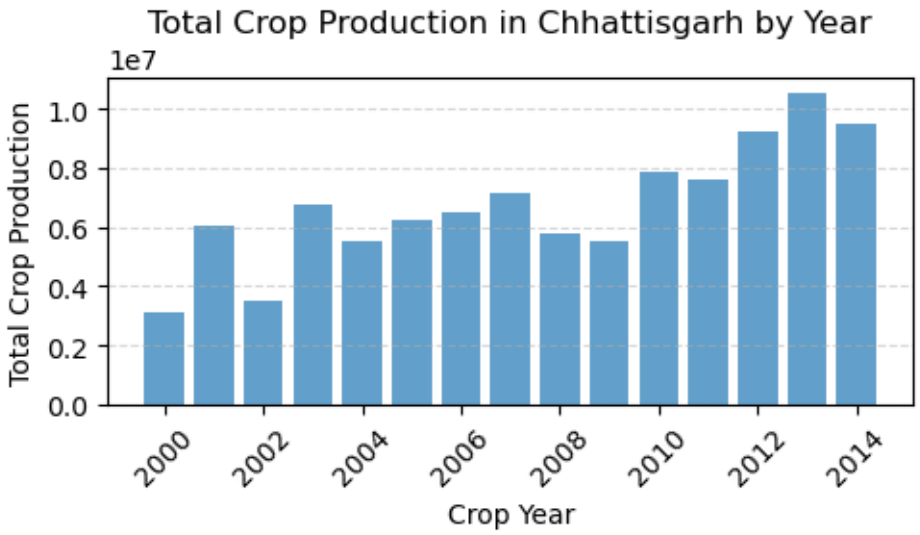


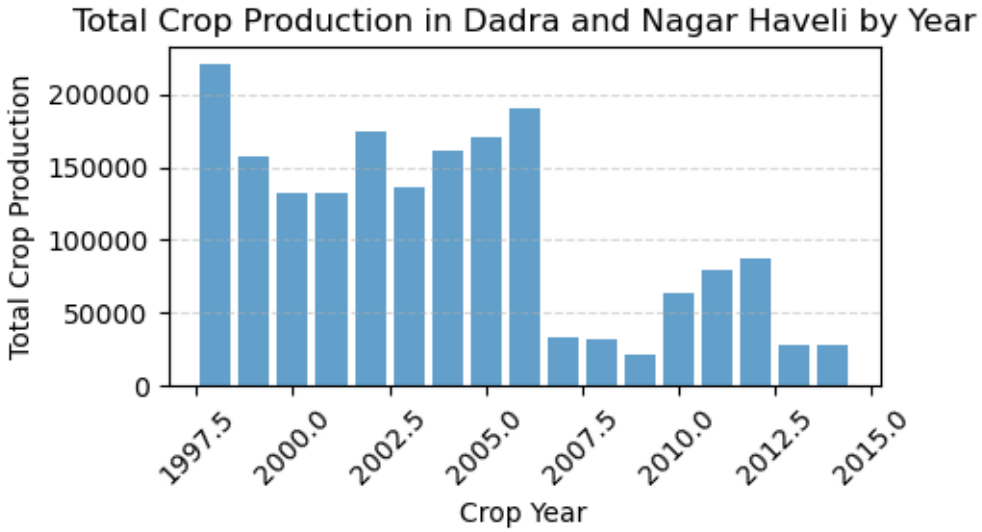

Total Crop Production in Arunachal Pradesh by Year
Total Crop Production
500000
400000
300000
200000
100000
0
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

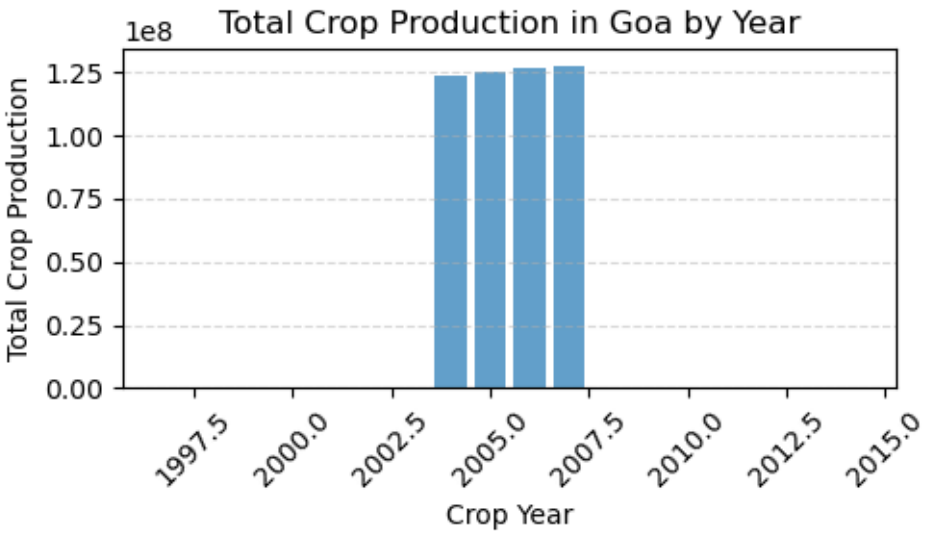

Total Crop Production in Assam by Year
1e8
Total Crop Production
2.0
1.5
1.0
0.5
0.0
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

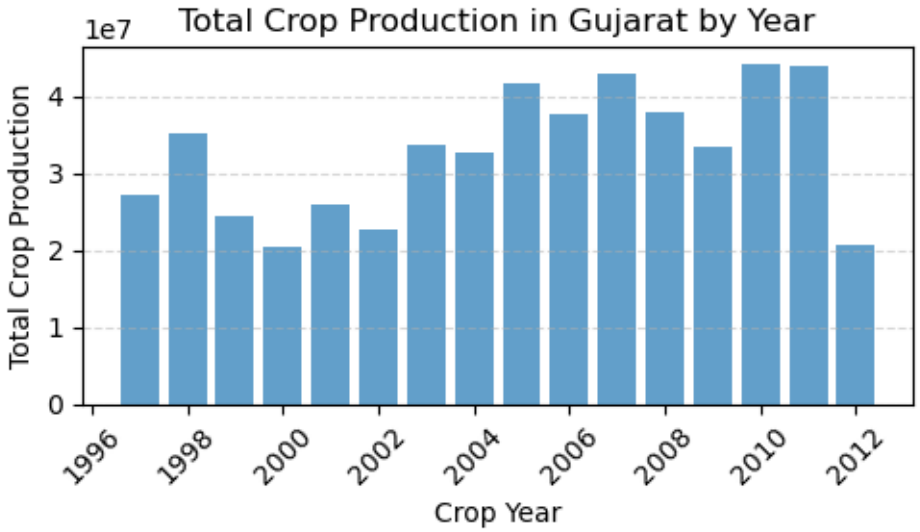

Total Crop Production in Bihar by Year
1e7
Total Crop Production
0
1
2
3
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

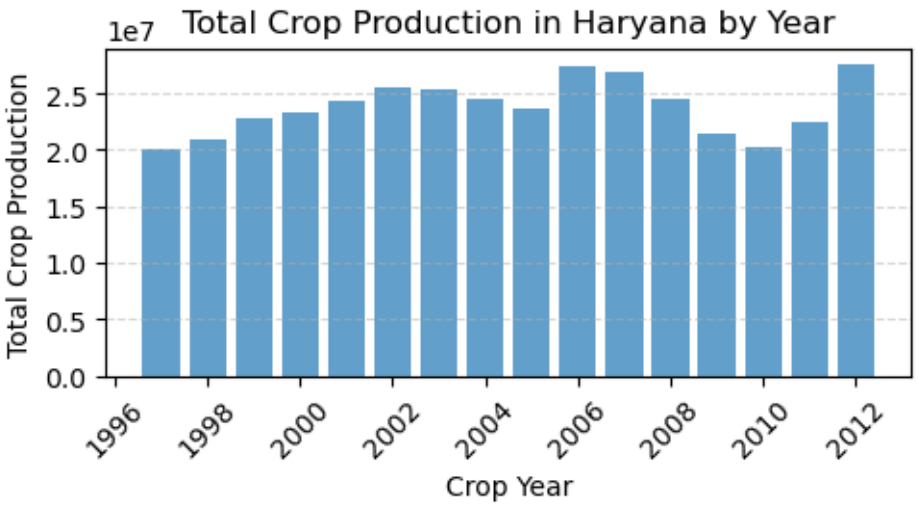

Total Crop Production in Chandigarh by Year
Total Crop Production
0
2000
4000
6000
8000
1998
2000
2002
2004
2006
2008
2010
Crop Year

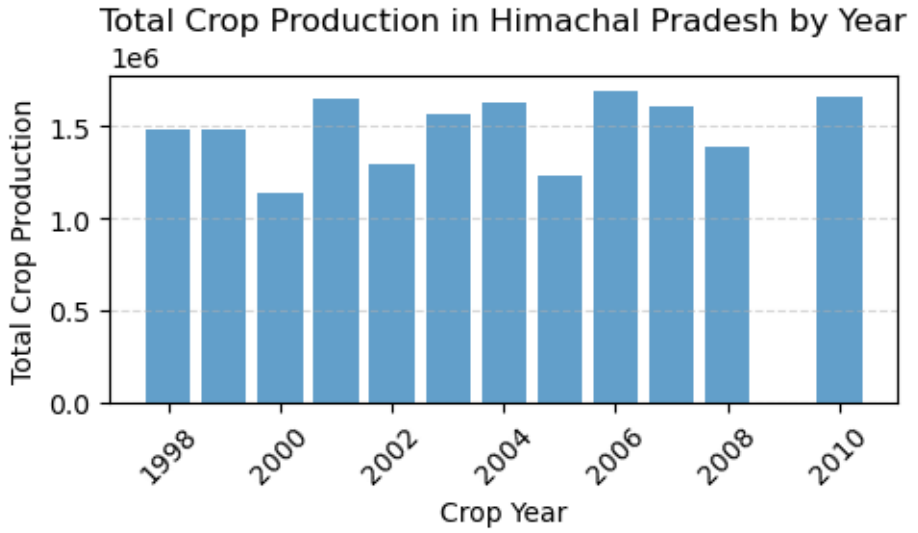

Total Crop Production in Chhattisgarh by Year
1e7
Total Crop Production
1.0
0.8
0.6
0.4
0.2
0.0
2000
2002
2004
2006
2008
2010
2012
2014
Crop Year

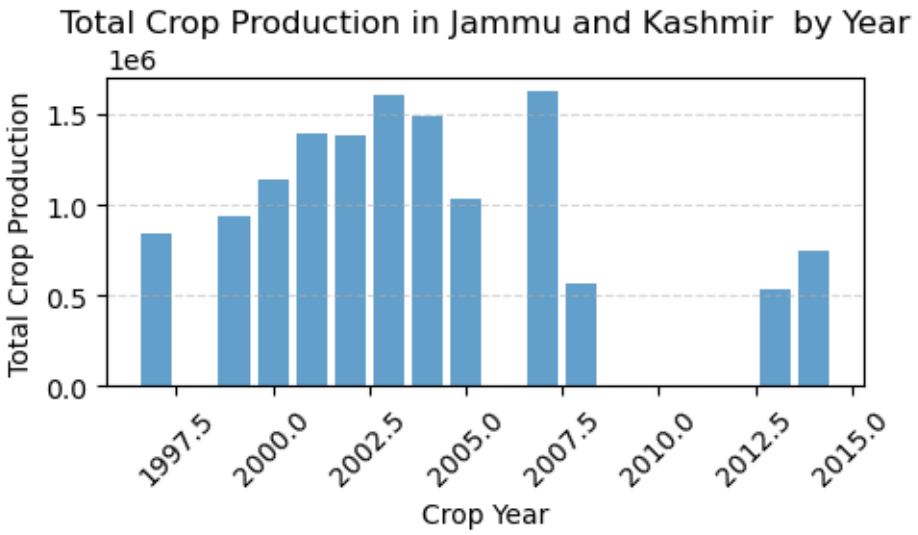

Total Crop Production in Dadra and Nagar Haveli by Year
Total Crop Production
200000
150000
100000
50000
0
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

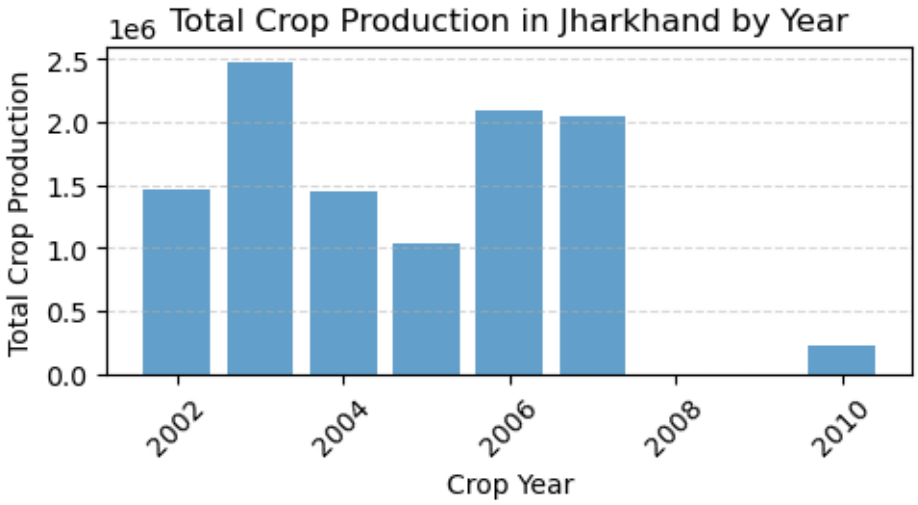

Total Crop Production in Goa by Year
1e8
Total Crop Production
1.25
1.00
0.75
0.50
0.25
0.00
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

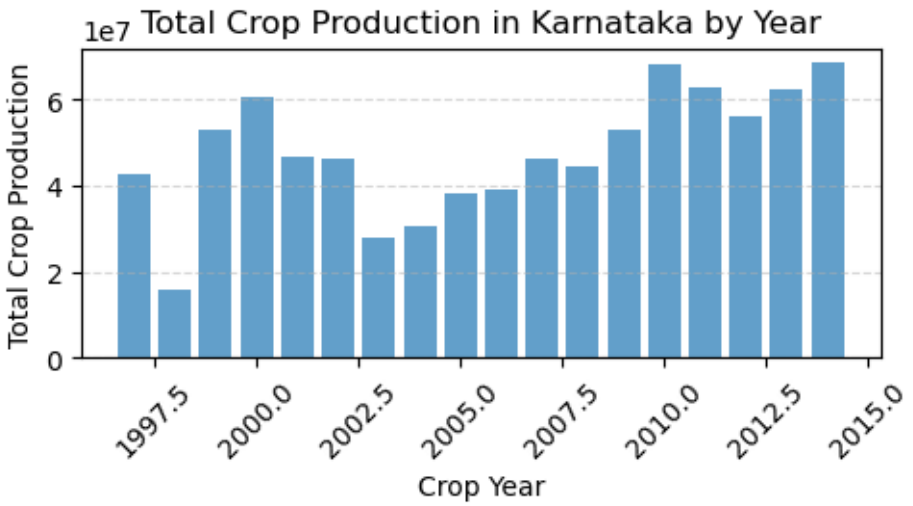

Total Crop Production in Gujarat by Year
1e7
Total Crop Production
4
3
2
1
0
1996
1998
2000
2002
2004
2006
2008
2010
2012
Crop Year

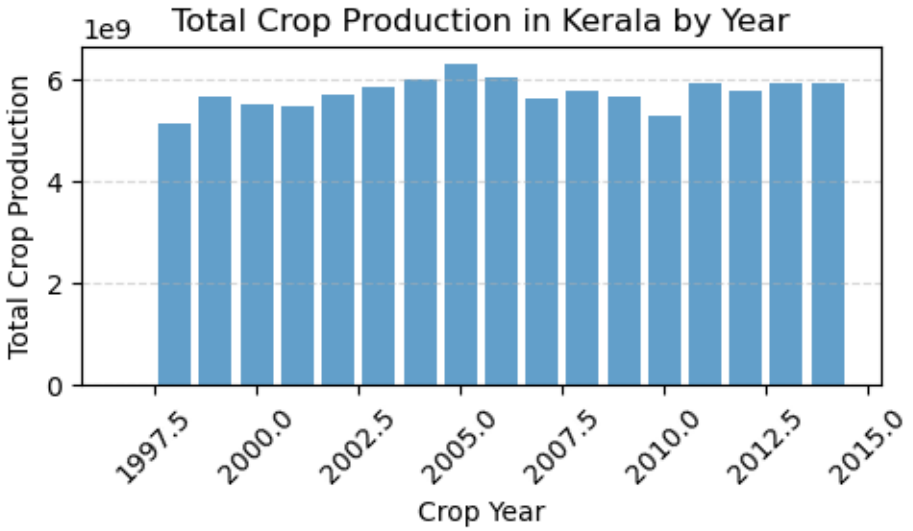

Total Crop Production in Haryana by Year
1e7
Total Crop Production
2.5
2.0
1.5
1.0
0.5
0.0
1996
1998
2000
2002
2004
2006
2008
2010
2012
Crop Year

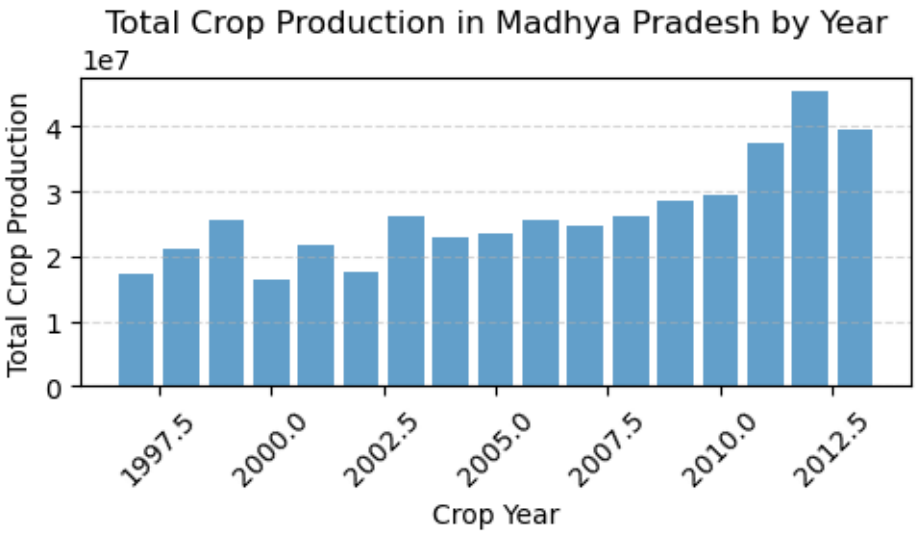

Total Crop Production in Himachal Pradesh by Year
1e6
Total Crop Production
1.5
1.0
0.5
0.0
1998
2000
2002
2004
2006
2008
2010
Crop Year

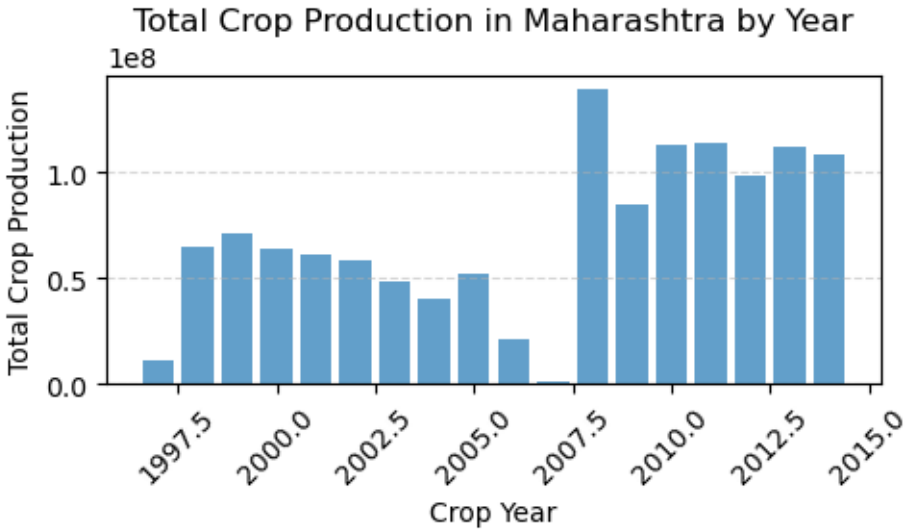

Total Crop Production in Jammu and Kashmir by Year
1e6
Total Crop Production
0.0
0.5
1.0
1.5
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

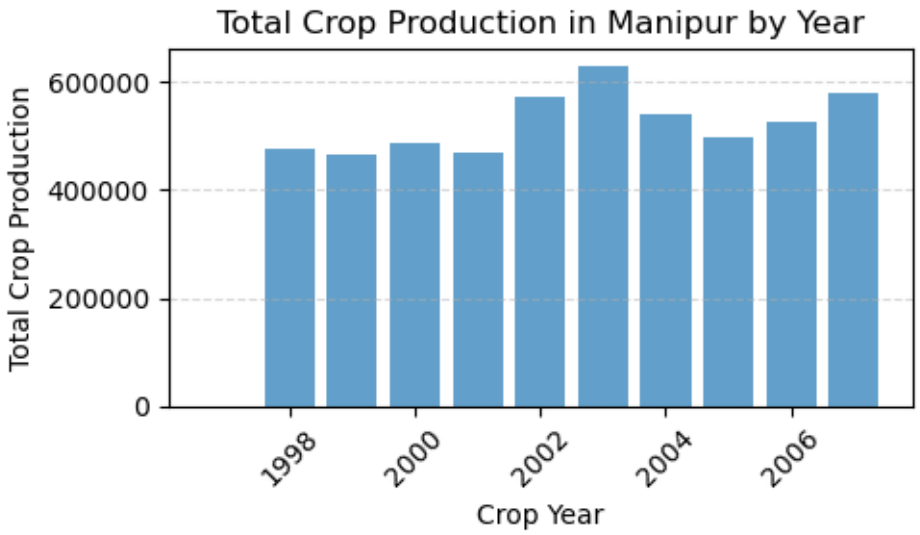

Total Crop Production in Jharkhand by Year
1e6
Total Crop Production
0.0
0.5
1.0
1.5
2.0
2.5
2002
2004
2006
2008
2010
Crop Year

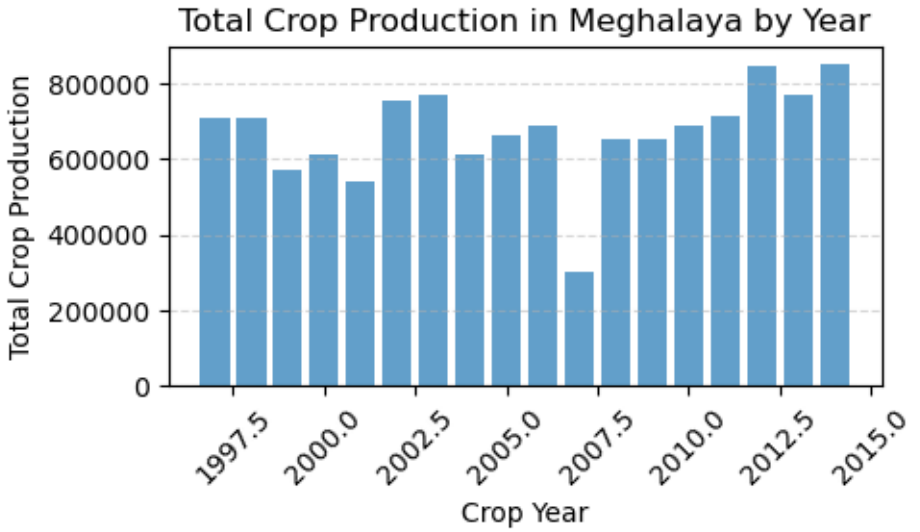

Total Crop Production in Karnataka by Year
1e7
Total Crop Production
0
2
4
6
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

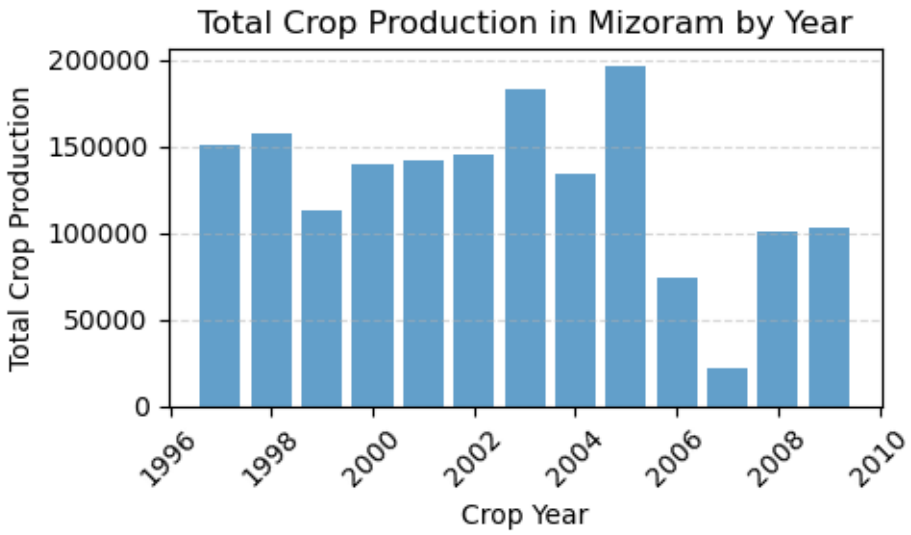

Total Crop Production in Kerala by Year
1e9
Total Crop Production
0
2
4
6
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

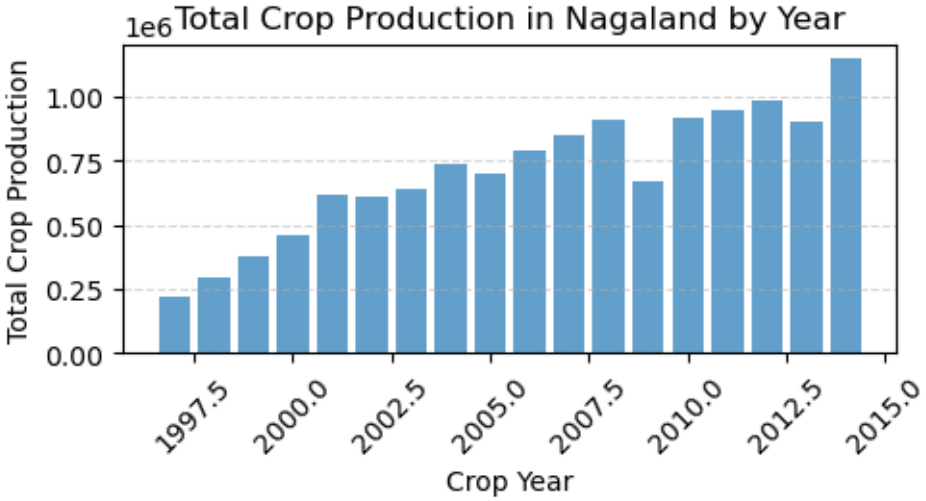

Total Crop Production in Madhya Pradesh by Year
1e7
Total Crop Production
0
1
2
3
4
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
Crop Year

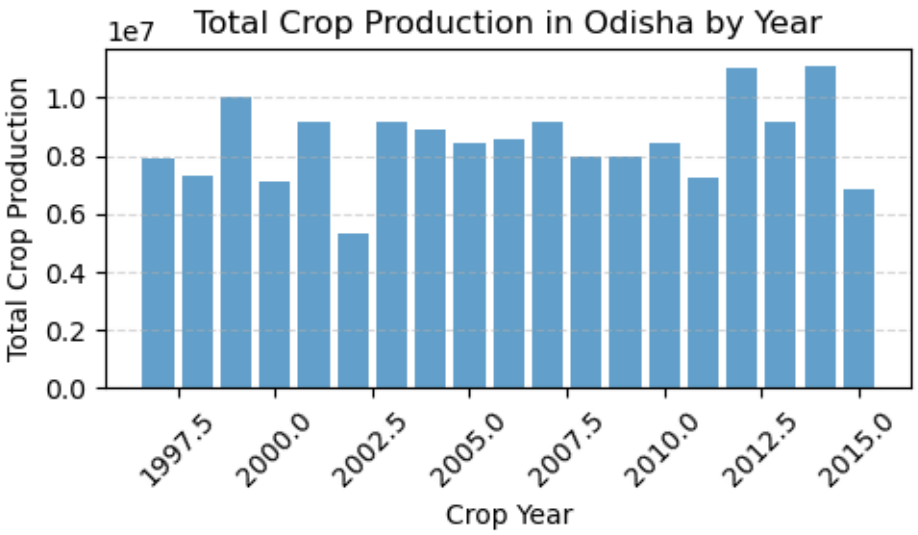

Total Crop Production in Maharashtra by Year
1e8
Total Crop Production
0.0
0.5
1.0
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

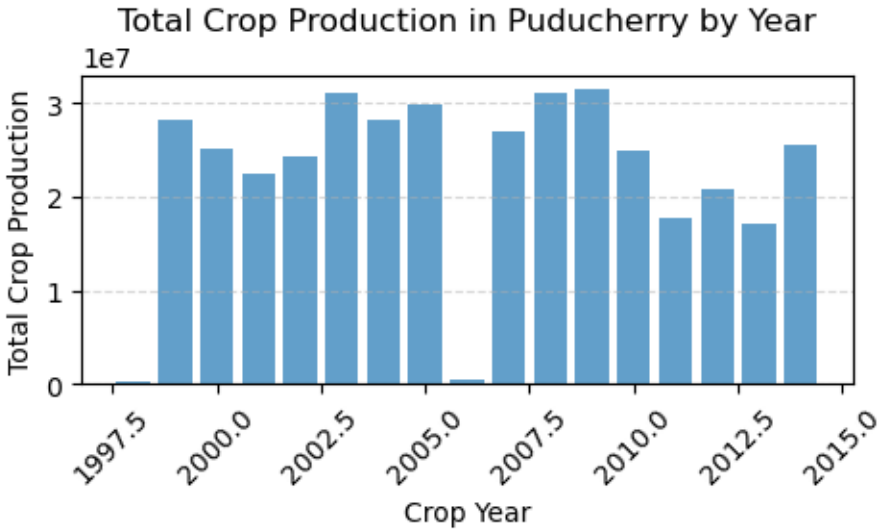

Total Crop Production in Manipur by Year
Total Crop Production
600000
400000
200000
0
1998
2000
2002
2004
2006
Crop Year

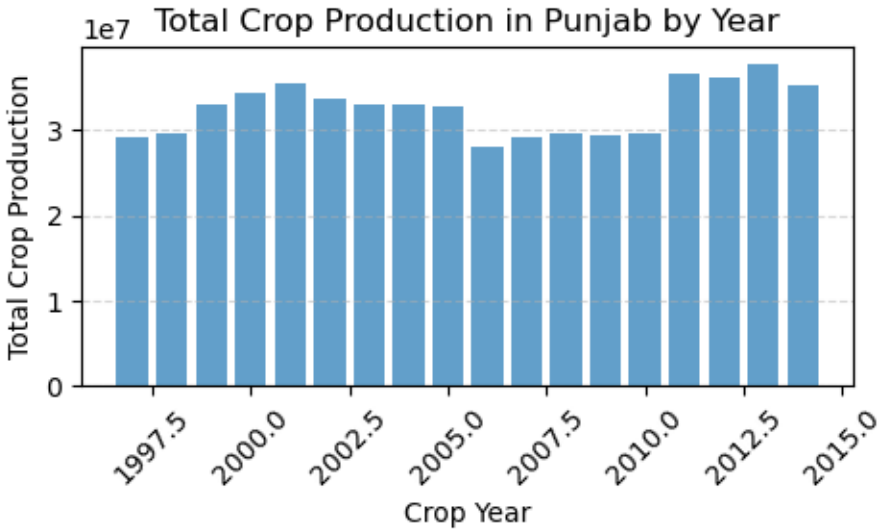

Total Crop Production in Meghalaya by Year
Total Crop Production
800000
600000
400000
200000
0
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

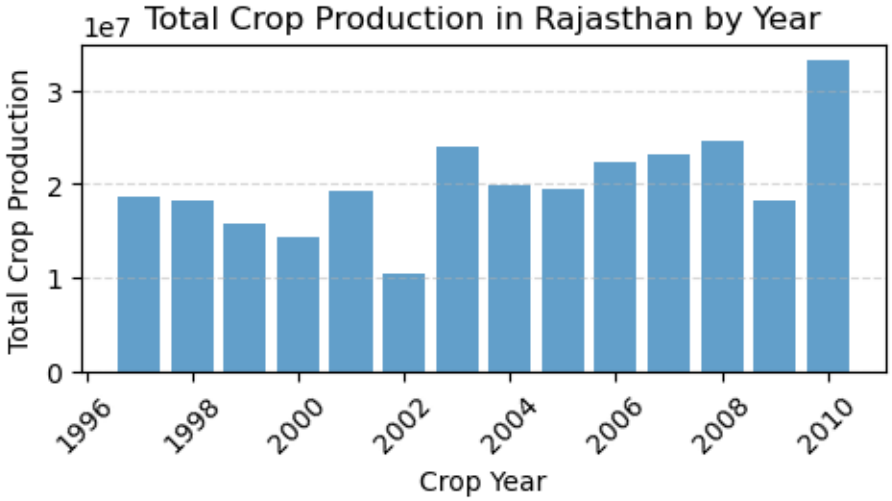

Total Crop Production in Mizoram by Year
Total Crop Production
200000
150000
100000
50000
0
1996
1998
2000
2002
2004
2006
2008
2010
Crop Year

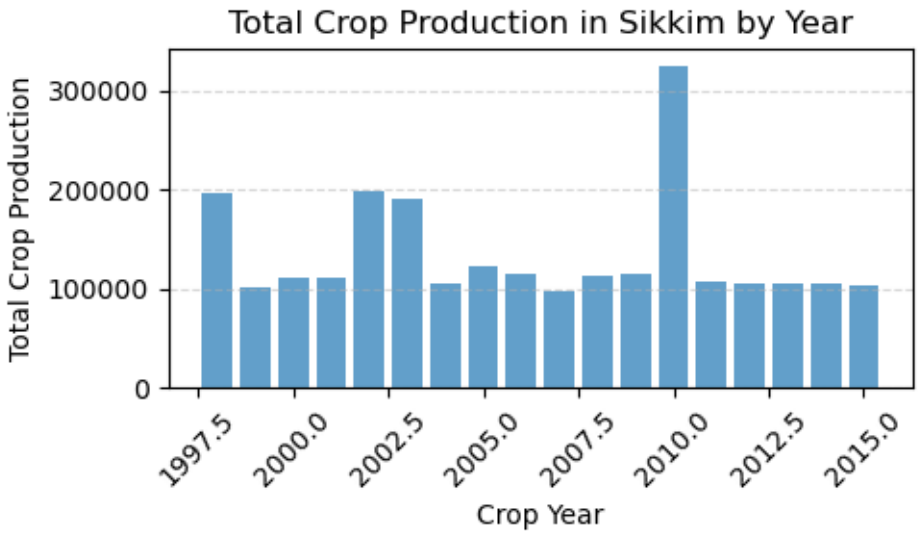

Total Crop Production in Nagaland by Year
1e6
Total Crop Production
1.00
0.75
0.50
0.25
0.00
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

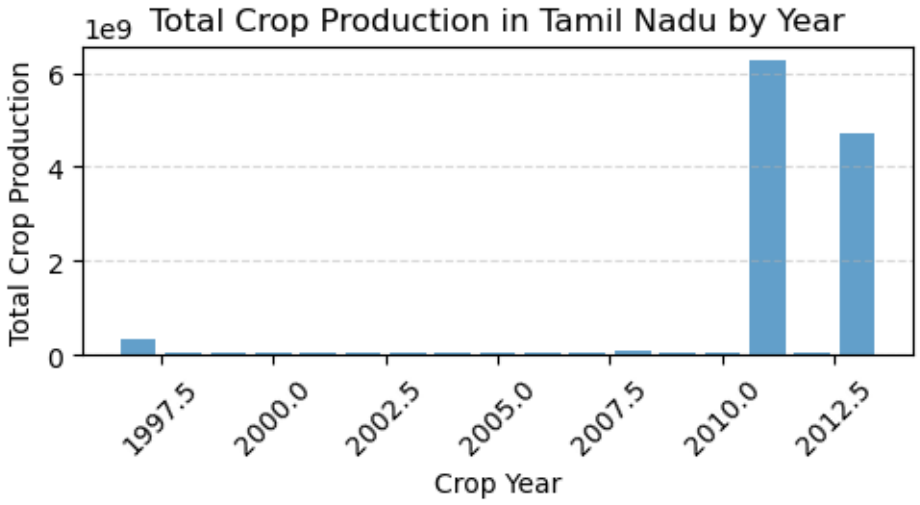

Total Crop Production in Odisha by Year
1e7
Total Crop Production
1.0
0.8
0.6
0.4
0.2
0.0
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

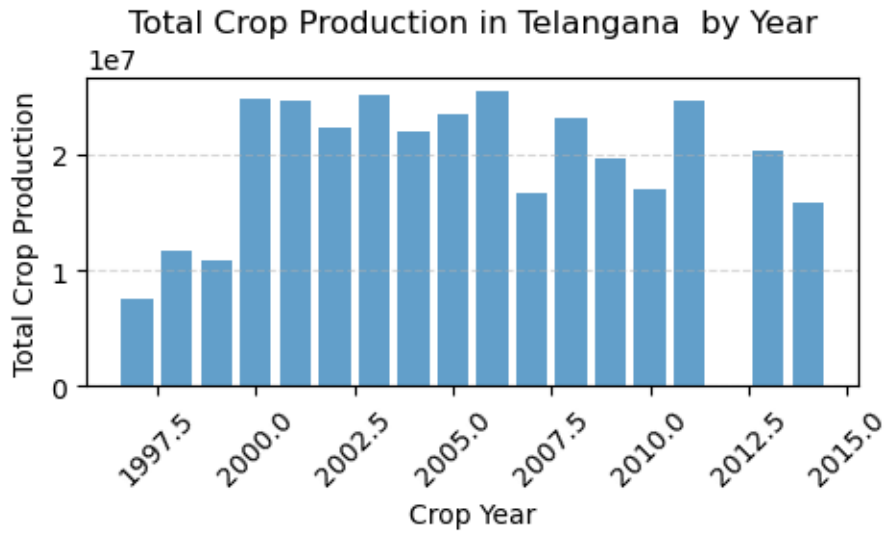

Total Crop Production in Puducherry by Year
1e7
Total Crop Production
3
2
1
0
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

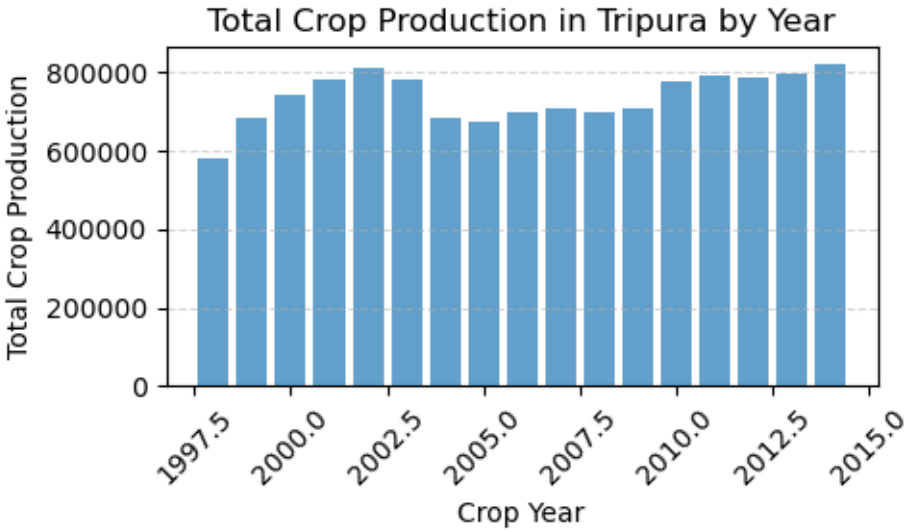

Total Crop Production in Punjab by Year
1e7
Total Crop Production
0
1
2
3
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

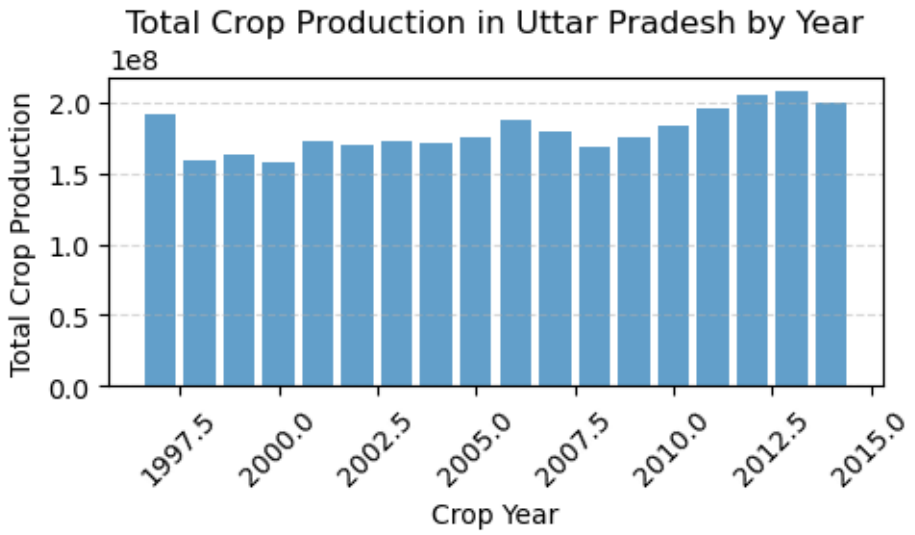

Total Crop Production in Rajasthan by Year
1e7
Total Crop Production
0
1
2
3
1996
1998
2000
2002
2004
2006
2008
2010
Crop Year

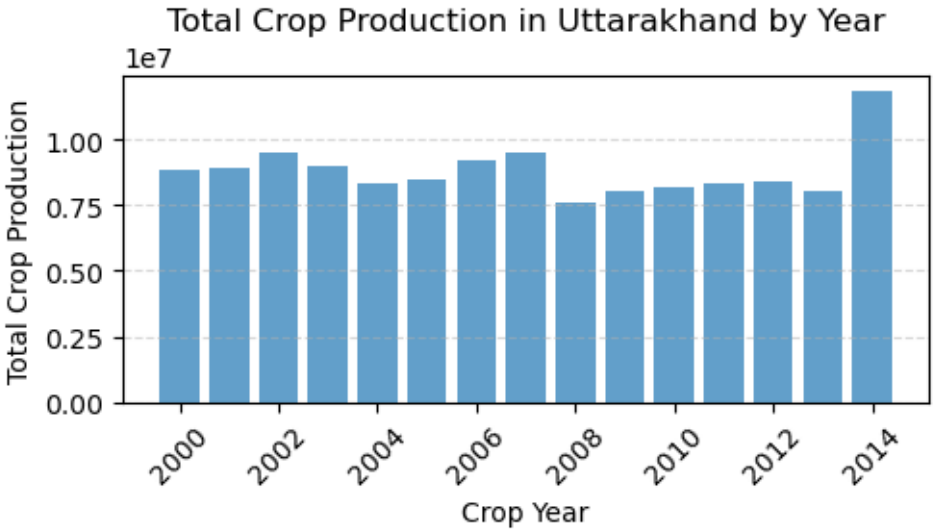

Total Crop Production in Sikkim by Year
Total Crop Production
300000
200000
100000
0
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

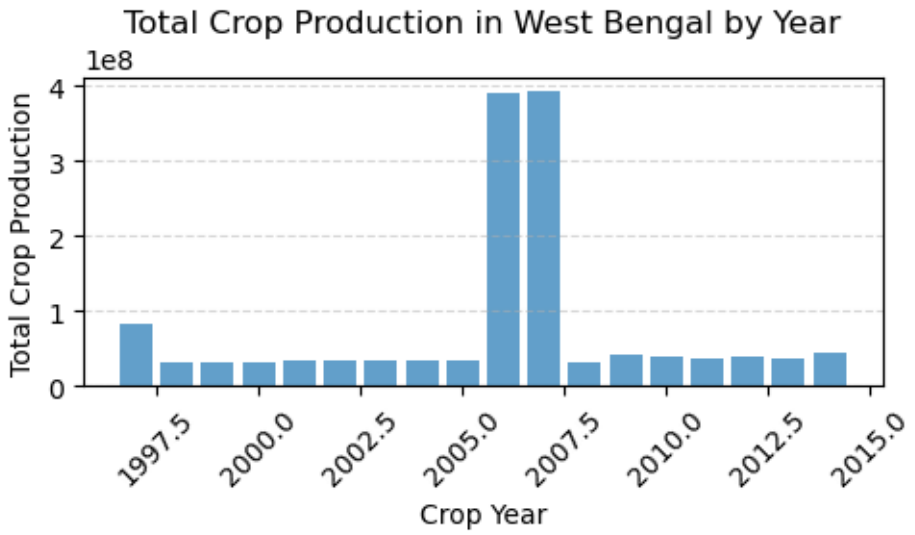

1e9
Total Crop Production in Tamil Nadu by Year
Total Crop Production
6
4
2
0
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
Crop Year


Total Crop Production in Telangana by Year
1e7
Total Crop Production
0
1
2
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

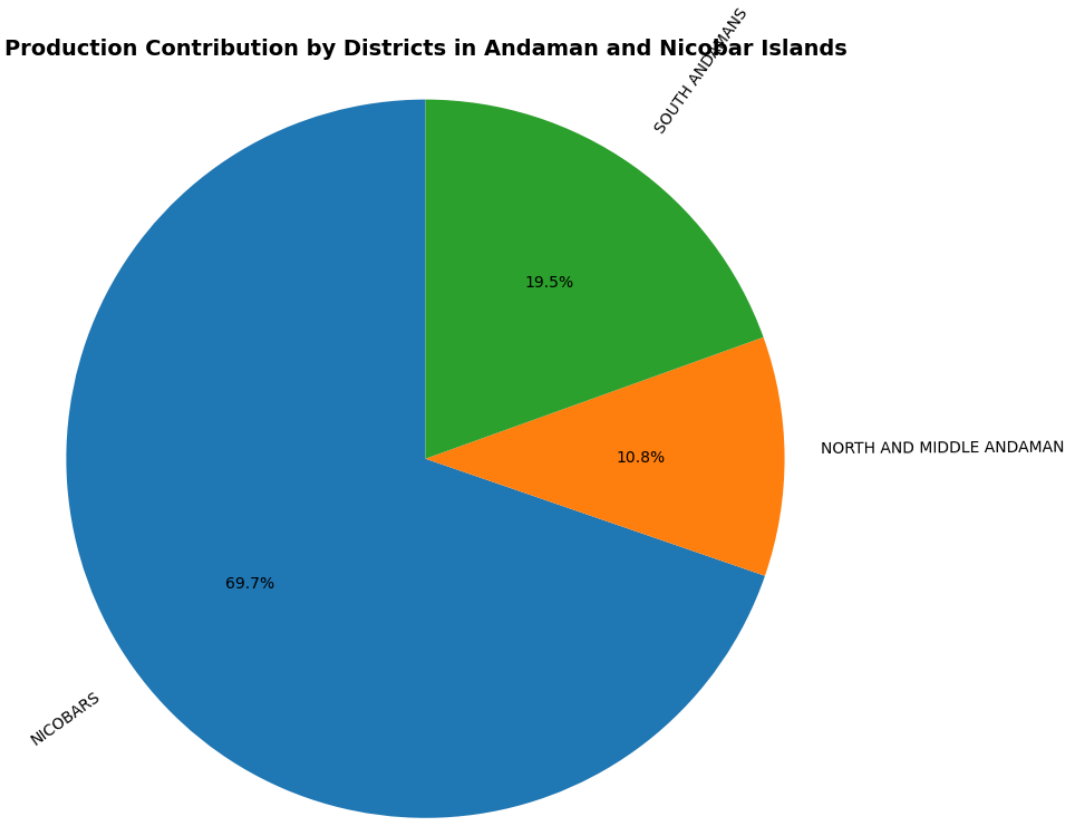

Total Crop Production in Tripura by Year
Total Crop Production
0
200000
400000
600000
800000
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

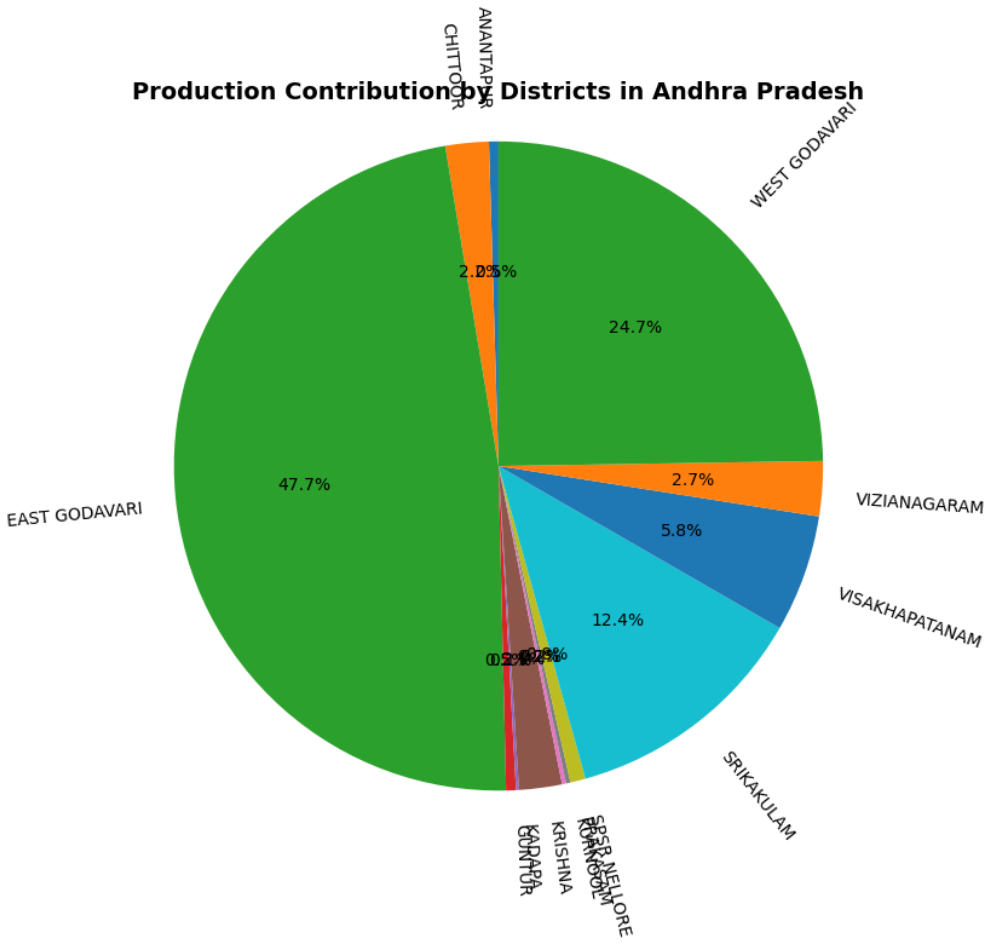

Total Crop Production in Uttar Pradesh by Year
1e8
Total Crop Production
2.0
1.5
1.0
0.5
0.0
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0
Crop Year

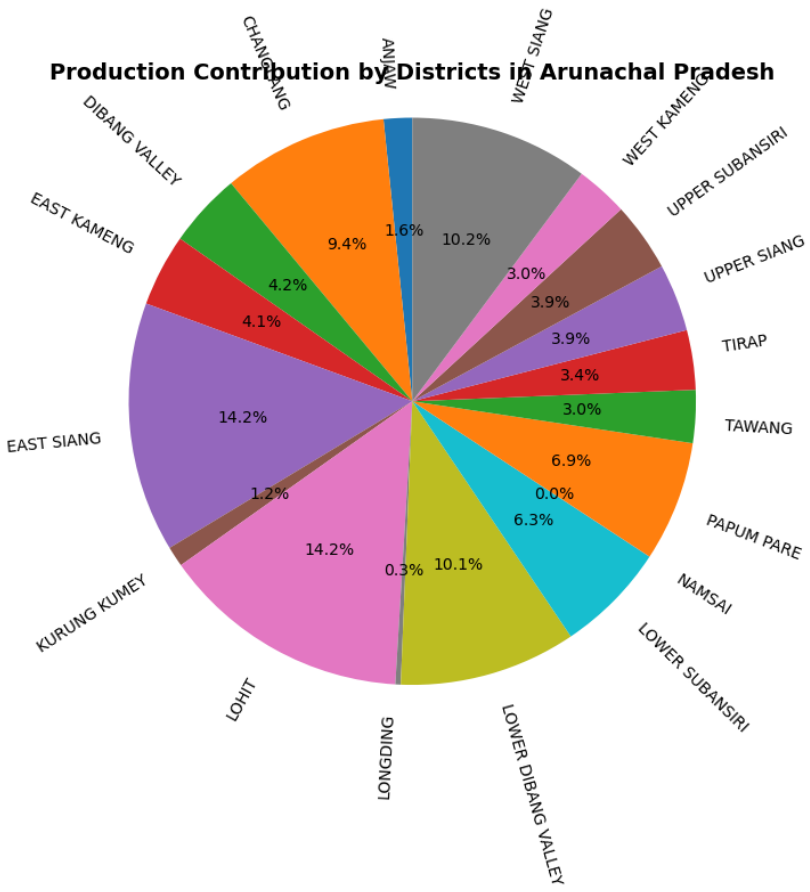

Total Crop Production in Uttarakhand by Year
1e7
Total Crop Production
1.00
0.75
0.50
0.25
0.00
2000
2002
2004
2006
2008
2010
2012
2014
Crop Year

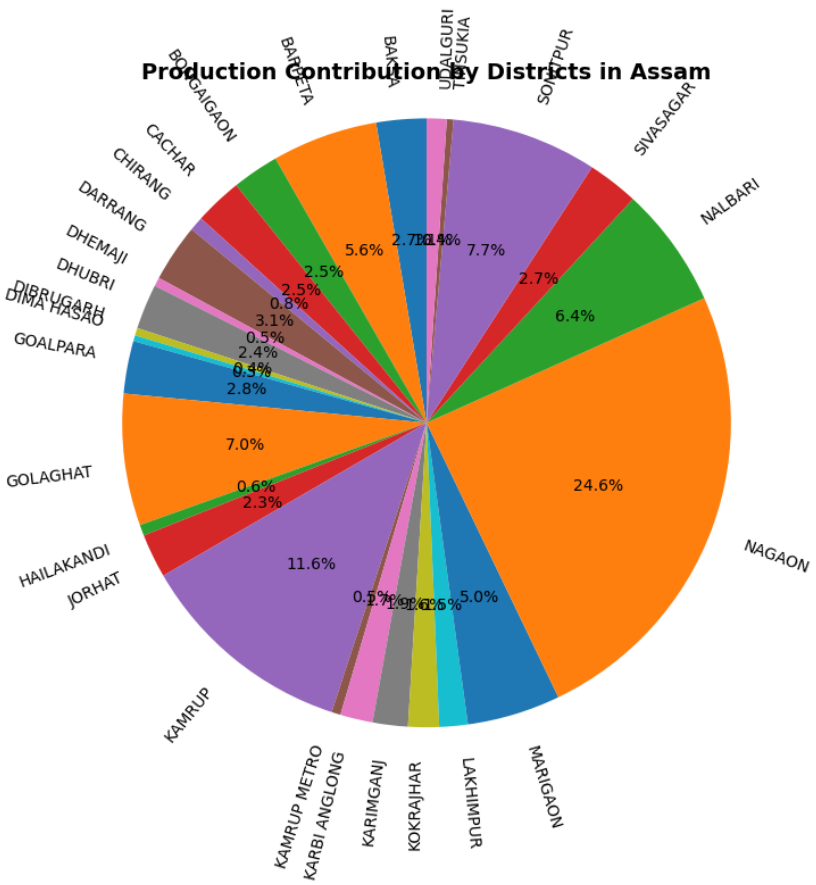


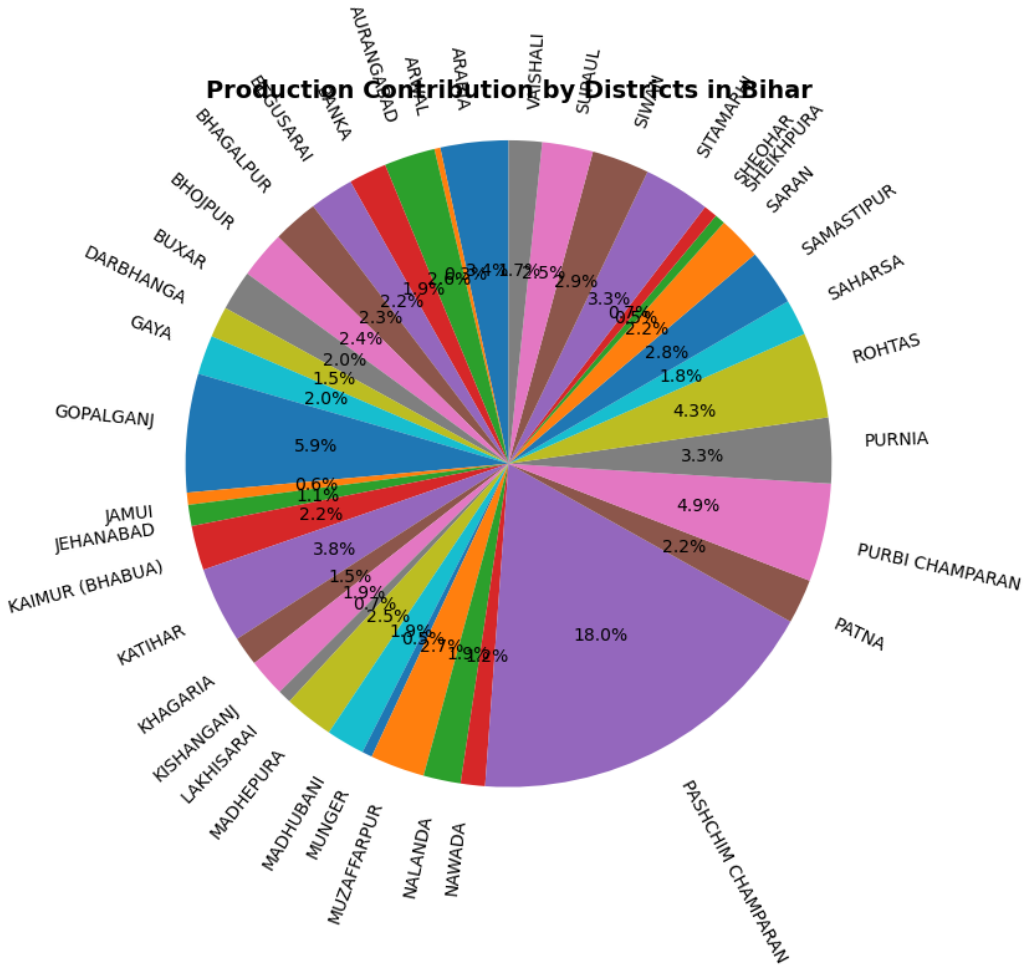
[17]:
```
import pandas as pd
import matplotlib.pyplot as plt

crop_data = pd.read_csv("Crop Production data.csv")
crop_data.columns = crop_data.columns.str.strip().str.lower()

state_district_production = crop_data.groupby(['state_name',␣
 ↪'district_name'])['production'].sum().reset_index()

unique_states = state_district_production['state_name'].unique()

for state_name in unique_states:
    state_data =␣
 ↪state_district_production[state_district_production['state_name'] ==␣
 ↪state_name]

    district_names = state_data['district_name']
    production_values = state_data['production']

    plt.figure(figsize=(10, 8))
    plt.pie(production_values, labels=district_names, autopct='%1.1f%%',␣
 ↪startangle=90, rotatelabels=True)

    plt.title(f'Production Contribution by Districts in {state_name}',␣
 ↪fontsize=14, fontweight='bold')
    plt.axis('equal')
    plt.tight_layout()
    plt.show()
```

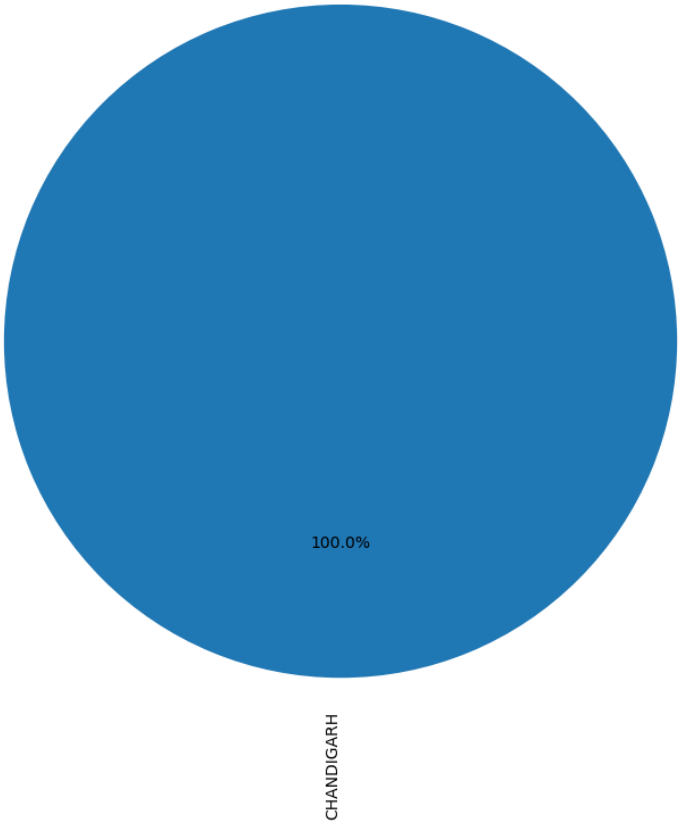

Production Contribution by Districts in Andaman and Nicobar Islands
SOUTH ANDAMANS
19.5%
NORTH AND MIDDLE ANDAMAN
10.8%
NICOBARS
69.7%

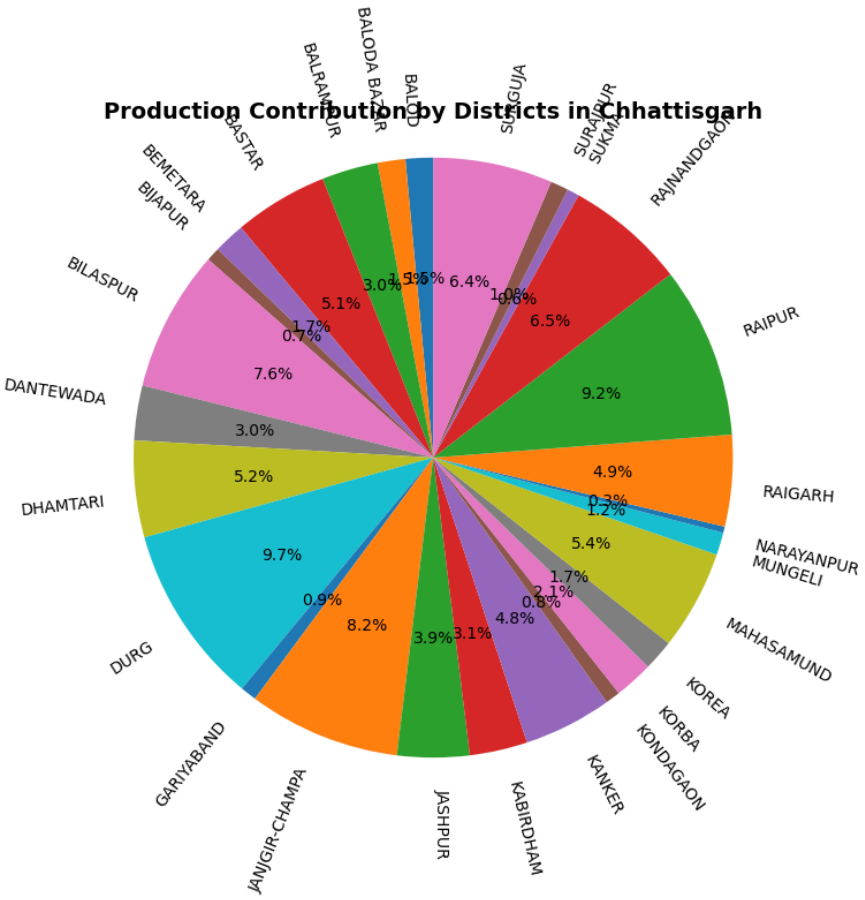

Production Contribution by Districts in Andhra Pradesh
ANANTAPUR
CHITTOOR
WEST GODAVARI
24.7%
2.7%
VIZIANAGARAM
5.8%
VISAKHAPATANAM
12.4%
SRIKAKULAM
47.7%
EAST GODAVARI
KRISHNA
GUNTUR

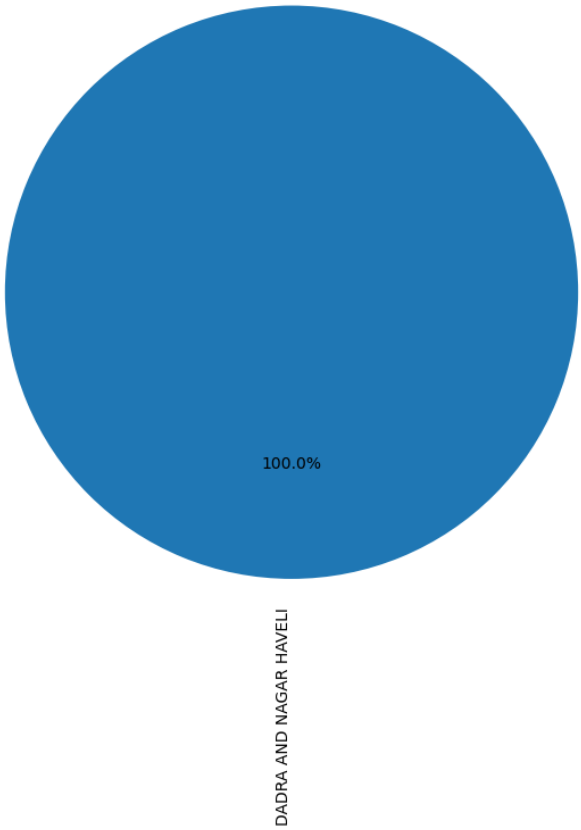

Production Contribution by Districts in Arunachal Pradesh
ANJAW
WEST SIANG
WEST KAMENG
UPPER SUBANSIRI
UPPER SIANG
TIRAP
TAWANG
PAPUM PARE
NAMSAI
LOWER SUBANSIRI
LOWER DIBANG VALLEY
LONGDING
LOHIT
KURUNG KUMEY
EAST SIANG
EAST KAMENG
DIBANG VALLEY
CHANGLANG
1.6%
10.2%
3.0%
3.9%
3.9%
3.4%
3.0%
6.9%
0.0%
6.3%
10.1%
0.3%
14.2%
1.2%
14.2%
4.1%
4.2%
9.4%

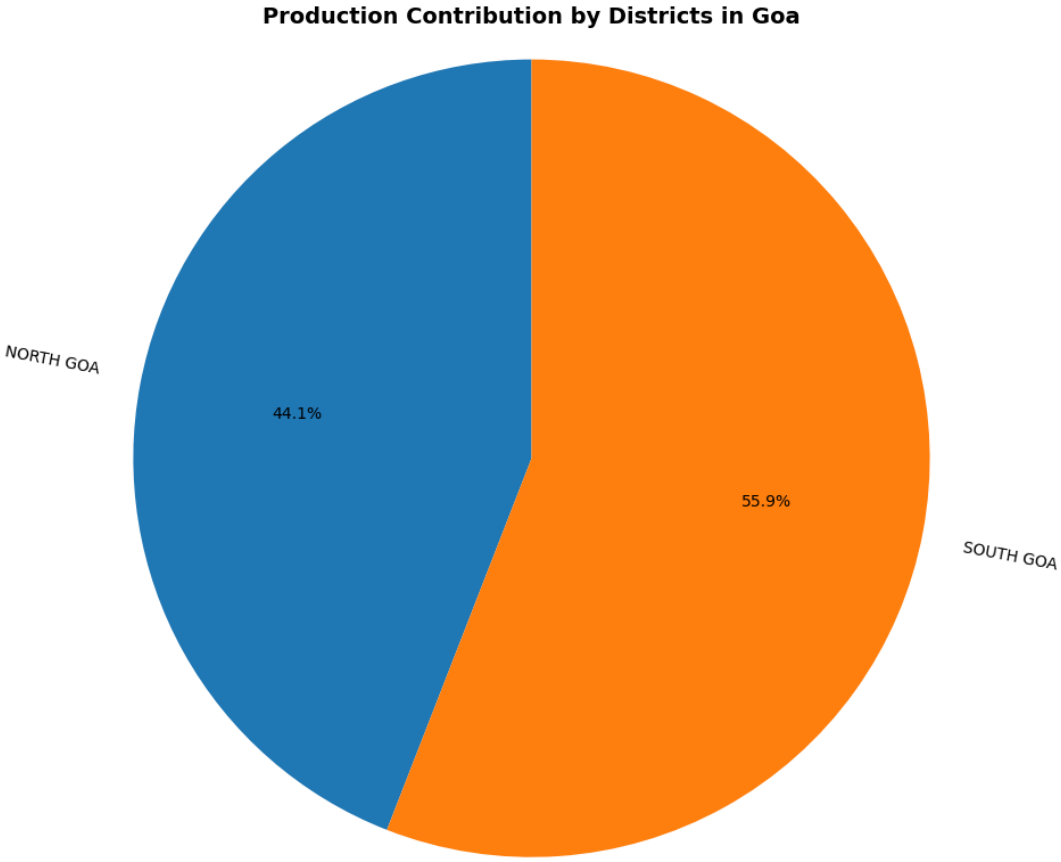

Production Contribution by Districts in Assam
BAKSA
BARPETA
BONGAIGAON
CACHAR
CHIRANG
DARRANG
DHEMAJI
DHUBRI
DIBRUGARH
DIMA HASAO
GOALPARA
GOLAGHAT
HAILAKANDI
JORHAT
KAMRUP
KAMRUP METRO
KARBI ANGLONG
KARIMGANJ
KOKRAJHAR
LAKHIMPUR
MARIGAON
NAGAON
NALBARI
SIVASAGAR
SONITPUR
TINSUKIA
UDALGURI
5.6%
2.5%
2.5%
0.8%
3.1%
0.5%
2.4%
2.8%
7.0%
0.6%
2.3%
11.6%
5.0%
24.6%
6.4%
2.7%
7.7%

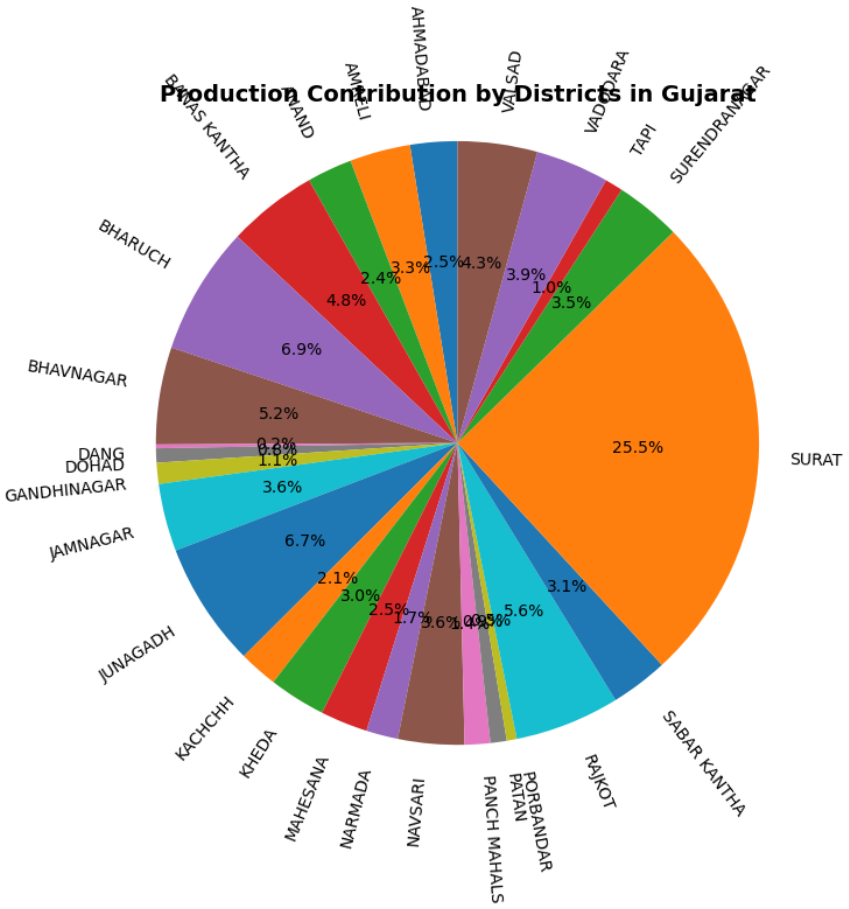

Production Contribution by Districts in Bihar
VAISHALI
SIWAN
SITAMARHI
SHEOHAR
SHEIKHPURA
SARAN
SAMASTIPUR
SAHARSA
ROHTAS
PURNIA
PURBI CHAMPARAN
PATNA
PASHCHIM CHAMPARAN
NAWADA
NALANDA
MUZAFFARPUR
MUNGER
MADHUBANI
MADHEPURA
LAKHISARAI
KISHANGANJ
KHAGARIA
KATIHAR
KAIMUR (BHABUA)
JEHANABAD
JAMUI
GOPALGANJ
GAYA
DARBHANGA
BUXAR
BHOJPUR
BHAGALPUR
BEGUSARAI
BANKA
AURANGABAD
ARWAL
ARARIA
1.7%
2.5%
2.9%
3.3%
2.2%
2.8%
1.8%
4.3%
3.3%
4.9%
2.2%
18.0%
1.2%
1.9%
2.7%
0.2%
1.9%
2.5%
0.7%
1.9%
1.5%
3.8%
2.2%
1.1%
0.6%
5.9%
2.0%
1.5%
2.0%
2.4%
2.3%
2.2%
1.9%

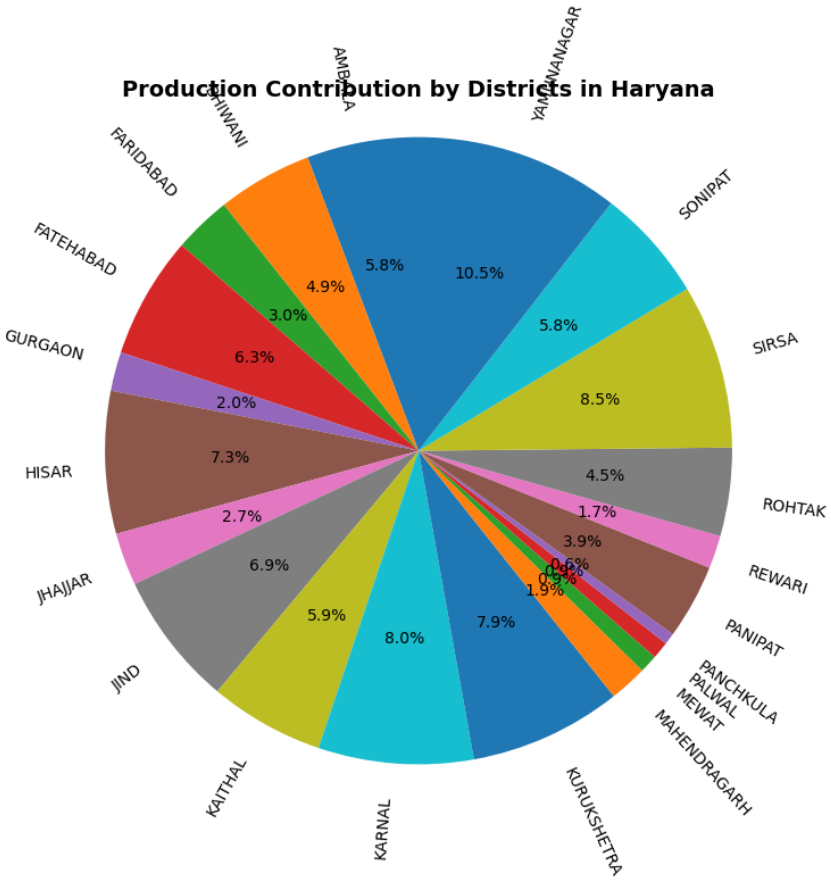

Production Contribution by Districts in Chandigarh
100.0%
CHANDIGARH

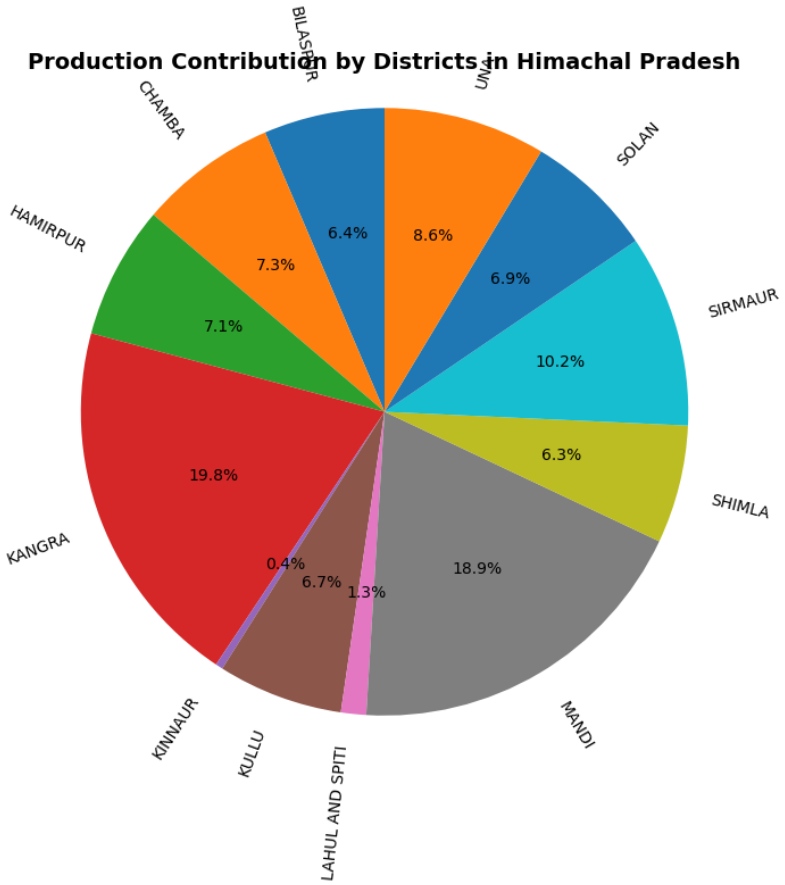

Production Contribution by Districts in Chhattisgarh
BALOD
BALODA BAZAR
BALRAMPUR
BASTAR
BEMETARA
BIJAPUR
BILASPUR
DANTEWADA
DHAMTARI
DURG
GARIYABAND
JANJGIR-CHAMPA
JASHPUR
KABIRDHAM
KANKER
KONDAGAON
KORBA
KOREA
MAHASAMUND
NARAYANPUR
MUNGELI
RAIGARH
RAIPUR
RAJNANDGAON
SUKMA
SURAJPUR
SURGUJA
6.4%
1.0%
0.6%
6.5%
9.2%
4.9%
0.3%
1.2%
5.4%
1.7%
2.1%
0.8%
4.8%
3.1%
3.9%
8.2%
0.9%
9.7%
5.2%
3.0%
7.6%
0.7%
1.7%
5.1%
3.0%
1.5%
1.5%

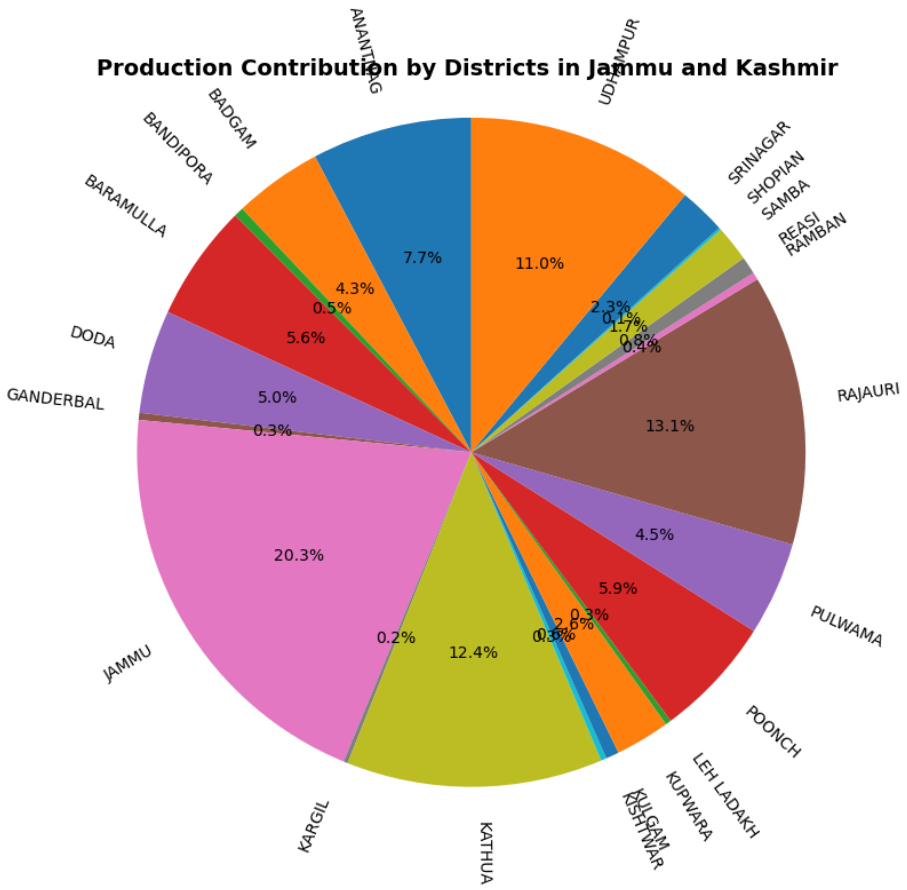

Production Contribution by Districts in Dadra and Nagar Haveli
100.0%
DADRA AND NAGAR HAVELI

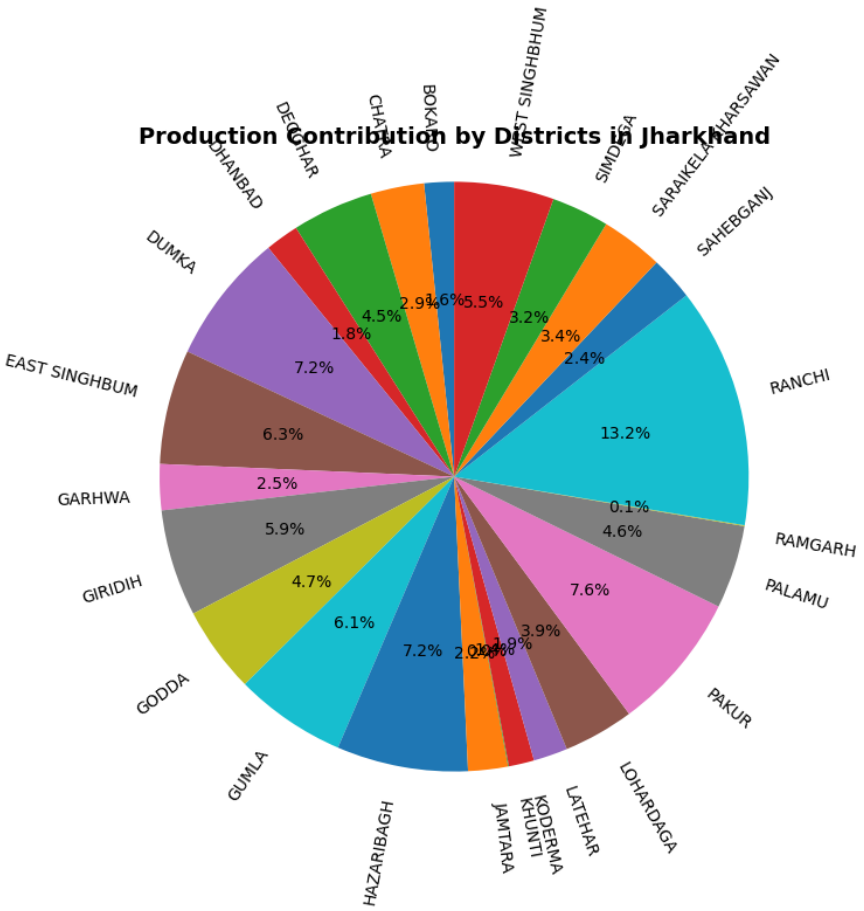

Production Contribution by Districts in Goa
NORTH GOA
44.1%
55.9%
SOUTH GOA

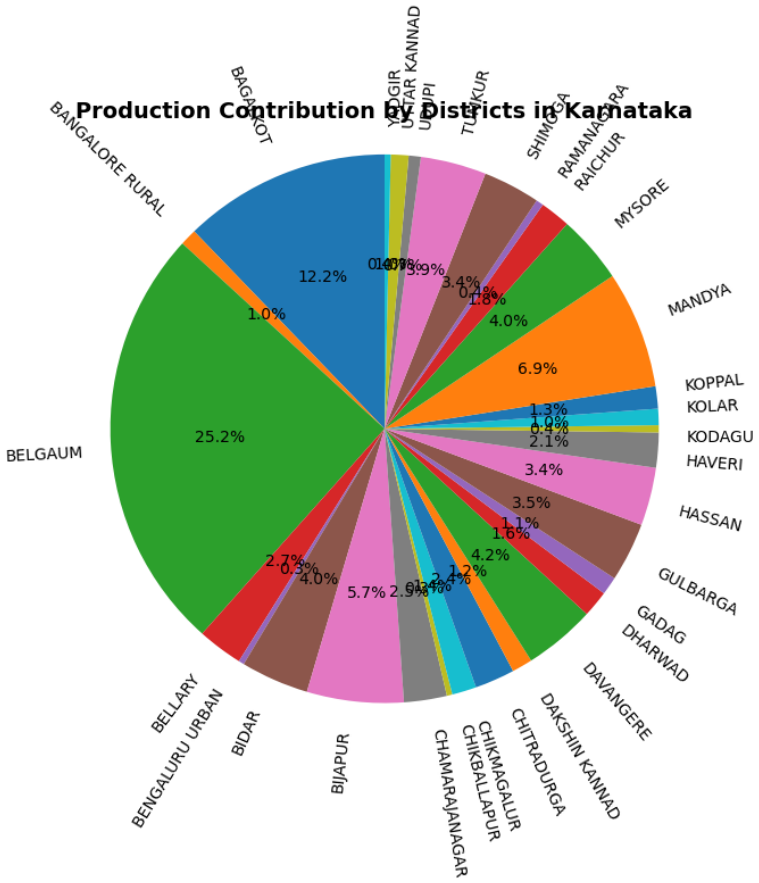

Production Contribution by Districts in Gujarat
AHMADABAD
VALSAD
VADODARA
TAPI
SURENDRANAGAR
BANAS KANTHA
ANAND
AMRELI
BHARUCH
BHAVNAGAR
DANG
DOHAD
GANDHINAGAR
JAMNAGAR
JUNAGADH
KACHCHH
KHEDA
MAHESANA
NARMADA
NAVSARI
PANCH MAHALS
PATAN
PORBANDAR
RAJKOT
SABAR KANTHA
SURAT
4.3%
3.9%
1.0%
3.5%
25.5%
3.1%
5.6%
3.6%
3.3%
2.5%
2.4%
4.8%
6.9%
5.2%
0.2%
0.8%
1.1%
3.6%
6.7%
2.1%
3.0%
2.5%
1.7%
3.6%
1.4%

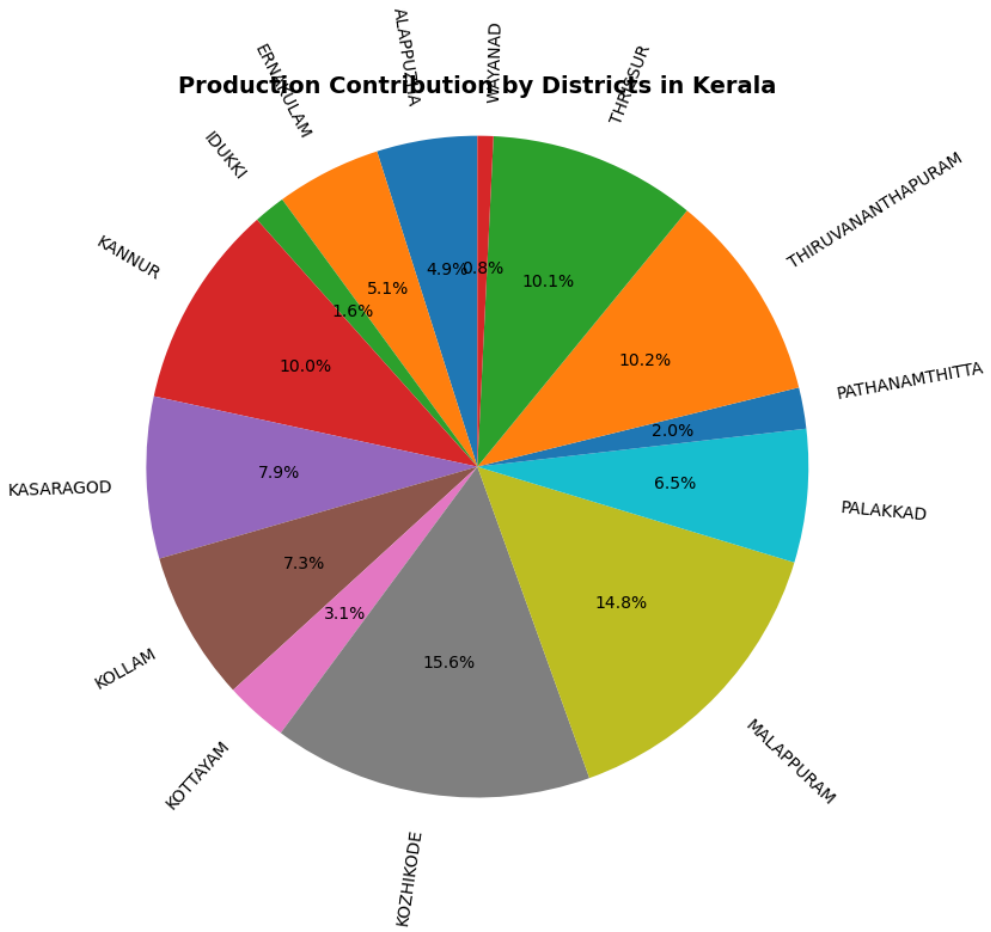

Production Contribution by Districts in Haryana
AMBALA
YAMUNANAGAR
SONIPAT
SIRSA
ROHTAK
REWARI
PANIPAT
PANCHKULA
PALWAL
MEWAT
MAHENDRAGARH
KURUKSHETRA
KARNAL
KAITHAL
JIND
JHAJJAR
HISAR
GURGAON
FATEHABAD
FARIDABAD
BHIWANI
10.5%
5.8%
8.5%
4.5%
1.7%
3.9%
0.6%
0.9%
0.9%
1.9%
7.9%
8.0%
5.9%
6.9%
2.7%
7.3%
2.0%
6.3%
3.0%
4.9%
5.8%

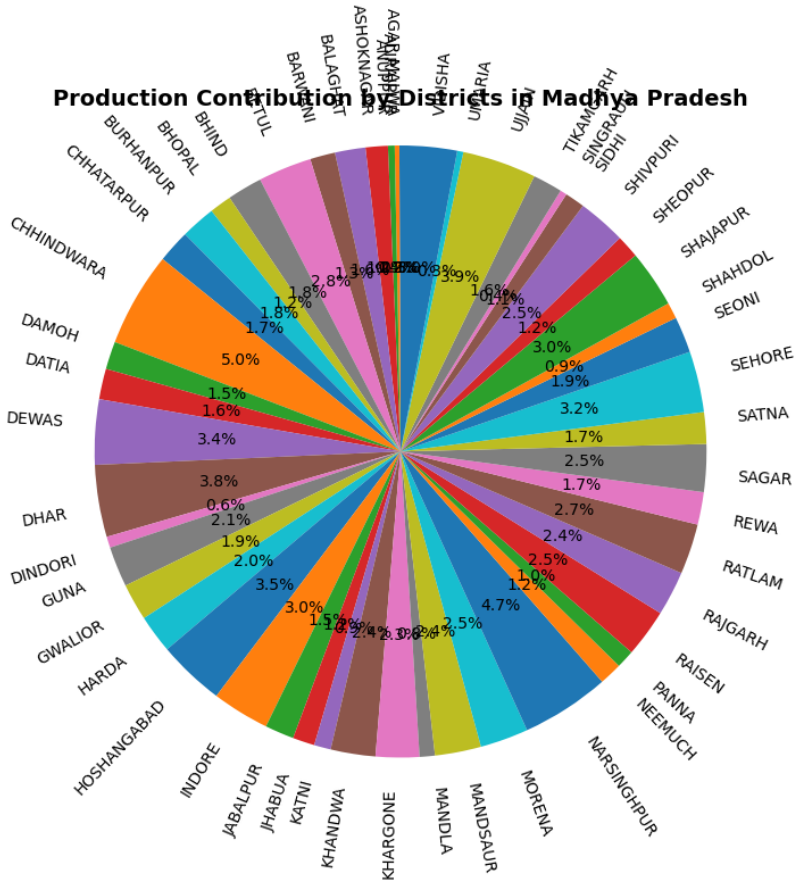

Production Contribution by Districts in Himachal Pradesh
BILASPUR
UNA
CHAMBA
SOLAN
HAMIRPUR
SIRMAUR
SHIMLA
KANGRA
MANDI
KINNAUR
KULLU
LAHUL AND SPITI
6.4%
8.6%
7.3%
6.9%
7.1%
10.2%
6.3%
19.8%
0.4%
6.7%
1.3%
18.9%

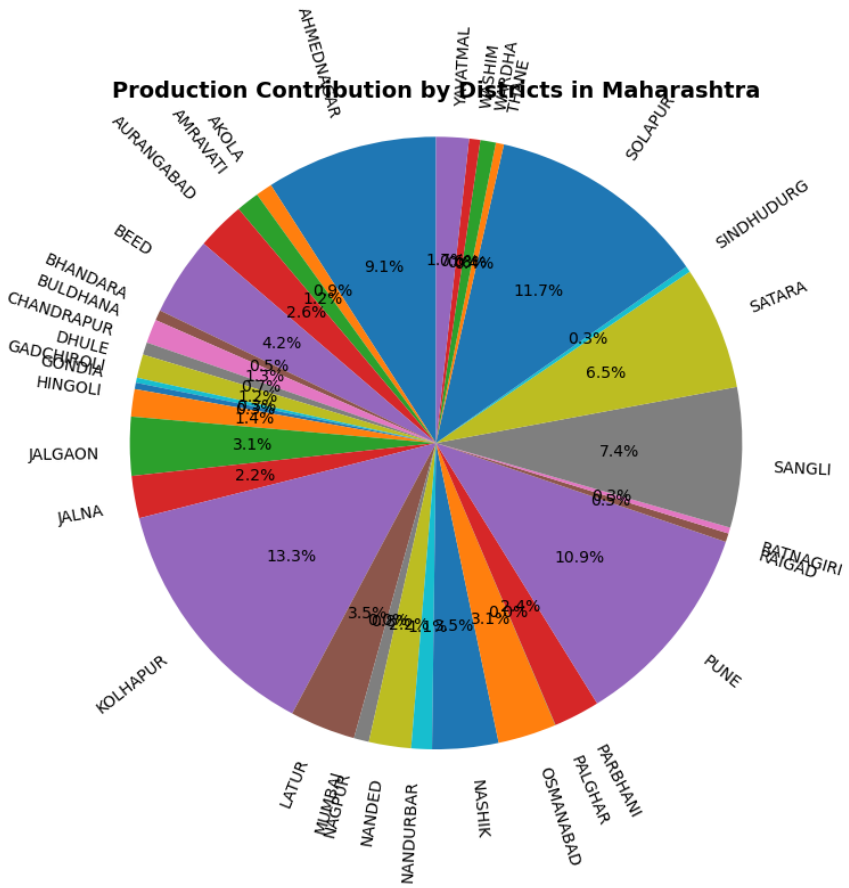

Production Contribution by Districts in Jammu and Kashmir
ANANTNAG
UDHAMPUR
SRINAGAR
SHOPIAN
SAMBA
REASI
RAMBAN
RAJAURI
PULWAMA
POONCH
LEH LADAKH
KUPWARA
KULGAM
KISHTWAR
KATHUA
KARGIL
JAMMU
GANDERBAL
DODA
BARAMULLA
BANDIPORA
BADGAM
7.7%
11.0%
2.3%
0.1%
1.7%
0.8%
0.4%
13.1%
4.5%
5.9%
0.3%
2.6%
12.4%
0.2%
20.3%
0.3%
5.0%
5.6%
0.5%
4.3%

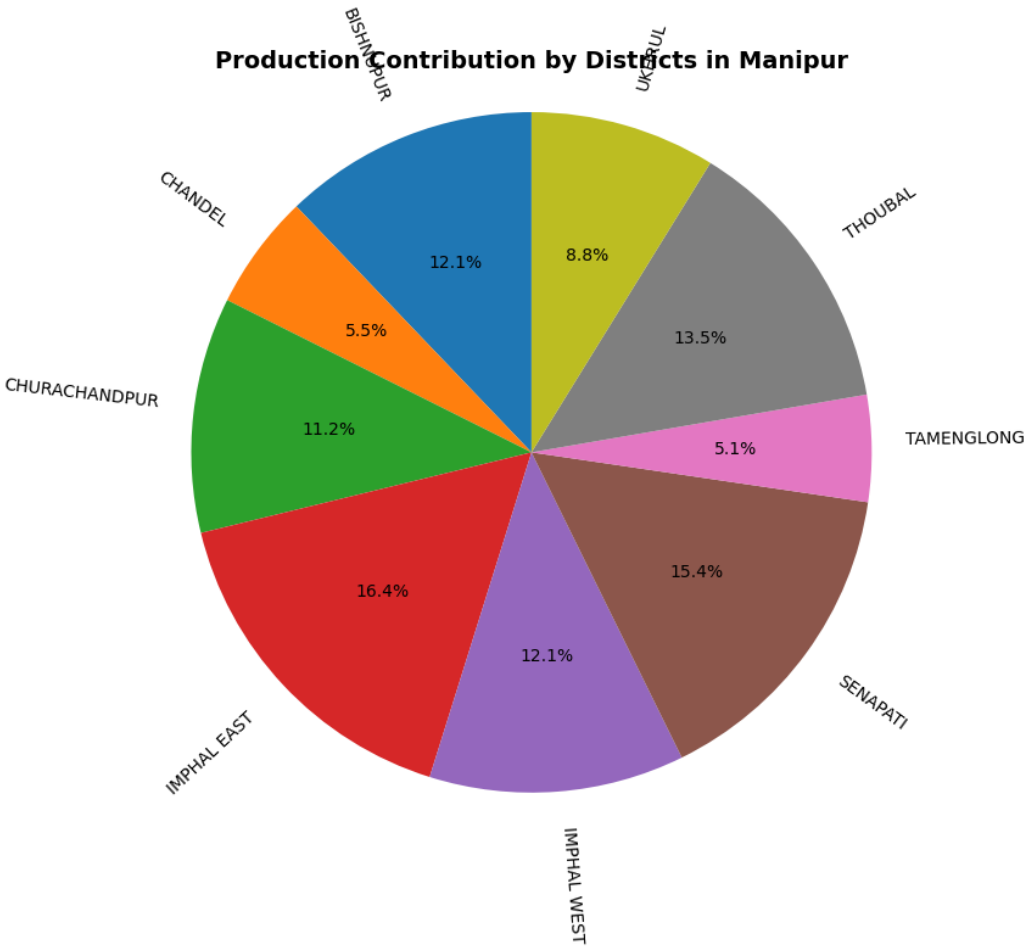

Production Contribution by Districts in Jharkhand
WEST SINGHBHUM
SIMDEGA
SARAIKELA KHARSAWAN
SAHEBGANJ
RANCHI
RAMGARH
PALAMU
PAKUR
LOHARDAGA
LATEHAR
KODERMA
KHUNTI
JAMTARA
HAZARIBAGH
GUMLA
GODDA
GIRIDIH
GARHWA
EAST SINGHBUM
DUMKA
DHANBAD
DEOGHAR
CHATRA
BOKARO
5.5%
3.2%
3.4%
2.4%
13.2%
0.1%
4.6%
7.6%
3.9%
7.2%
6.1%
4.7%
5.9%
2.5%
6.3%
7.2%
1.8%
4.5%
2.9%
1.6%

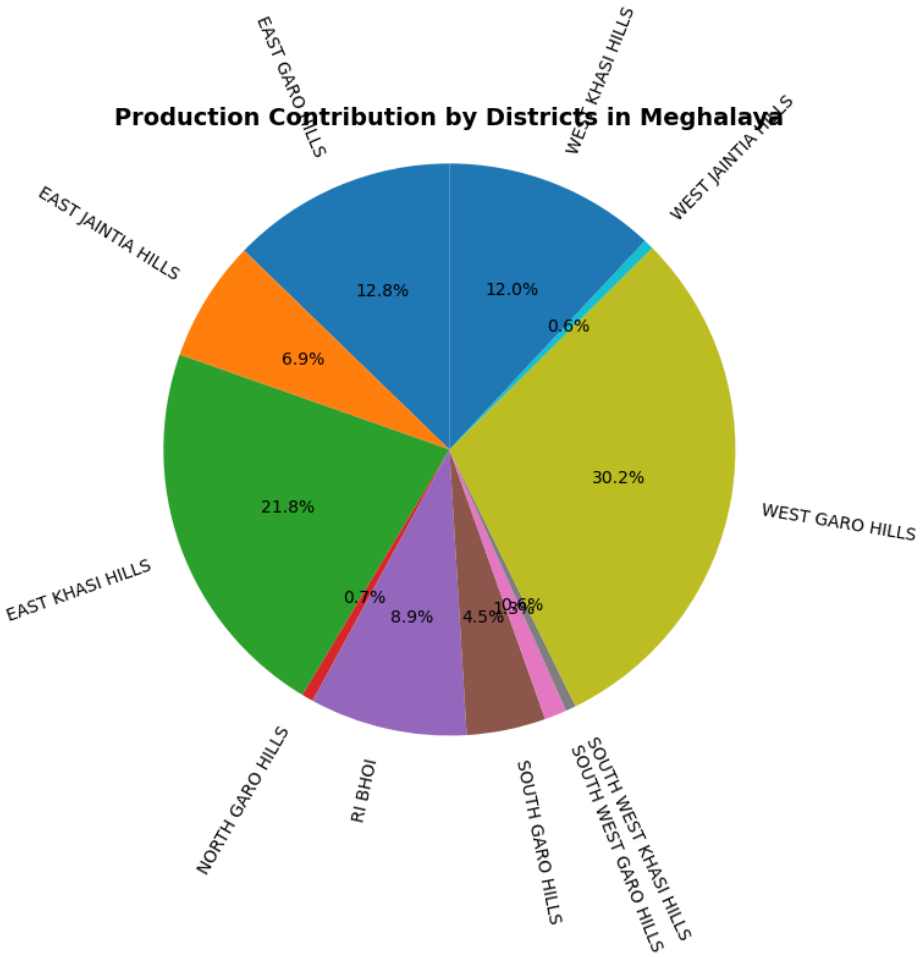

Production Contribution by Districts in Karnataka
BAGALKOT
BANGALORE RURAL
BELGAUM
BELLARY
BENGALURU URBAN
BIDAR
BIJAPUR
CHAMARAJANAGAR
CHIKBALLAPUR
CHIKMAGALUR
CHITRADURGA
DAKSHIN KANNAD
DAVANGERE
DHARWAD
GADAG
GULBARGA
HASSAN
HAVERI
KODAGU
KOLAR
KOPPAL
MANDYA
MYSORE
RAICHUR
RAMANAGARA
SHIMOGA
TUMKUR
UDUPI
UTTAR KANNAD
YADGIR
12.2%
1.0%
25.2%
2.7%
0.3%
4.0%
5.7%
2.9%
4.2%
3.4%
3.5%
1.1%
1.6%
2.1%
3.4%
6.9%
4.0%
1.8%
3.4%
3.9%

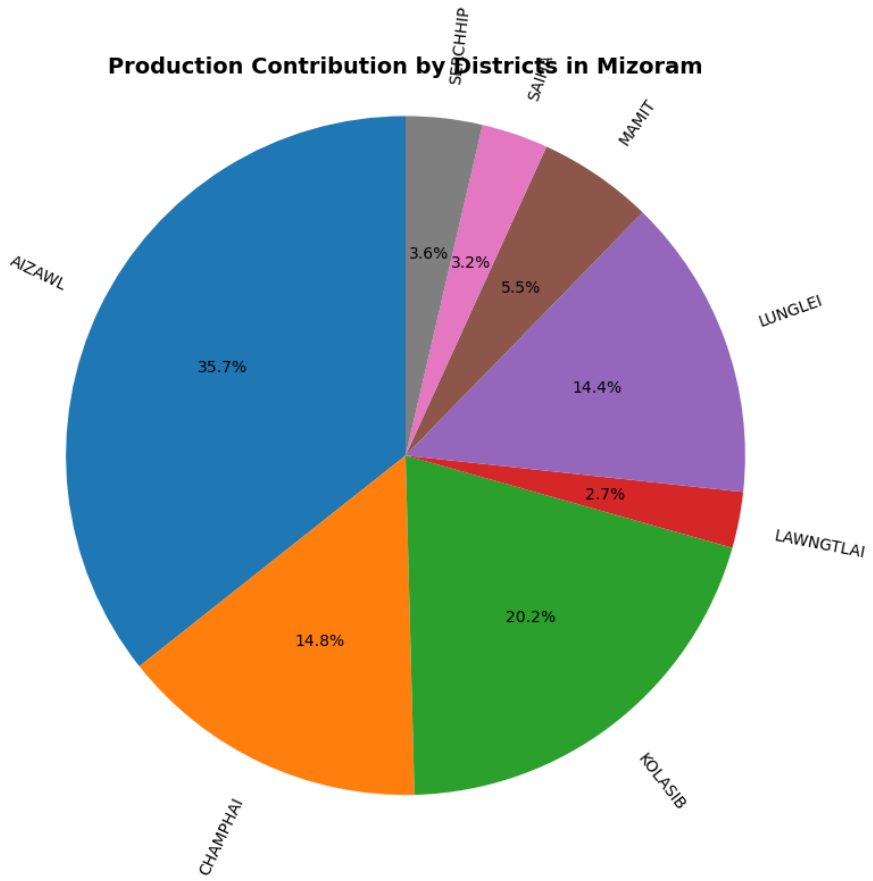

Production Contribution by Districts in Kerala
ALAPPUZHA
WAYANAD
THRISSUR
ERNAKULAM
IDUKKI
THIRUVANANTHAPURAM
KANNUR
PATHANAMTHITTA
KASARAGOD
PALAKKAD
KOLLAM
MALAPPURAM
KOTTAYAM
KOZHIKODE
4.9%
0.8%
10.1%
5.1%
1.6%
10.2%
10.0%
2.0%
7.9%
6.5%
7.3%
14.8%
3.1%
15.6%

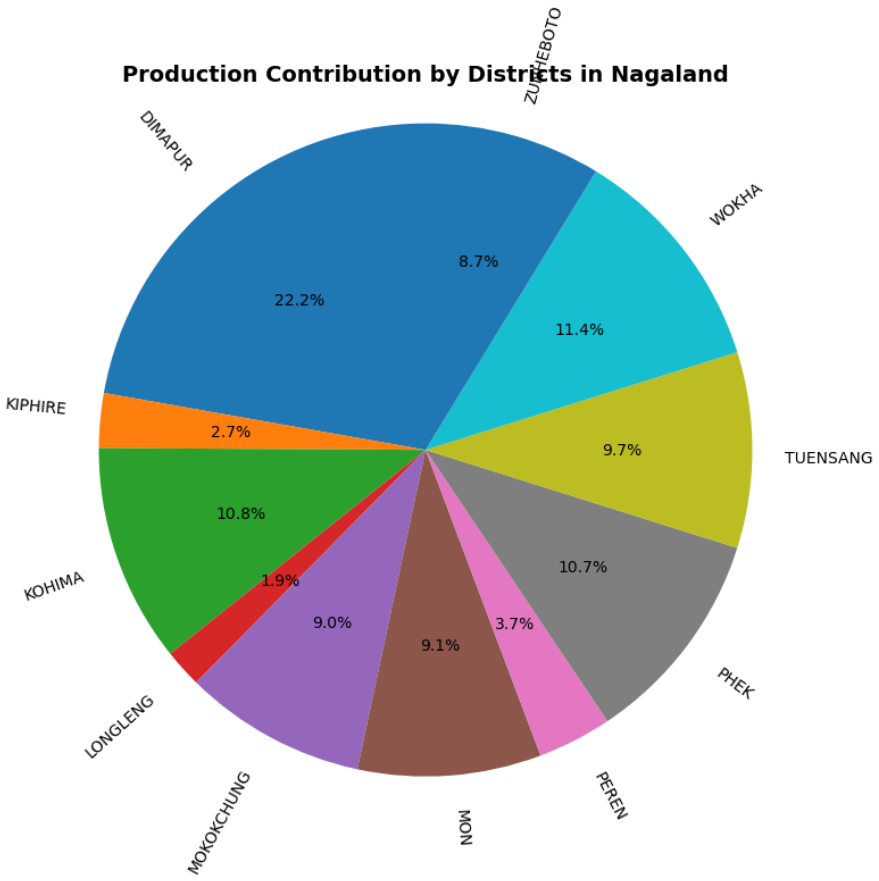

Production Contribution by Districts in Madhya Pradesh
VIDISHA
UMARIA
UJJAIN
TIKAMGARH
SINGRAULI
SIDHI
SHIVPURI
SHEOPUR
SHAJAPUR
SHAHDOL
SEONI
SEHORE
SATNA
SAGAR
REWA
RATLAM
RAJGARH
RAISEN
PANNA
NEEMUCH
NARSINGHPUR
MORENA
MANDSAUR
MANDLA
KHARGONE
KHANDWA
KATNI
JHABUA
JABALPUR
INDORE
HOSHANGABAD
HARDA
GWALIOR
GUNA
DINDORI
DHAR
DEWAS
DATIA
DAMOH
CHHINDWARA
CHHATARPUR
BURHANPUR
BHOPAL
BHIND
BETUL
BARWANI
BALAGHAT
ASHOKNAGAR
AGAR MALWA
ANUPPUR
3.9%
2.5%
1.2%
3.0%
0.9%
1.9%
3.2%
1.7%
2.5%
1.7%
2.7%
2.4%
2.5%
1.0%
1.2%
4.7%
2.5%
3.5%
3.0%
2.0%
1.9%
2.1%
0.6%
3.8%
3.4%
1.6%
1.5%
5.0%
1.7%
1.8%
1.2%
1.8%
2.8%

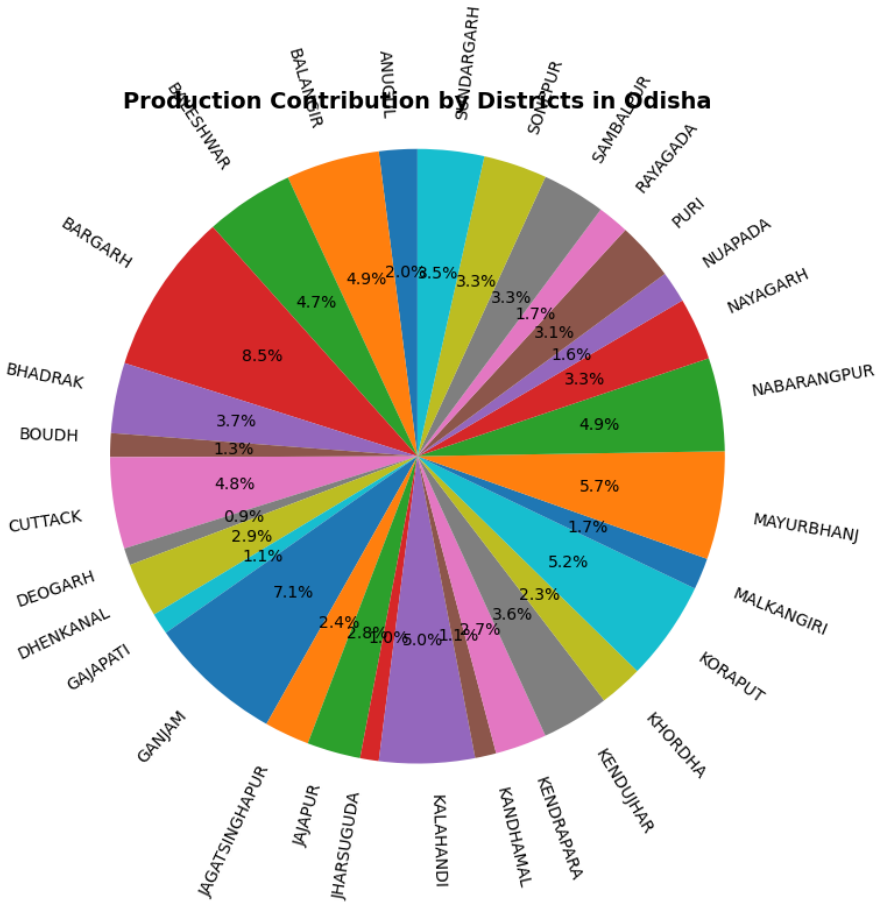

Production Contribution by Districts in Maharashtra
AHMEDNAGAR
YAVATMAL
WASHIM
WARDHA
THANE
SOLAPUR
SINDHUDURG
SATARA
SANGLI
RATNAGIRI
RAIGAD
PUNE
PARBHANI
PALGHAR
OSMANABAD
NASHIK
NANDURBAR
NANDED
NAGPUR
MUMBAI
LATUR
KOLHAPUR
JALNA
JALGAON
HINGOLI
GONDIA
GADCHIROLI
DHULE
CHANDRAPUR
BULDHANA
BHANDARA
BEED
AURANGABAD
AMRAVATI
AKOLA
9.1%
11.7%
0.3%
6.5%
7.4%
0.5%
10.9%
2.4%
3.1%
1.5%
3.5%
13.3%
2.2%
3.1%
1.4%
0.5%
4.2%
2.6%
1.2%
0.9%

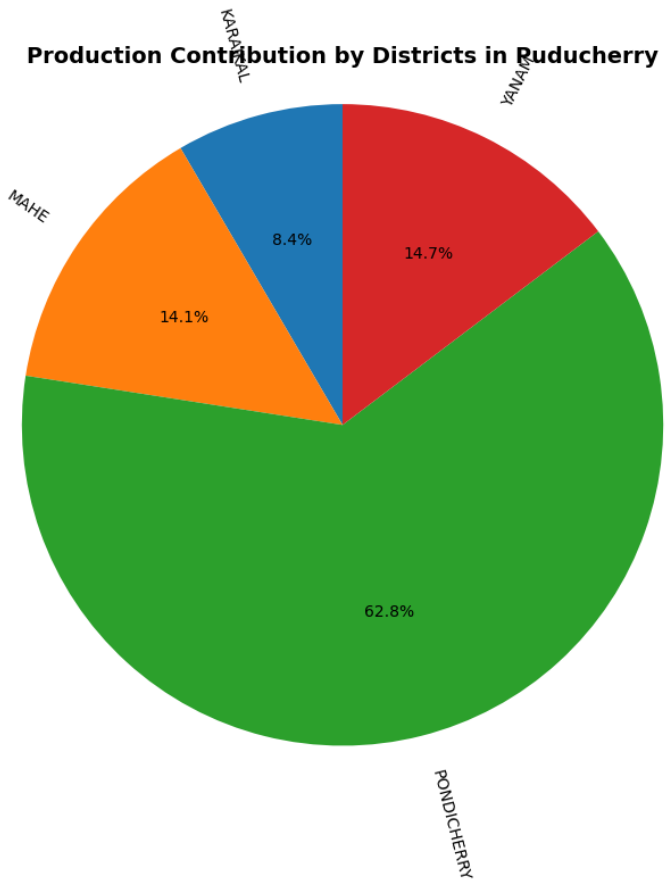

Production Contribution by Districts in Manipur
BISHNUPUR
12.1%
UKHRUL
8.8%
THOUBAL
13.5%
TAMENGLONG
5.1%
SENAPATI
15.4%
IMPHAL WEST
12.1%
IMPHAL EAST
16.4%
CHURACHANDPUR
11.2%
CHANDEL
5.5%

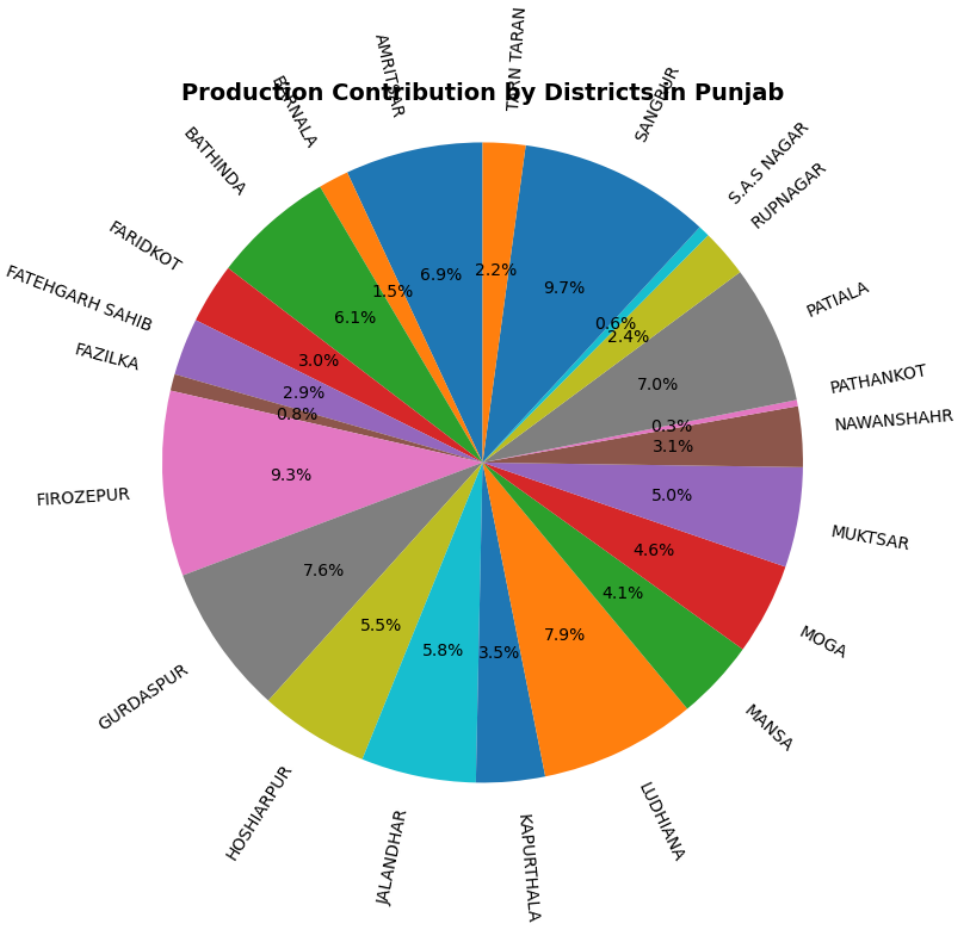

Production Contribution by Districts in Meghalaya
EAST GARO HILLS
WEST KHASI HILLS
WEST JAINTIA HILLS
EAST JAINTIA HILLS
12.8%
12.0%
0.6%
6.9%
30.2%
WEST GARO HILLS
21.8%
EAST KHASI HILLS
0.7%
8.9%
4.5%
1.3%
1.6%
NORTH GARO HILLS
RI BHOI
SOUTH GARO HILLS
SOUTH WEST KHASI HILLS
SOUTH WEST GARO HILLS

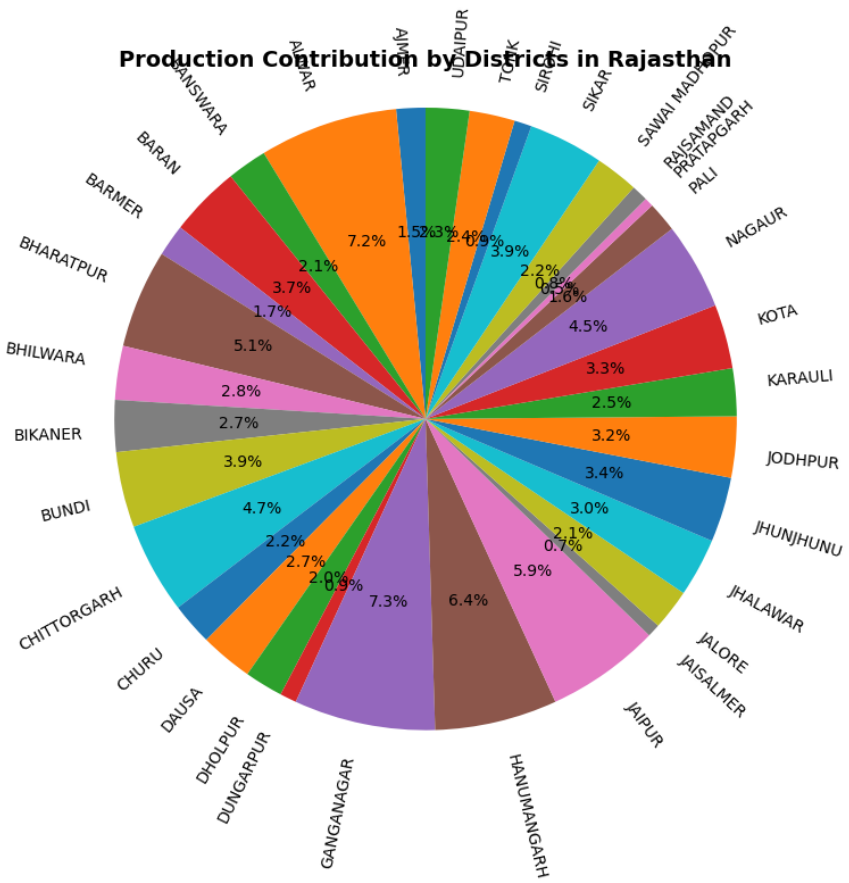

Production Contribution by Districts in Mizoram
SERCHHIP
SAIHA
MAMIT
LUNGLEI
LAWNGTLAI
KOLASIB
CHAMPHAI
AIZAWL
3.6%
3.2%
5.5%
14.4%
2.7%
20.2%
14.8%
35.7%

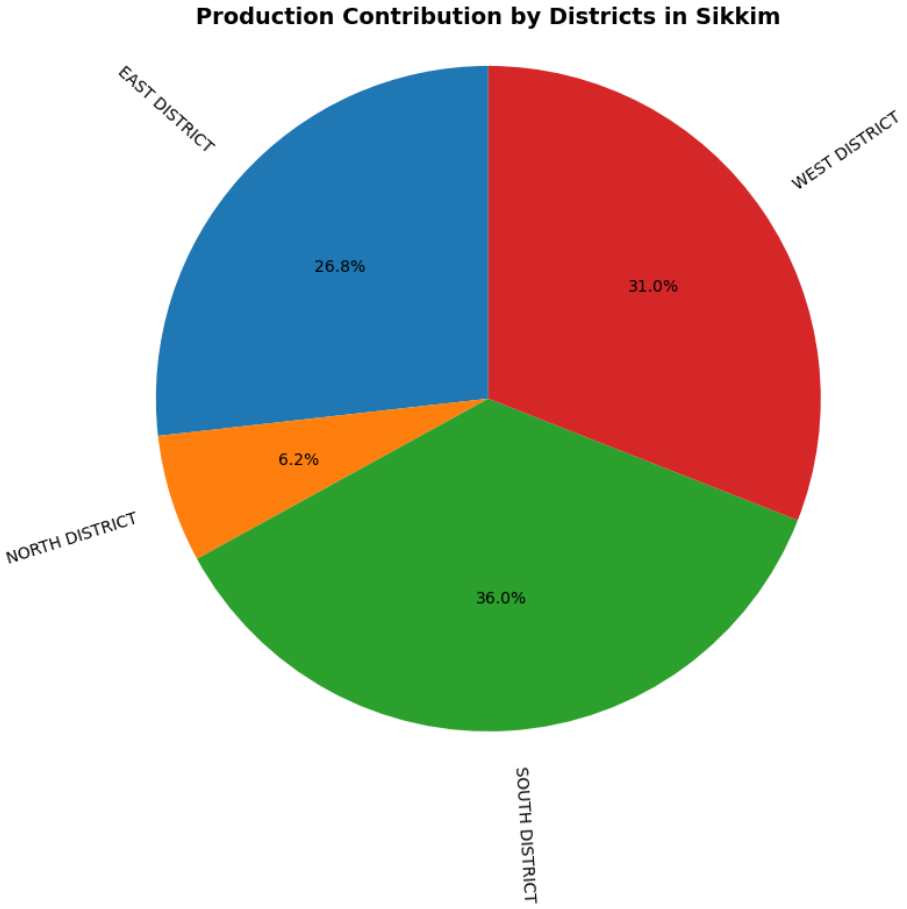

Production Contribution by Districts in Nagaland
ZUNHEBOTO
DIMAPUR
WOKHA
TUENSANG
PHEK
PEREN
MON
MOKOKCHUNG
LONGLENG
KOHIMA
KIPHIRE
8.7%
22.2%
11.4%
9.7%
2.7%
10.8%
10.7%
1.9%
9.0%
9.1%
3.7%

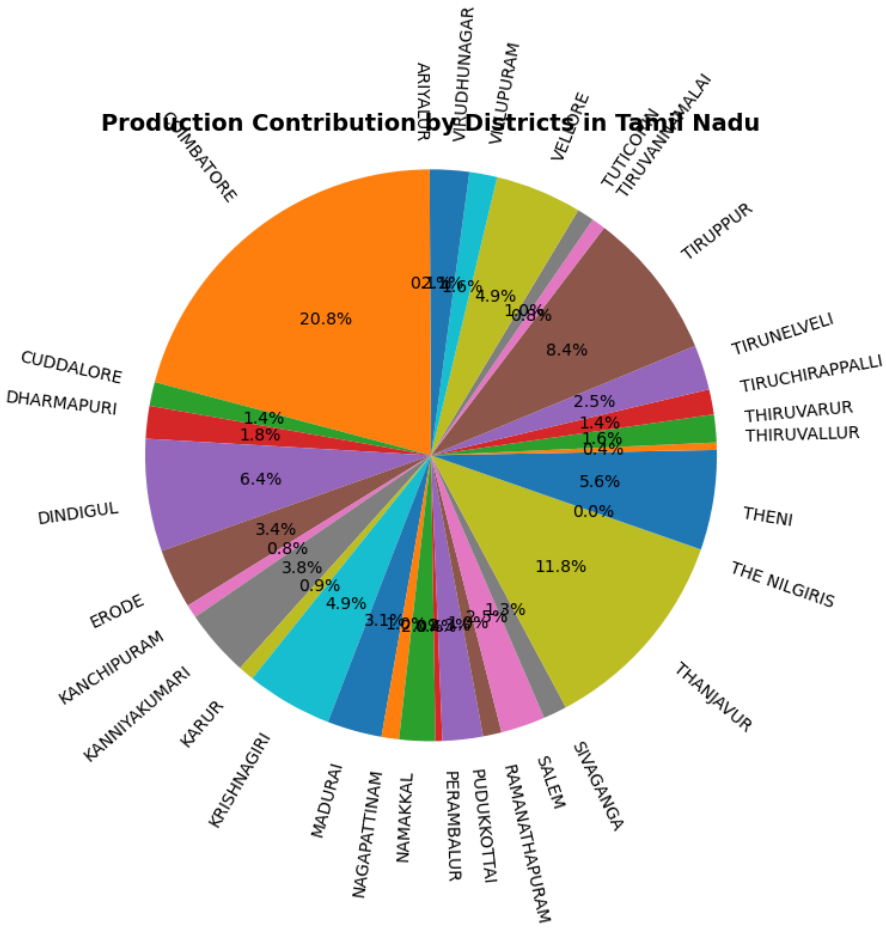

Production Contribution by Districts in Odisha
SUNDARGARH
SONEPUR
SAMBALPUR
RAYAGADA
PURI
NUAPADA
NAYAGARH
NABARANGPUR
MAYURBHANJ
MALKANGIRI
KORAPUT
KHORDHA
KENDUJHAR
KENDRAPARA
KANDHAMAL
KALAHANDI
JHARSUGUDA
JAJAPUR
JAGATSINGHAPUR
GANJAM
GAJAPATI
DHENKANAL
DEOGARH
CUTTACK
BOUDH
BHADRAK
BARGARH
BALANGIR
ANUGUL
BALESHWAR
3.5%
3.3%
3.3%
1.7%
3.1%
1.6%
3.3%
4.9%
5.7%
1.7%
5.2%
2.3%
3.6%
2.7%
1.1%
5.0%
1.0%
2.8%
2.4%
7.1%
1.1%
2.9%
0.9%
4.8%
1.3%
3.7%
8.5%
4.7%
4.9%
2.0%

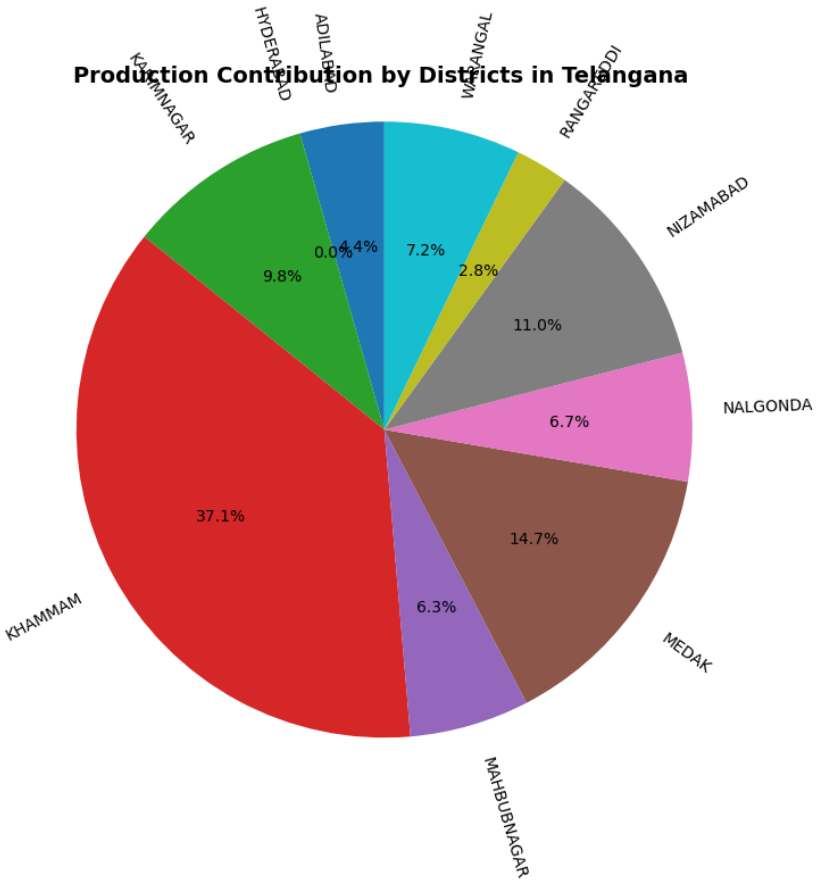

Production Contribution by Districts in Puducherry
KARAIKAL
YANAM
MAHE
PONDICHERRY
8.4%
14.7%
14.1%
62.8%

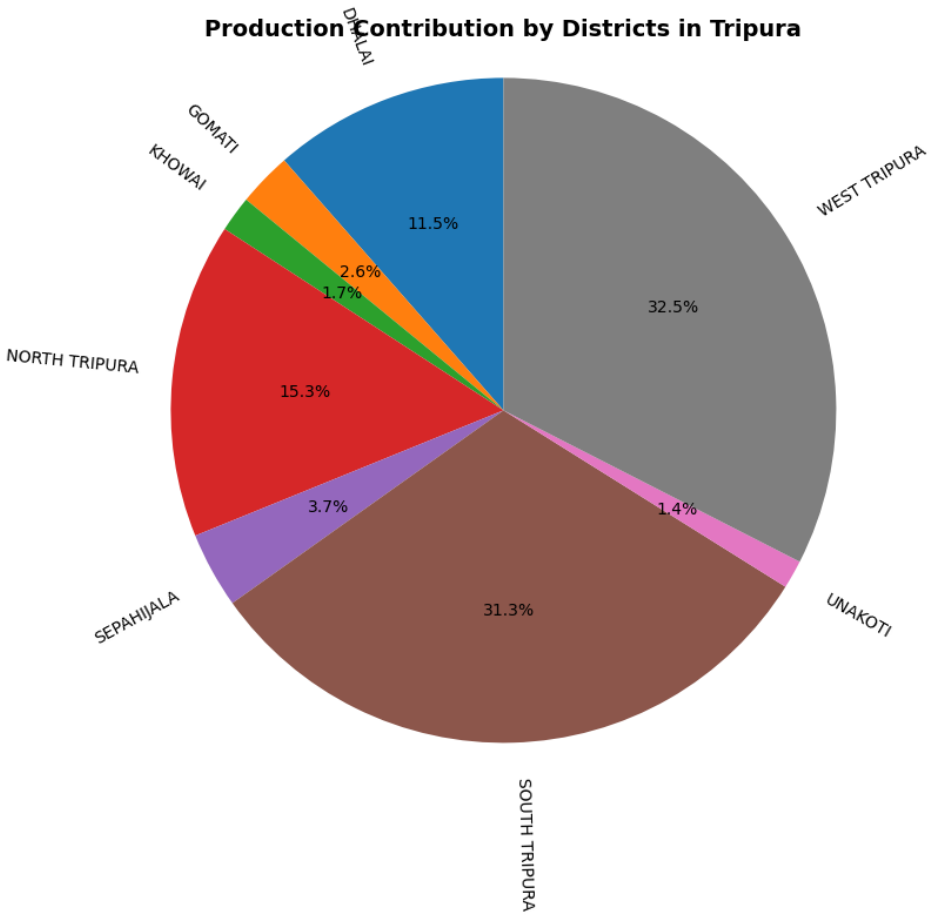

Production Contribution by Districts in Punjab
AMRITSAR
TARN TARAN
SANGRUR
S.A.S NAGAR
RUPNAGAR
PATIALA
PATHANKOT
NAWANSHAHR
MUKTSAR
MOGA
MANSA
LUDHIANA
KAPURTHALA
JALANDHAR
HOSHIARPUR
GURDASPUR
FIROZEPUR
FAZILKA
FATEHGARH SAHIB
FARIDKOT
BATHINDA
BARNALA
6.9%
2.2%
9.7%
0.6%
2.4%
7.0%
0.3%
3.1%
5.0%
4.6%
4.1%
7.9%
3.5%
5.8%
5.5%
7.6%
9.3%
0.8%
2.9%
3.0%
6.1%
1.5%

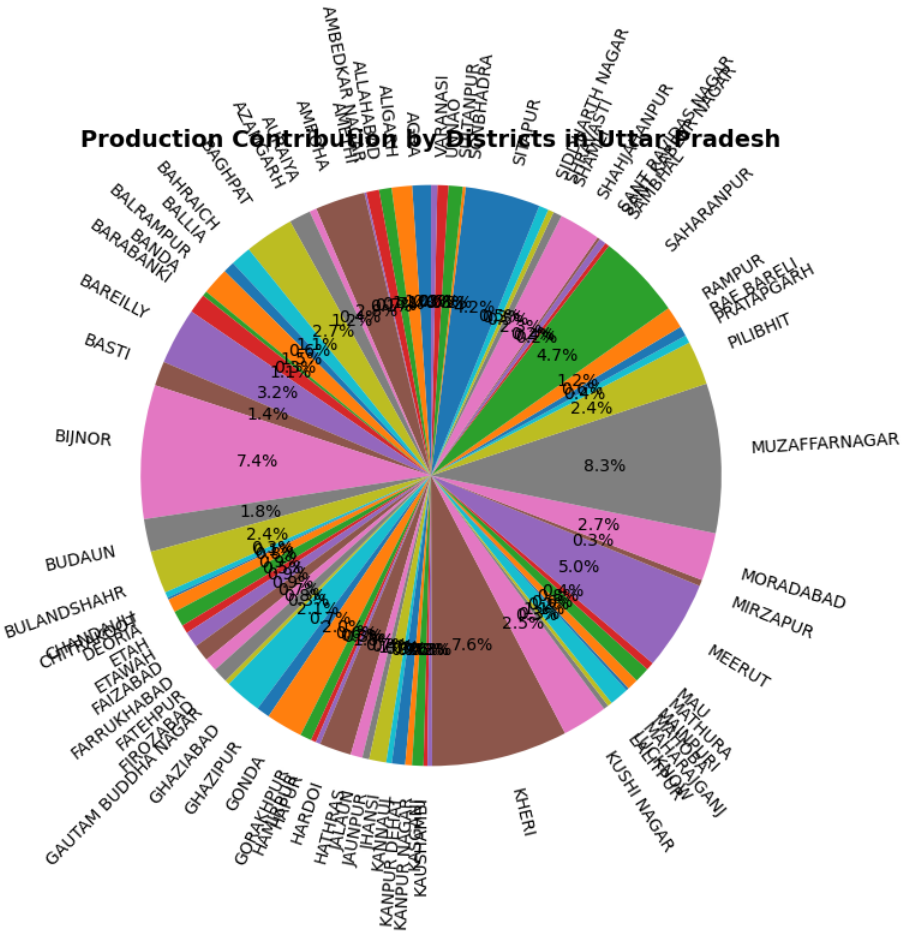

Production Contribution by Districts in Rajasthan
AJMER
ALWAR
BANSWARA
BARAN
BARMER
BHARATPUR
BHILWARA
BIKANER
BUNDI
CHITTORGARH
CHURU
DAUSA
DHOLPUR
DUNGARPUR
GANGANAGAR
HANUMANGARH
JAIPUR
JAISALMER
JALORE
JHALAWAR
JHUNJHUNU
JODHPUR
KARAULI
KOTA
NAGAUR
PALI
PRATAPGARH
RAJSAMAND
SAWAI MADHOPUR
SIKAR
SIROHI
TONK
UDAIPUR
7.2%
2.1%
3.7%
1.7%
5.1%
2.8%
2.7%
3.9%
4.7%
2.2%
2.7%
2.0%
0.9%
7.3%
6.4%
5.9%
0.7%
2.1%
3.0%
3.4%
3.2%
2.5%
3.3%
4.5%
1.6%
0.8%
2.2%
3.9%
0.9%
2.4%
1.5%

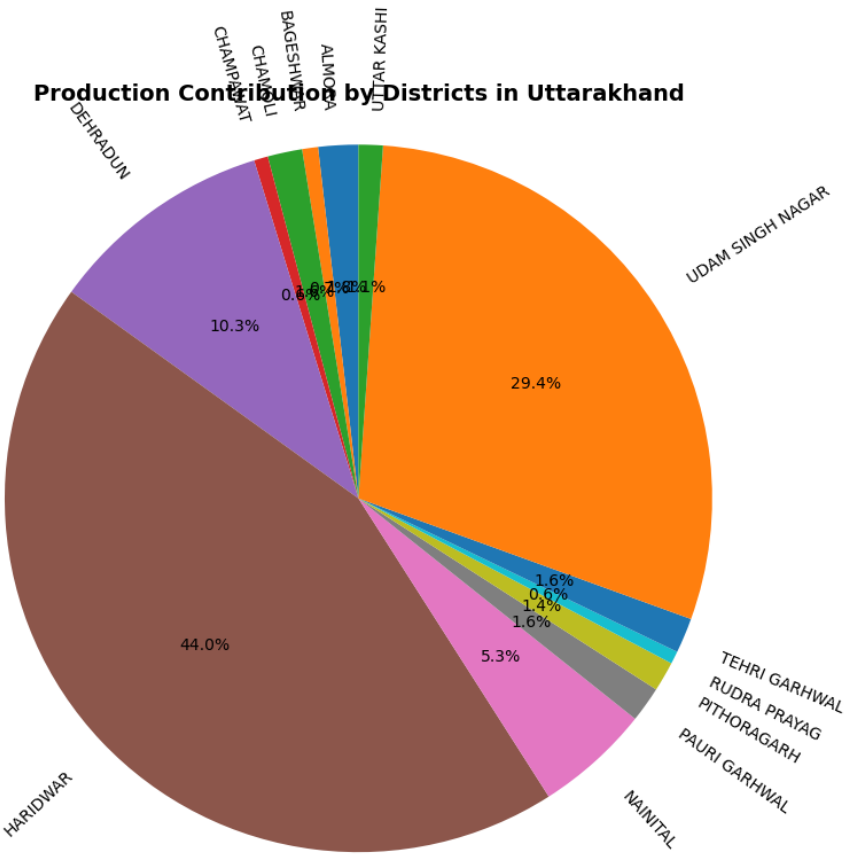

Production Contribution by Districts in Sikkim
EAST DISTRICT
WEST DISTRICT
NORTH DISTRICT
SOUTH DISTRICT
26.8%
31.0%
6.2%
36.0%

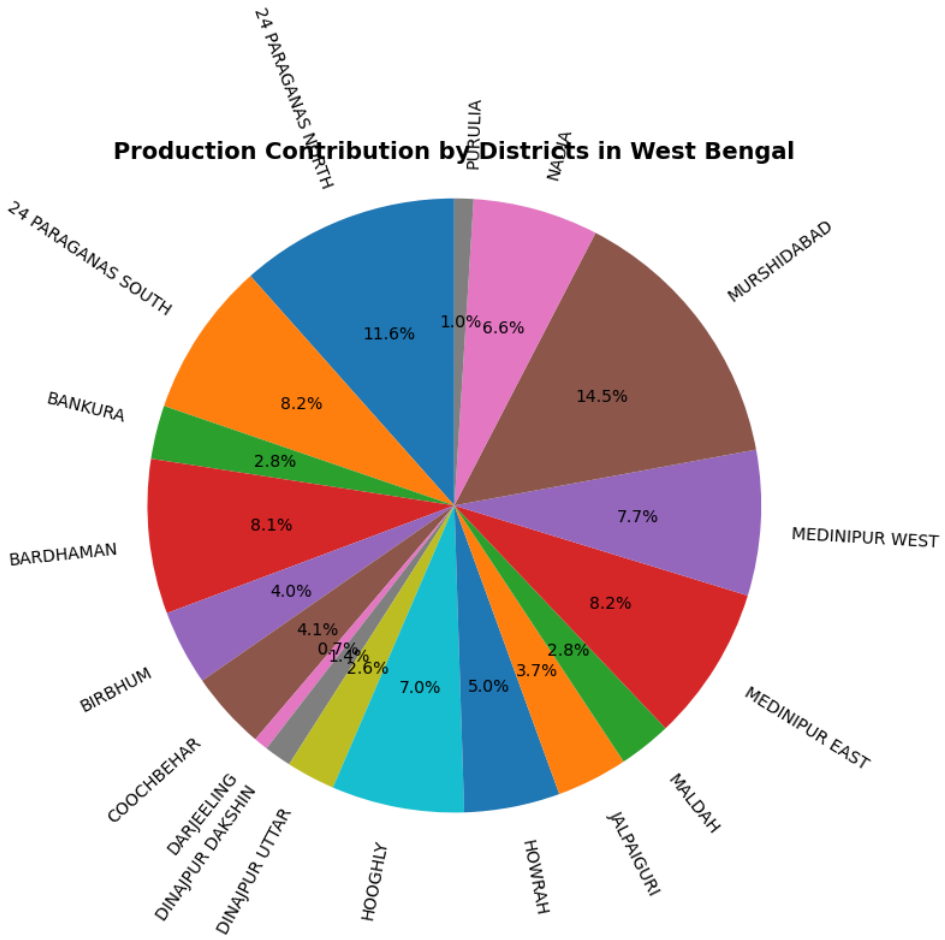

Production Contribution by Districts in Tamil Nadu
ARIYALUR
VUDHUNAGAR
VILUPURAM
VELLORE
TUTICORIN
TIRUVANNAMALAI
TIRUPPUR
TIRUNELVELI
TIRUCHIRAPPALLI
THIRUVARUR
THIRUVALLUR
THENI
THE NILGIRIS
THANJAVUR
SIVAGANGA
SALEM
RAMANATHAPURAM
PUDUKKOTTAI
PERAMBALUR
NAMAKKAL
NAGAPATTINAM
MADURAI
KRISHNAGIRI
KARUR
KANNIYAKUMARI
KANCHIPURAM
ERODE
DINDIGUL
DHARMAPURI
CUDDALORE
COIMBATORE
20.8%
8.4%
6.4%
5.6%
4.9%
4.9%
3.8%
3.4%
2.5%
1.8%
1.6%
1.4%
1.4%
0.9%
0.8%
0.4%
0.0%


Production Contribution by Districts in Telangana
ADILABAD
KARIMNAGAR
WARANGAL
RANGAREDDI
NIZAMABAD
NALGONDA
MEDAK
MAHBUBNAGAR
KHAMMAM
4.4%
7.2%
2.8%
11.0%
6.7%
14.7%
6.3%
37.1%
9.8%
0.0%


Production Contribution by Districts in Tripura
DHALAI
GOMATI
KHOWAI
WEST TRIPURA
NORTH TRIPURA
SEPAHIJALA
UNAKOTI
SOUTH TRIPURA
11.5%
2.6%
1.7%
32.5%
15.3%
3.7%
1.4%
31.3%


Production Contribution by Districts in Uttar Pradesh
SAHARANPUR
RAMPUR
RAE BARELI
PILIBHIT
MUZAFFARNAGAR
MORADABAD
MIRZAPUR
MEERUT
KUSHI NAGAR
KHERI
BIJNOR
BUDAUN
BULANDSHAHR
BAREILLY
BASTI
BAHRAICH
BALLIA
BALRAMPUR
BANDA
BARABANKI
GHAZIPUR
GONDA
GHAZIABAD
FIROZABAD
FATEHPUR
FARRUKHABAD
FAIZABAD
ETAWAH
ETAH
DEORIA
GAUTAM BUDDHA NAGAR
HARDOI
JAUNPUR
KANPUR NAGAR
KANPUR DEHAT
KANNAUJ
MAINPURI
MATHURA
MAU
LUCKNOW
LALITPUR
HATHRAS
AZAMGARH
AMROHA
AMBEDKAR NAGAR
ALLAHABAD
ALIGARH
AGRA
VARANASI
SITAPUR
SIDDHARTH NAGAR
SHRAVASTI
SHAHJAHANPUR
SANT RAVIDAS NAGAR
SAMBHAL
7.6%
8.3%
7.4%
5.0%
4.7%
3.2%
2.7%
2.4%
2.3%
1.8%
1.4%
1.2%


Production Contribution by Districts in Uttarakhand
UTTAR KASHI
ALMORA
BAGESHWAR
CHAMOLI
CHAMPAWAT
DEHRADUN
UDAM SINGH NAGAR
TEHRI GARHWAL
RUDRA PRAYAG
PITHORAGARH
PAURI GARHWAL
NAINITAL
HARIDWAR
10.3%
29.4%
1.6%
0.6%
1.4%
1.6%
5.3%
44.0%



[18]:
```
def catategory_crop(crop):
    for i in ['Rice','Maize','Wheat','Barley','Varagu','Other Cereals &␣
 ↪Millets','Ragi','Small millets','Bajra','Jowar', 'Paddy','Total␣
 ↪foodgrain','Jobster']:
        if crop==i:
            return 'Cereal'
    for i in ['Moong','Urad','Arhar/Tur','Peas & beans','Masoor',
              'Other Kharif pulses','other misc. pulses','Ricebean (nagadal)',
              'Rajmash␣
 ↪Kholar','Lentil','Samai','Blackgram','Korra','Cowpea(Lobia)',
              'Other  Rabi pulses','Other Kharif pulses','Peas & beans␣
 ↪(Pulses)','Pulses total','Gram']:
        if crop==i:
            return 'Pulses'
    for i in␣
 ↪['Peach','Apple','Litchi','Pear','Plums','Ber','Sapota','Lemon','Pome␣
 ↪Granet',
```

```
            'Other Citrus Fruit','Water Melon','Jack␣
↪Fruit','Grapes','Pineapple','Orange',
            'Pome Fruit','Citrus Fruit','Other Fresh␣
↪Fruits','Mango','Papaya','Coconut','Banana']:
      if crop==i:
          return 'Fruits'
  for i in ['Bean','Lab-Lab','Moth','Guar seed','Soyabean','Horse-gram']:
      if crop==i:
          return 'Beans'
  for i in ['Turnip','Peas','Beet Root','Carrot','Yam','Ribed Guard','Ash␣
↪Gourd ','Pump Kin','Redish','Snak Guard','Bottle Gourd',
            'Bitter Gourd','Cucumber','Drum Stick','Cauliflower','Beans &␣
↪Mutter(Vegetable)','Cabbage',
            'Bhindi','Tomato','Brinjal','Khesari','Sweet␣
↪potato','Potato','Onion','Tapioca','Colocosia']:
            if crop==i:
              return 'Vegetables'
  for i in ['Perilla','Ginger','Cardamom','Black pepper','Dry␣
↪ginger','Garlic','Coriander','Turmeric','Dry chillies','Cond-spcs other']:
      if crop==i:
          return 'spices'
  for i in ['other fibres','Kapas','Jute &␣
↪mesta','Jute','Mesta','Cotton(lint)','Sannhamp']:
      if crop==i:
          return 'fibres'
  for i in ['Arcanut (Processed)','Atcanut (Raw)','Cashewnut␣
↪Processed','Cashewnut Raw','Cashewnut','Arecanut','Groundnut']:
      if crop==i:
          return 'Nuts'
  for i in ['other oilseeds','Safflower','Niger seed','Castor␣
↪seed','Linseed','Sunflower','Rapeseed &Mustard','Sesamum','Oilseeds total']:
      if crop==i:
          return 'oilseeds'
  for i in ['Tobacco','Coffee','Tea','Sugarcane','Rubber']:
      if crop==i:
          return 'Commercial'
```

[19]:
```
# Clean and standardize column names
crop_data.columns = crop_data.columns.str.strip().str.lower()
```

[20]:
```
import pandas as pd


def categorize_crop(crop):
    crop_categories = {
```

```
      'Rice': 'Cereal', 'Maize': 'Cereal', 'Wheat': 'Cereal', 'Barley':␣
↪'Cereal', 'Varagu': 'Cereal',
      'Other Cereals & Millets': 'Cereal', 'Ragi': 'Cereal', 'Small millets':␣
↪'Cereal', 'Bajra': 'Cereal',
      'Jowar': 'Cereal', 'Paddy': 'Cereal', 'Total foodgrain': 'Cereal',␣
↪'Jobster': 'Cereal',
      'Moong': 'Pulses', 'Urad': 'Pulses', 'Arhar/Tur': 'Pulses', 'Peas &␣
↪beans': 'Pulses', 'Masoor': 'Pulses',
      'Other Kharif pulses': 'Pulses', 'other misc. pulses': 'Pulses',␣
↪'Ricebean (nagadal)': 'Pulses',
      'Rajmash Kholar': 'Pulses', 'Lentil': 'Pulses', 'Samai': 'Pulses',␣
↪'Blackgram': 'Pulses', 'Korra': 'Pulses',
      'Cowpea(Lobia)': 'Pulses', 'Other Rabi pulses': 'Pulses', 'Pulses␣
↪total': 'Pulses', 'Gram': 'Pulses',
      'Peach': 'Fruits', 'Apple': 'Fruits', 'Litchi': 'Fruits', 'Pear':␣
↪'Fruits', 'Plums': 'Fruits', 'Ber': 'Fruits',
      'Sapota': 'Fruits', 'Lemon': 'Fruits', 'Pome Granet': 'Fruits', 'Other␣
↪Citrus Fruit': 'Fruits',
      'Water Melon': 'Fruits', 'Jack Fruit': 'Fruits', 'Grapes': 'Fruits',␣
↪'Pineapple': 'Fruits', 'Orange': 'Fruits',
      'Pome Fruit': 'Fruits', 'Citrus Fruit': 'Fruits', 'Other Fresh Fruits':␣
↪'Fruits', 'Mango': 'Fruits',
      'Papaya': 'Fruits', 'Coconut': 'Fruits', 'Banana': 'Fruits', 'Bean':␣
↪'Beans', 'Lab-Lab': 'Beans', 'Moth': 'Beans',
      'Guar seed': 'Beans', 'Soyabean': 'Beans', 'Horse-gram': 'Beans',␣
↪'Turnip': 'Vegetables', 'Peas': 'Vegetables',
      'Beet Root': 'Vegetables', 'Carrot': 'Vegetables', 'Yam': 'Vegetables',␣
↪'Ribed Guard': 'Vegetables',
      'Ash Gourd': 'Vegetables', 'Pump Kin': 'Vegetables', 'Redish':␣
↪'Vegetables', 'Snak Guard': 'Vegetables',
      'Bottle Gourd': 'Vegetables', 'Bitter Gourd': 'Vegetables', 'Cucumber':␣
↪'Vegetables', 'Drum Stick': 'Vegetables',
      'Cauliflower': 'Vegetables', 'Beans & Mutter(Vegetable)': 'Vegetables',␣
↪'Cabbage': 'Vegetables', 'Bhindi': 'Vegetables',
      'Tomato': 'Vegetables', 'Brinjal': 'Vegetables', 'Khesari':␣
↪'Vegetables', 'Sweet potato': 'Vegetables',
      'Potato': 'Vegetables', 'Onion': 'Vegetables', 'Tapioca': 'Vegetables',␣
↪'Colocosia': 'Vegetables',
      'Perilla': 'Spices', 'Ginger': 'Spices', 'Cardamom': 'Spices', 'Black␣
↪pepper': 'Spices', 'Dry ginger': 'Spices',
      'Garlic': 'Spices', 'Coriander': 'Spices', 'Turmeric': 'Spices', 'Dry␣
↪chillies': 'Spices', 'Cond-spcs other': 'Spices',
      'other fibres': 'Fibres', 'Kapas': 'Fibres', 'Jute & mesta': 'Fibres',␣
↪'Jute': 'Fibres', 'Mesta': 'Fibres',
```

```
        'Cotton(lint)': 'Fibres', 'Sannhamp': 'Fibres', 'Arcanut (Processed)':␣
 ↪'Nuts', 'Atcanut (Raw)': 'Nuts',
        'Cashewnut Processed': 'Nuts', 'Cashewnut Raw': 'Nuts', 'Cashewnut':␣
 ↪'Nuts', 'Arecanut': 'Nuts',
        'Groundnut': 'Nuts', 'other oilseeds': 'Oilseeds', 'Safflower':␣
 ↪'Oilseeds', 'Niger seed': 'Oilseeds',
        'Castor seed': 'Oilseeds', 'Linseed': 'Oilseeds', 'Sunflower':␣
 ↪'Oilseeds', 'Rapeseed &Mustard': 'Oilseeds',
        'Sesamum': 'Oilseeds', 'Oilseeds total': 'Oilseeds', 'Tobacco':␣
 ↪'Commercial', 'Coffee': 'Commercial',
        'Tea': 'Commercial', 'Sugarcane': 'Commercial', 'Rubber': 'Commercial'
    }


    return crop_categories.get(crop, 'Other')


crop_data = pd.read_csv("Crop Production data.csv")


crop_data.columns = crop_data.columns.str.strip().str.lower()


crop_data['category_of_crop'] = crop_data['crop'].apply(categorize_crop)


print(crop_data.head())
```

```
                  state_name district_name  crop_year       season  \
0  Andaman and Nicobar Islands      NICOBARS       2000  Kharif
1  Andaman and Nicobar Islands      NICOBARS       2000  Kharif
2  Andaman and Nicobar Islands      NICOBARS       2000  Kharif
3  Andaman and Nicobar Islands      NICOBARS       2000  Whole Year
4  Andaman and Nicobar Islands      NICOBARS       2000  Whole Year

                crop    area  production category_of_crop
0           Arecanut  1254.0      2000.0             Nuts
1  Other Kharif pulses     2.0         1.0           Pulses
2               Rice   102.0       321.0           Cereal
3             Banana   176.0       641.0           Fruits
4          Cashewnut   720.0       165.0             Nuts
```

[21]:
```
crop_data.head()
```

[21]:
```
                  state_name district_name  crop_year       season  \
0  Andaman and Nicobar Islands      NICOBARS       2000  Kharif
1  Andaman and Nicobar Islands      NICOBARS       2000  Kharif
```

```
2  Andaman and Nicobar Islands      NICOBARS       2000  Kharif
3  Andaman and Nicobar Islands      NICOBARS       2000  Whole Year
4  Andaman and Nicobar Islands      NICOBARS       2000  Whole Year

                 crop    area  production category_of_crop
0             Arecanut  1254.0      2000.0             Nuts
1  Other Kharif pulses     2.0         1.0           Pulses
2                 Rice   102.0       321.0           Cereal
3               Banana   176.0       641.0           Fruits
4            Cashewnut   720.0       165.0             Nuts
```

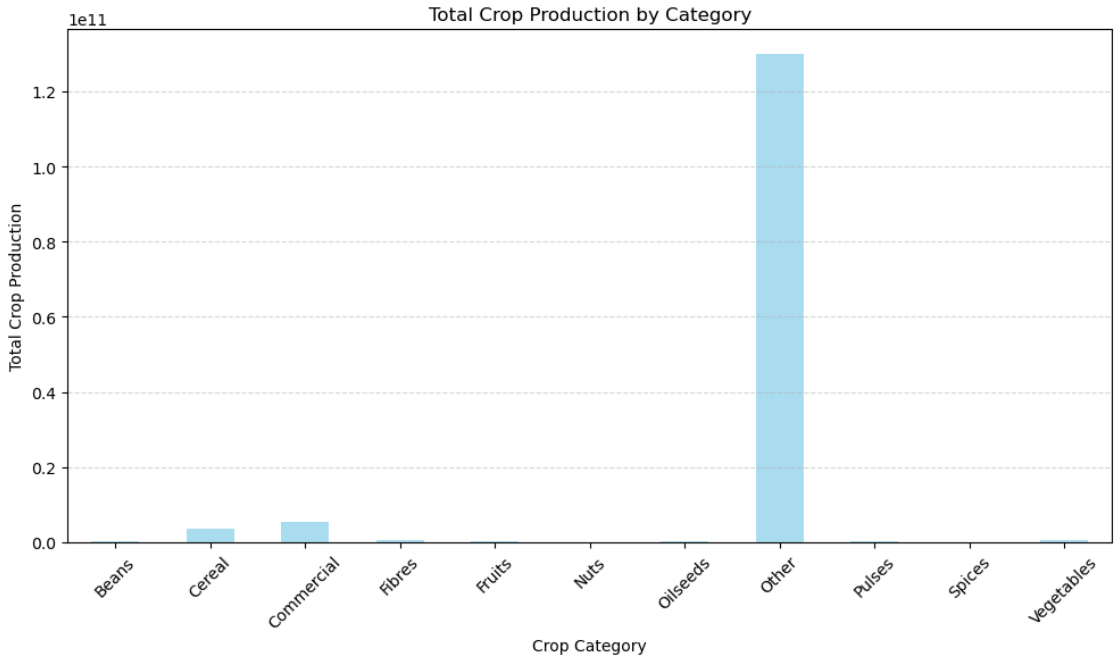
[22]:
```
crop_data
```

[22]:
```
                        state_name district_name  crop_year       season  \
0       Andaman and Nicobar Islands      NICOBARS       2000  Kharif
1       Andaman and Nicobar Islands      NICOBARS       2000  Kharif
2       Andaman and Nicobar Islands      NICOBARS       2000  Kharif
3       Andaman and Nicobar Islands      NICOBARS       2000  Whole Year
4       Andaman and Nicobar Islands      NICOBARS       2000  Whole Year
…                               …           …         …           …
246086                West Bengal       PURULIA       2014  Summer
246087                West Bengal       PURULIA       2014  Summer
246088                West Bengal       PURULIA       2014  Whole Year
246089                West Bengal       PURULIA       2014  Winter
246090                West Bengal       PURULIA       2014  Winter

                      crop      area  production category_of_crop
0                  Arecanut    1254.0      2000.0             Nuts
1       Other Kharif pulses       2.0         1.0           Pulses
2                     Rice     102.0       321.0           Cereal
3                   Banana     176.0       641.0           Fruits
4                 Cashewnut     720.0       165.0             Nuts
…                       …       …          …                …
246086                Rice     306.0       801.0           Cereal
246087             Sesamum     627.0       463.0         Oilseeds
246088           Sugarcane     324.0     16250.0       Commercial
246089                Rice  279151.0    597899.0           Cereal
246090             Sesamum     175.0        88.0         Oilseeds

[246091 rows x 8 columns]
```

9 #which category has the most crop production

[23]:
```
import pandas as pd
import matplotlib.pyplot as plt

def categorize_crop(crop):
    crop_categories = {
        'Rice': 'Cereal', 'Maize': 'Cereal', 'Wheat': 'Cereal', 'Barley':␣
↪'Cereal', 'Varagu': 'Cereal',
        'Other Cereals & Millets': 'Cereal', 'Ragi': 'Cereal', 'Small millets':␣
↪'Cereal', 'Bajra': 'Cereal',
        'Jowar': 'Cereal', 'Paddy': 'Cereal', 'Total foodgrain': 'Cereal',␣
↪'Jobster': 'Cereal',
        'Moong': 'Pulses', 'Urad': 'Pulses', 'Arhar/Tur': 'Pulses', 'Peas &␣
↪beans': 'Pulses', 'Masoor': 'Pulses',
        'Other Kharif pulses': 'Pulses', 'other misc. pulses': 'Pulses',␣
↪'Ricebean (nagadal)': 'Pulses',
        'Rajmash Kholar': 'Pulses', 'Lentil': 'Pulses', 'Samai': 'Pulses',␣
↪'Blackgram': 'Pulses', 'Korra': 'Pulses',
        'Cowpea(Lobia)': 'Pulses', 'Other Rabi pulses': 'Pulses', 'Pulses␣
↪total': 'Pulses', 'Gram': 'Pulses',
        'Peach': 'Fruits', 'Apple': 'Fruits', 'Litchi': 'Fruits', 'Pear':␣
↪'Fruits', 'Plums': 'Fruits', 'Ber': 'Fruits',
        'Sapota': 'Fruits', 'Lemon': 'Fruits', 'Pome Granet': 'Fruits', 'Other␣
↪Citrus Fruit': 'Fruits',
        'Water Melon': 'Fruits', 'Jack Fruit': 'Fruits', 'Grapes': 'Fruits',␣
↪'Pineapple': 'Fruits', 'Orange': 'Fruits',
        'Pome Fruit': 'Fruits', 'Citrus Fruit': 'Fruits', 'Other Fresh Fruits':␣
↪'Fruits', 'Mango': 'Fruits',
        'Papaya': 'Fruits', 'Coconut': 'Fruits', 'Banana': 'Fruits', 'Bean':␣
↪'Beans', 'Lab-Lab': 'Beans', 'Moth': 'Beans',
        'Guar seed': 'Beans', 'Soyabean': 'Beans', 'Horse-gram': 'Beans',␣
↪'Turnip': 'Vegetables', 'Peas': 'Vegetables',
        'Beet Root': 'Vegetables', 'Carrot': 'Vegetables', 'Yam': 'Vegetables',␣
↪'Ribed Guard': 'Vegetables',
        'Ash Gourd': 'Vegetables', 'Pump Kin': 'Vegetables', 'Redish':␣
↪'Vegetables', 'Snak Guard': 'Vegetables',
        'Bottle Gourd': 'Vegetables', 'Bitter Gourd': 'Vegetables', 'Cucumber':␣
↪'Vegetables', 'Drum Stick': 'Vegetables',
        'Cauliflower': 'Vegetables', 'Beans & Mutter(Vegetable)': 'Vegetables',␣
↪'Cabbage': 'Vegetables', 'Bhindi': 'Vegetables',
        'Tomato': 'Vegetables', 'Brinjal': 'Vegetables', 'Khesari':␣
↪'Vegetables', 'Sweet potato': 'Vegetables',
        'Potato': 'Vegetables', 'Onion': 'Vegetables', 'Tapioca': 'Vegetables',␣
↪'Colocosia': 'Vegetables',
```

```
        'Perilla': 'Spices', 'Ginger': 'Spices', 'Cardamom': 'Spices', 'Black␣
↪pepper': 'Spices', 'Dry ginger': 'Spices',
        'Garlic': 'Spices', 'Coriander': 'Spices', 'Turmeric': 'Spices', 'Dry␣
↪chillies': 'Spices', 'Cond-spcs other': 'Spices',
        'other fibres': 'Fibres', 'Kapas': 'Fibres', 'Jute & mesta': 'Fibres',␣
↪'Jute': 'Fibres', 'Mesta': 'Fibres',
        'Cotton(lint)': 'Fibres', 'Sannhamp': 'Fibres', 'Arcanut (Processed)':␣
↪'Nuts', 'Atcanut (Raw)': 'Nuts',
        'Cashewnut Processed': 'Nuts', 'Cashewnut Raw': 'Nuts', 'Cashewnut':␣
↪'Nuts', 'Arecanut': 'Nuts',
        'Groundnut': 'Nuts', 'other oilseeds': 'Oilseeds', 'Safflower':␣
↪'Oilseeds', 'Niger seed': 'Oilseeds',
        'Castor seed': 'Oilseeds', 'Linseed': 'Oilseeds', 'Sunflower':␣
↪'Oilseeds', 'Rapeseed &Mustard': 'Oilseeds',
        'Sesamum': 'Oilseeds', 'Oilseeds total': 'Oilseeds', 'Tobacco':␣
↪'Commercial', 'Coffee': 'Commercial',
        'Tea': 'Commercial', 'Sugarcane': 'Commercial', 'Rubber': 'Commercial'
    }

    return crop_categories.get(crop, 'Other')

crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()

crop_data['category_of_crop'] = crop_data['crop'].apply(categorize_crop)

category_production = crop_data.groupby('category_of_crop')['production'].sum()

plt.figure(figsize=(10, 6))
category_production.plot(kind='bar', color='skyblue', alpha=0.7)

plt.xlabel('Crop Category')
plt.ylabel('Total Crop Production')
plt.title('Total Crop Production by Category')
plt.xticks(rotation=45)
plt.grid(axis='y', linestyle='--', alpha=0.5)
plt.tight_layout()
plt.show()
```



[24]:
```
df1=pd.crosstab(crop_data['state_name'],crop_data['category_of_crop'])
df1
```

[24]:

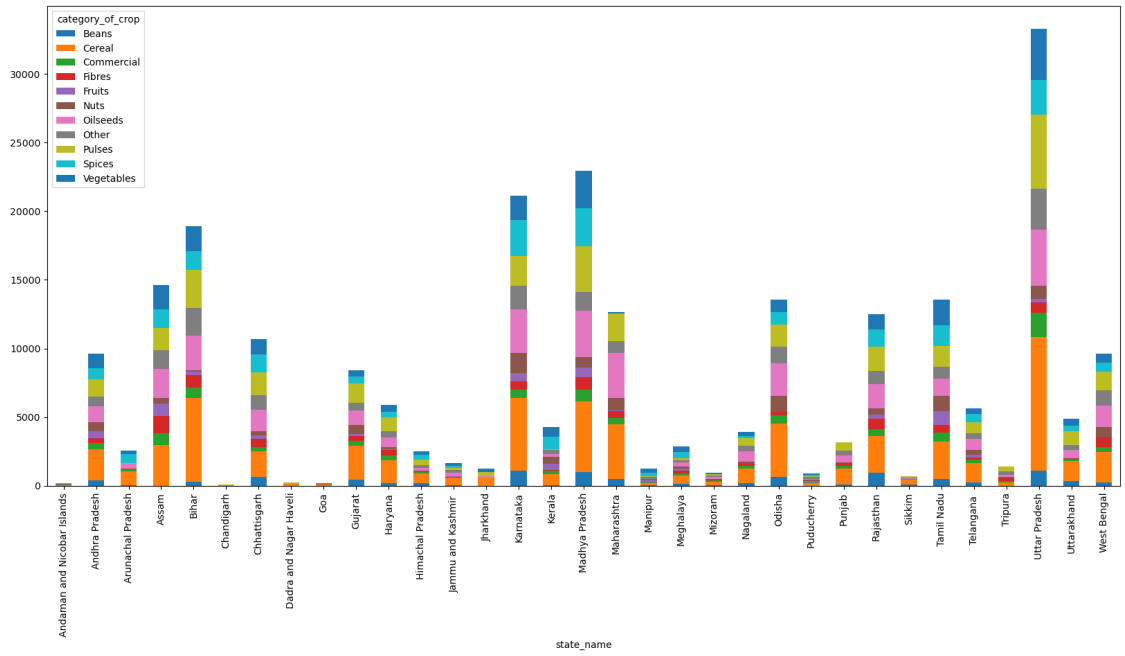
category_of_crop	Beans	Cereal	Commercial	Fibres	Fruits	Nuts	\
state_name							
Andaman and Nicobar Islands	0	20	15	0	16	38	
Andhra Pradesh	391	2271	475	339	502	675	
Arunachal Pradesh	26	1021	168	0	0	26	
Assam	0	2952	856	1287	920	400	
Bihar	280	6110	756	924	226	130	
Chandigarh	0	39	0	0	0	0	
Chhattisgarh	663	1824	328	603	269	264	
Dadra and Nagar Haveli	0	116	12	13	9	9	
Goa	0	62	22	0	16	48	
Gujarat	420	2490	373	327	157	685	
Haryana	163	1712	309	420	52	174	
Himachal Pradesh	185	727	67	39	0	54	
Jammu and Kashmir	12	562	42	44	24	7	
Jharkhand	0	575	16	0	0	0	
Karnataka	1096	5297	615	608	598	1470	
Kerala	13	829	272	13	451	538	
Madhya Pradesh	974	5165	837	949	685	771	
Maharashtra	477	4020	458	465	83	869	
Manipur	31	151	40	12	228	4	
Meghalaya	113	606	182	177	162	143	

Mizoram	42	230	124	64	0	15
Nagaland	211	1055	160	197	0	144
Odisha	633	3886	607	284	0	1156
Puducherry	0	198	30	33	73	98
Punjab	104	1123	216	186	0	76
Rajasthan	947	2652	550	748	295	445
Sikkim	72	391	0	0	8	0
Tamil Nadu	503	2734	628	566	994	1124
Telangana	263	1369	252	192	206	341
Tripura	0	240	80	220	0	119
Uttar Pradesh	1121	9728	1741	774	269	958
Uttarakhand	361	1428	129	1	0	76
West Bengal	254	2217	356	710	0	731

category_of_crop state_name	Oilseeds	Other	Pulses	Spices	Vegetables
Andaman and Nicobar Islands	11	21	9	53	20
Andhra Pradesh	1134	715	1276	802	1048
Arunachal Pradesh	343	0	67	638	257
Assam	2097	1355	1642	1338	1781
Bihar	2506	2001	2781	1396	1775
Chandigarh	7	3	15	0	26
Chhattisgarh	1565	1096	1634	1308	1155
Dadra and Nagar Haveli	30	24	49	1	0
Goa	0	32	16	12	0
Gujarat	1034	576	1383	518	473
Haryana	681	480	1012	367	505
Himachal Pradesh	239	196	415	356	216
Jammu and Kashmir	234	217	181	115	196
Jharkhand	124	0	304	0	247
Karnataka	3148	1738	2184	2605	1763
Kerala	184	305	66	907	683
Madhya Pradesh	3368	1385	3328	2741	2740
Maharashtra	3282	879	2039	0	56
Manipur	49	120	59	226	347
Meghalaya	329	141	173	442	399
Mizoram	143	113	130	0	96
Nagaland	718	430	558	131	302
Odisha	2351	1205	1632	912	909
Puducherry	52	138	79	90	85
Punjab	513	318	637	0	0
Rajasthan	1761	959	1767	1286	1104
Sikkim	91	12	132	0	8
Tamil Nadu	1279	852	1481	1510	1876
Telangana	791	417	818	584	416
Tripura	144	234	355	0	20
Uttar Pradesh	4057	2964	5429	2531	3734

Uttarakhand	640	346	979	425	511
West Bengal	1549	1128	1355	692	621

[25]:
```
df1.plot(kind='bar',stacked=True,figsize = (20,9));
```

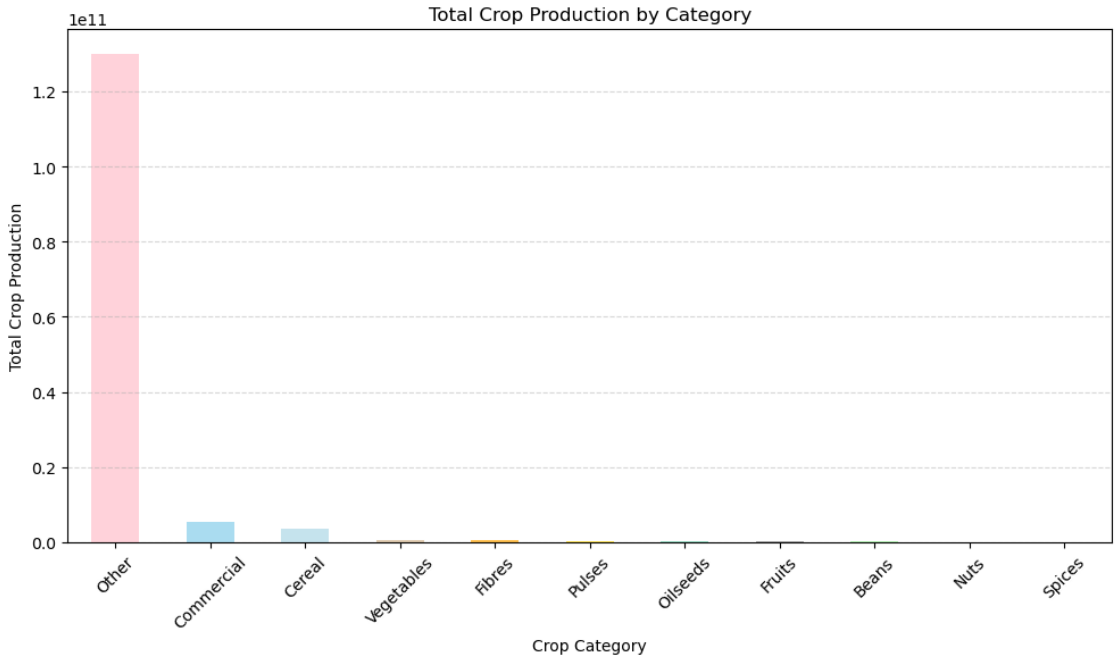


9.1 which category has high crop production

[26]:
```
import pandas as pd
import matplotlib.pyplot as plt

def categorize_crop(crop):
    crop_categories = {
        'Rice': 'Cereal', 'Maize': 'Cereal', 'Wheat': 'Cereal', 'Barley':␣
 ↪'Cereal', 'Varagu': 'Cereal',
        'Other Cereals & Millets': 'Cereal', 'Ragi': 'Cereal', 'Small millets':␣
 ↪'Cereal', 'Bajra': 'Cereal',
        'Jowar': 'Cereal', 'Paddy': 'Cereal', 'Total foodgrain': 'Cereal',␣
 ↪'Jobster': 'Cereal',
        'Moong': 'Pulses', 'Urad': 'Pulses', 'Arhar/Tur': 'Pulses', 'Peas &␣
 ↪beans': 'Pulses', 'Masoor': 'Pulses',
        'Other Kharif pulses': 'Pulses', 'other misc. pulses': 'Pulses',␣
 ↪'Ricebean (nagadal)': 'Pulses',
        'Rajmash Kholar': 'Pulses', 'Lentil': 'Pulses', 'Samai': 'Pulses',␣
 ↪'Blackgram': 'Pulses', 'Korra': 'Pulses',
```

```
      'Cowpea(Lobia)': 'Pulses', 'Other Rabi pulses': 'Pulses', 'Pulses␣
↪total': 'Pulses', 'Gram': 'Pulses',
      'Peach': 'Fruits', 'Apple': 'Fruits', 'Litchi': 'Fruits', 'Pear':␣
↪'Fruits', 'Plums': 'Fruits', 'Ber': 'Fruits',
      'Sapota': 'Fruits', 'Lemon': 'Fruits', 'Pome Granet': 'Fruits', 'Other␣
↪Citrus Fruit': 'Fruits',
      'Water Melon': 'Fruits', 'Jack Fruit': 'Fruits', 'Grapes': 'Fruits',␣
↪'Pineapple': 'Fruits', 'Orange': 'Fruits',
      'Pome Fruit': 'Fruits', 'Citrus Fruit': 'Fruits', 'Other Fresh Fruits':␣
↪'Fruits', 'Mango': 'Fruits',
      'Papaya': 'Fruits', 'Coconut': 'Fruits', 'Banana': 'Fruits', 'Bean':␣
↪'Beans', 'Lab-Lab': 'Beans', 'Moth': 'Beans',
      'Guar seed': 'Beans', 'Soyabean': 'Beans', 'Horse-gram': 'Beans',␣
↪'Turnip': 'Vegetables', 'Peas': 'Vegetables',
      'Beet Root': 'Vegetables', 'Carrot': 'Vegetables', 'Yam': 'Vegetables',␣
↪'Ribed Guard': 'Vegetables',
      'Ash Gourd': 'Vegetables', 'Pump Kin': 'Vegetables', 'Redish':␣
↪'Vegetables', 'Snak Guard': 'Vegetables',
      'Bottle Gourd': 'Vegetables', 'Bitter Gourd': 'Vegetables', 'Cucumber':␣
↪'Vegetables', 'Drum Stick': 'Vegetables',
      'Cauliflower': 'Vegetables', 'Beans & Mutter(Vegetable)': 'Vegetables',␣
↪'Cabbage': 'Vegetables', 'Bhindi': 'Vegetables',
      'Tomato': 'Vegetables', 'Brinjal': 'Vegetables', 'Khesari':␣
↪'Vegetables', 'Sweet potato': 'Vegetables',
      'Potato': 'Vegetables', 'Onion': 'Vegetables', 'Tapioca': 'Vegetables',␣
↪'Colocosia': 'Vegetables',
      'Perilla': 'Spices', 'Ginger': 'Spices', 'Cardamom': 'Spices', 'Black␣
↪pepper': 'Spices', 'Dry ginger': 'Spices',
      'Garlic': 'Spices', 'Coriander': 'Spices', 'Turmeric': 'Spices', 'Dry␣
↪chillies': 'Spices', 'Cond-spcs other': 'Spices',
      'other fibres': 'Fibres', 'Kapas': 'Fibres', 'Jute & mesta': 'Fibres',␣
↪'Jute': 'Fibres', 'Mesta': 'Fibres',
      'Cotton(lint)': 'Fibres', 'Sannhamp': 'Fibres', 'Arcanut (Processed)':␣
↪'Nuts', 'Atcanut (Raw)': 'Nuts',
      'Cashewnut Processed': 'Nuts', 'Cashewnut Raw': 'Nuts', 'Cashewnut':␣
↪'Nuts', 'Arecanut': 'Nuts',
      'Groundnut': 'Nuts', 'other oilseeds': 'Oilseeds', 'Safflower':␣
↪'Oilseeds', 'Niger seed': 'Oilseeds',
      'Castor seed': 'Oilseeds', 'Linseed': 'Oilseeds', 'Sunflower':␣
↪'Oilseeds', 'Rapeseed &Mustard': 'Oilseeds',
      'Sesamum': 'Oilseeds', 'Oilseeds total': 'Oilseeds', 'Tobacco':␣
↪'Commercial', 'Coffee': 'Commercial',
      'Tea': 'Commercial', 'Sugarcane': 'Commercial', 'Rubber': 'Commercial'
  }
```

```
    return crop_categories.get(crop, 'Other')

crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()

crop_data['category_of_crop'] = crop_data['crop'].apply(categorize_crop)

category_production = crop_data.groupby('category_of_crop')['production'].sum()

plt.figure(figsize=(10, 6))

colors = {
    'Cereal': 'skyblue',
    'Pulses': 'lightgreen',
    'Fruits': 'orange',
    'Beans': 'pink',
    'Vegetables': 'lightcoral',
    'Spices': 'violet',
    'Fibres': 'tan',
    'Nuts': 'gold',
    'Oilseeds': 'mediumaquamarine',
    'Commercial': 'lightblue',
    'Other': 'gray'
}

category_production.sort_values(ascending=False).plot(kind='bar', color=[colors.
 ↪get(cat, 'gray') for cat in category_production.index], alpha=0.7)

plt.xlabel('Crop Category')
plt.ylabel('Total Crop Production')
plt.title('Total Crop Production by Category')
plt.xticks(rotation=45)
plt.grid(axis='y', linestyle='--', alpha=0.5)
plt.tight_layout()
plt.show()
```



<> The category which is having high production is “other” <> comparitively the seond high producing category is “commercial” crops

10 what crops are there in “other” category

[27]:
```
import pandas as pd


def categorize_crop(crop):
    crop_categories = {
        'Rice': 'Cereal', 'Maize': 'Cereal', 'Wheat': 'Cereal', 'Barley':␣
 ↪'Cereal', 'Varagu': 'Cereal',
        'Other Cereals & Millets': 'Cereal', 'Ragi': 'Cereal', 'Small millets':␣
 ↪'Cereal', 'Bajra': 'Cereal',
        'Jowar': 'Cereal', 'Paddy': 'Cereal', 'Total foodgrain': 'Cereal',␣
 ↪'Jobster': 'Cereal',
        'Moong': 'Pulses', 'Urad': 'Pulses', 'Arhar/Tur': 'Pulses', 'Peas &␣
 ↪beans': 'Pulses', 'Masoor': 'Pulses',
        'Other Kharif pulses': 'Pulses', 'other misc. pulses': 'Pulses',␣
 ↪'Ricebean (nagadal)': 'Pulses',
        'Rajmash Kholar': 'Pulses', 'Lentil': 'Pulses', 'Samai': 'Pulses',␣
 ↪'Blackgram': 'Pulses', 'Korra': 'Pulses',
        'Cowpea(Lobia)': 'Pulses', 'Other Rabi pulses': 'Pulses', 'Pulses␣
 ↪total': 'Pulses', 'Gram': 'Pulses',
```

```
        'Peach': 'Fruits', 'Apple': 'Fruits', 'Litchi': 'Fruits', 'Pear':␣
↪'Fruits', 'Plums': 'Fruits', 'Ber': 'Fruits',
        'Sapota': 'Fruits', 'Lemon': 'Fruits', 'Pome Granet': 'Fruits', 'Other␣
↪Citrus Fruit': 'Fruits',
        'Water Melon': 'Fruits', 'Jack Fruit': 'Fruits', 'Grapes': 'Fruits',␣
↪'Pineapple': 'Fruits', 'Orange': 'Fruits',
        'Pome Fruit': 'Fruits', 'Citrus Fruit': 'Fruits', 'Other Fresh Fruits':␣
↪'Fruits', 'Mango': 'Fruits',
        'Papaya': 'Fruits', 'Coconut': 'Fruits', 'Banana': 'Fruits', 'Bean':␣
↪'Beans', 'Lab-Lab': 'Beans', 'Moth': 'Beans',
        'Guar seed': 'Beans', 'Soyabean': 'Beans', 'Horse-gram': 'Beans',␣
↪'Turnip': 'Vegetables', 'Peas': 'Vegetables',
        'Beet Root': 'Vegetables', 'Carrot': 'Vegetables', 'Yam': 'Vegetables',␣
↪'Ribed Guard': 'Vegetables',
        'Ash Gourd': 'Vegetables', 'Pump Kin': 'Vegetables', 'Redish':␣
↪'Vegetables', 'Snak Guard': 'Vegetables',
        'Bottle Gourd': 'Vegetables', 'Bitter Gourd': 'Vegetables', 'Cucumber':␣
↪'Vegetables', 'Drum Stick': 'Vegetables',
        'Cauliflower': 'Vegetables', 'Beans & Mutter(Vegetable)': 'Vegetables',␣
↪'Cabbage': 'Vegetables', 'Bhindi': 'Vegetables',
        'Tomato': 'Vegetables', 'Brinjal': 'Vegetables', 'Khesari':␣
↪'Vegetables', 'Sweet potato': 'Vegetables',
        'Potato': 'Vegetables', 'Onion': 'Vegetables', 'Tapioca': 'Vegetables',␣
↪'Colocosia': 'Vegetables',
        'Perilla': 'Spices', 'Ginger': 'Spices', 'Cardamom': 'Spices', 'Black␣
↪pepper': 'Spices', 'Dry ginger': 'Spices',
        'Garlic': 'Spices', 'Coriander': 'Spices', 'Turmeric': 'Spices', 'Dry␣
↪chillies': 'Spices', 'Cond-spcs other': 'Spices',
        'other fibres': 'Fibres', 'Kapas': 'Fibres', 'Jute & mesta': 'Fibres',␣
↪'Jute': 'Fibres', 'Mesta': 'Fibres',
        'Cotton(lint)': 'Fibres', 'Sannhamp': 'Fibres', 'Arcanut (Processed)':␣
↪'Nuts', 'Atcanut (Raw)': 'Nuts',
        'Cashewnut Processed': 'Nuts', 'Cashewnut Raw': 'Nuts', 'Cashewnut':␣
↪'Nuts', 'Arecanut': 'Nuts',
        'Groundnut': 'Nuts', 'other oilseeds': 'Oilseeds', 'Safflower':␣
↪'Oilseeds', 'Niger seed': 'Oilseeds',
        'Castor seed': 'Oilseeds', 'Linseed': 'Oilseeds', 'Sunflower':␣
↪'Oilseeds', 'Rapeseed &Mustard': 'Oilseeds',
        'Sesamum': 'Oilseeds', 'Oilseeds total': 'Oilseeds', 'Tobacco':␣
↪'Commercial', 'Coffee': 'Commercial',
        'Tea': 'Commercial', 'Sugarcane': 'Commercial', 'Rubber': 'Commercial'
    }
    return crop_categories.get(crop, 'Other')

crop_data = pd.read_csv("Crop Production data.csv")
```

```
crop_data.columns = crop_data.columns.str.strip().str.lower()

crop_data['category_of_crop'] = crop_data['crop'].apply(categorize_crop)

other_crops = crop_data[crop_data['category_of_crop'] == 'Other']

other_crop_names = other_crops['crop'].unique()
print(other_crop_names)
```

```
['Coconut ' 'Moong(Green Gram)' 'Other  Rabi pulses' 'Other Vegetables'
 'Peas  (vegetable)' 'Peas & beans (Pulses)' 'Other Dry Fruit']
```

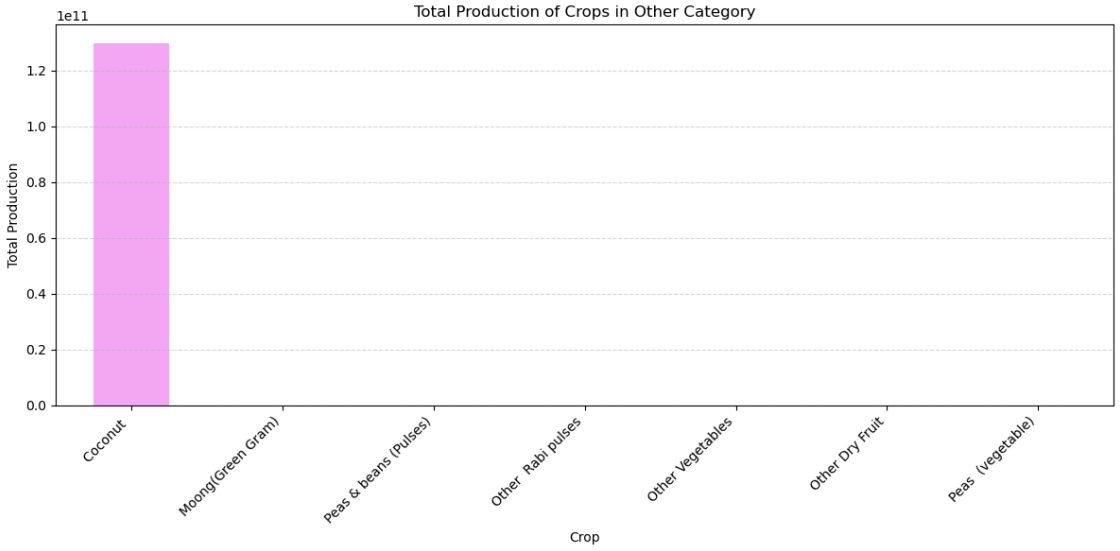
10.1 creating new csv file after adding new column column called "category_of_crop"

[28]:
```
import pandas as pd

# Define the crop categorization function
def categorize_crop(crop):
    crop_categories = {
        'Rice': 'Cereal', 'Maize': 'Cereal', 'Wheat': 'Cereal', 'Barley':␣
 ↪'Cereal', 'Varagu': 'Cereal',
        'Other Cereals & Millets': 'Cereal', 'Ragi': 'Cereal', 'Small millets':␣
 ↪'Cereal', 'Bajra': 'Cereal',
        'Jowar': 'Cereal', 'Paddy': 'Cereal', 'Total foodgrain': 'Cereal',␣
 ↪'Jobster': 'Cereal',
        'Moong': 'Pulses', 'Urad': 'Pulses', 'Arhar/Tur': 'Pulses', 'Peas &␣
 ↪beans': 'Pulses', 'Masoor': 'Pulses',
        'Other Kharif pulses': 'Pulses', 'other misc. pulses': 'Pulses',␣
 ↪'Ricebean (nagadal)': 'Pulses',
        'Rajmash Kholar': 'Pulses', 'Lentil': 'Pulses', 'Samai': 'Pulses',␣
 ↪'Blackgram': 'Pulses', 'Korra': 'Pulses',
        'Cowpea(Lobia)': 'Pulses', 'Other Rabi pulses': 'Pulses', 'Pulses␣
 ↪total': 'Pulses', 'Gram': 'Pulses',
        'Peach': 'Fruits', 'Apple': 'Fruits', 'Litchi': 'Fruits', 'Pear':␣
 ↪'Fruits', 'Plums': 'Fruits', 'Ber': 'Fruits',
        'Sapota': 'Fruits', 'Lemon': 'Fruits', 'Pome Granet': 'Fruits', 'Other␣
 ↪Citrus Fruit': 'Fruits',
        'Water Melon': 'Fruits', 'Jack Fruit': 'Fruits', 'Grapes': 'Fruits',␣
 ↪'Pineapple': 'Fruits', 'Orange': 'Fruits',
        'Pome Fruit': 'Fruits', 'Citrus Fruit': 'Fruits', 'Other Fresh Fruits':␣
 ↪'Fruits', 'Mango': 'Fruits',
        'Papaya': 'Fruits', 'Coconut': 'Fruits', 'Banana': 'Fruits', 'Bean':␣
 ↪'Beans', 'Lab-Lab': 'Beans', 'Moth': 'Beans',
```

```
        'Guar seed': 'Beans', 'Soyabean': 'Beans', 'Horse-gram': 'Beans',␣
↪'Turnip': 'Vegetables', 'Peas': 'Vegetables',
        'Beet Root': 'Vegetables', 'Carrot': 'Vegetables', 'Yam': 'Vegetables',␣
↪'Ribed Guard': 'Vegetables',
        'Ash Gourd': 'Vegetables', 'Pump Kin': 'Vegetables', 'Redish':␣
↪'Vegetables', 'Snak Guard': 'Vegetables',
        'Bottle Gourd': 'Vegetables', 'Bitter Gourd': 'Vegetables', 'Cucumber':␣
↪'Vegetables', 'Drum Stick': 'Vegetables',
        'Cauliflower': 'Vegetables', 'Beans & Mutter(Vegetable)': 'Vegetables',␣
↪'Cabbage': 'Vegetables', 'Bhindi': 'Vegetables',
        'Tomato': 'Vegetables', 'Brinjal': 'Vegetables', 'Khesari':␣
↪'Vegetables', 'Sweet potato': 'Vegetables',
        'Potato': 'Vegetables', 'Onion': 'Vegetables', 'Tapioca': 'Vegetables',␣
↪'Colocosia': 'Vegetables',
        'Perilla': 'Spices', 'Ginger': 'Spices', 'Cardamom': 'Spices', 'Black␣
↪pepper': 'Spices', 'Dry ginger': 'Spices',
        'Garlic': 'Spices', 'Coriander': 'Spices', 'Turmeric': 'Spices', 'Dry␣
↪chillies': 'Spices', 'Cond-spcs other': 'Spices',
        'other fibres': 'Fibres', 'Kapas': 'Fibres', 'Jute & mesta': 'Fibres',␣
↪'Jute': 'Fibres', 'Mesta': 'Fibres',
        'Cotton(lint)': 'Fibres', 'Sannhamp': 'Fibres', 'Arcanut (Processed)':␣
↪'Nuts', 'Atcanut (Raw)': 'Nuts',
        'Cashewnut Processed': 'Nuts', 'Cashewnut Raw': 'Nuts', 'Cashewnut':␣
↪'Nuts', 'Arecanut': 'Nuts',
        'Groundnut': 'Nuts', 'other oilseeds': 'Oilseeds', 'Safflower':␣
↪'Oilseeds', 'Niger seed': 'Oilseeds',
        'Castor seed': 'Oilseeds', 'Linseed': 'Oilseeds', 'Sunflower':␣
↪'Oilseeds', 'Rapeseed &Mustard': 'Oilseeds',
        'Sesamum': 'Oilseeds', 'Oilseeds total': 'Oilseeds', 'Tobacco':␣
↪'Commercial', 'Coffee': 'Commercial',
        'Tea': 'Commercial', 'Sugarcane': 'Commercial', 'Rubber': 'Commercial'
    }
    return crop_categories.get(crop, 'Other')
crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()

crop_data['category_of_crop'] = crop_data['crop'].apply(categorize_crop)

crop_data.to_csv("Crop Production data with Categories.csv", index=False)
```

11 THE FIRST HIGHEST CATEGORY : OTHER CROPS

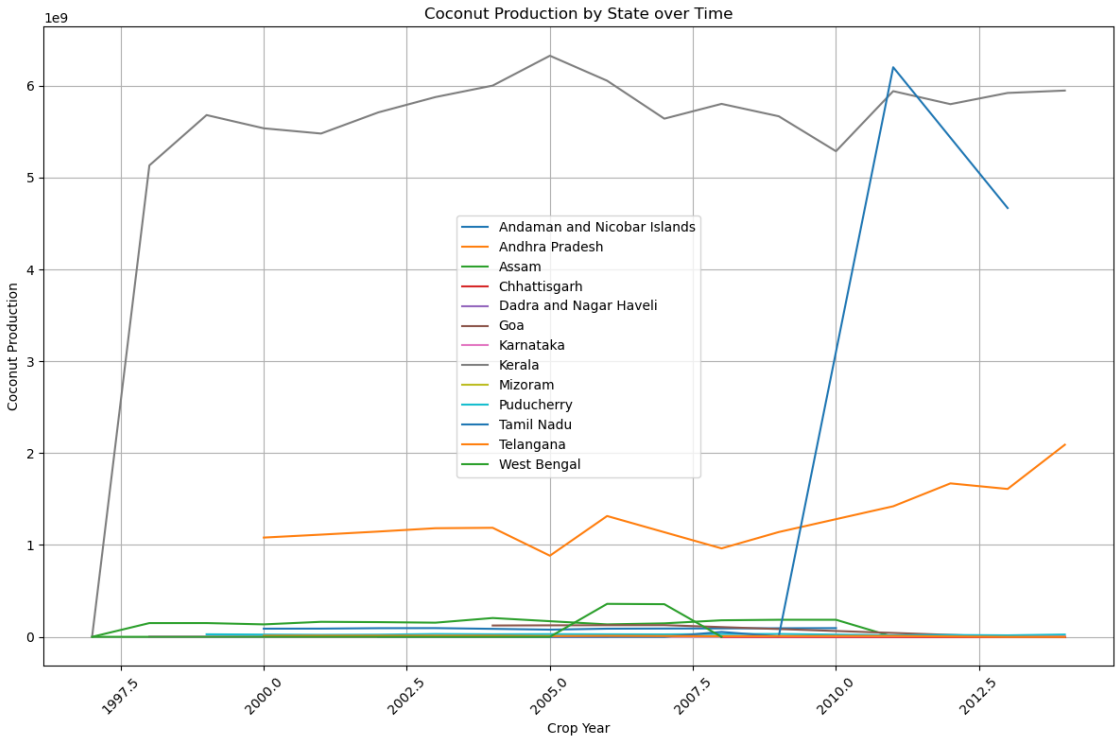
[29]:
```
crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()
crop_data['category_of_crop'] = crop_data['crop'].apply(categorize_crop)

other_crop_data = crop_data[crop_data['category_of_crop'] == 'Other']

other_crop_production = other_crop_data.groupby('crop')['production'].sum()


plt.figure(figsize=(12, 6))
other_crop_production.sort_values(ascending=False).plot(kind='bar',␣
 ↪color='violet', alpha=0.7)

plt.xlabel('Crop')
plt.ylabel('Total Production')
plt.title('Total Production of Crops in Other Category')
plt.xticks(rotation=45, ha='right')
plt.grid(axis='y', linestyle='--', alpha=0.5)
plt.tight_layout()
plt.show()
```



[ ]:

12 STATE WHICH IS PRODUCING HIGHEST COCONUT CROP

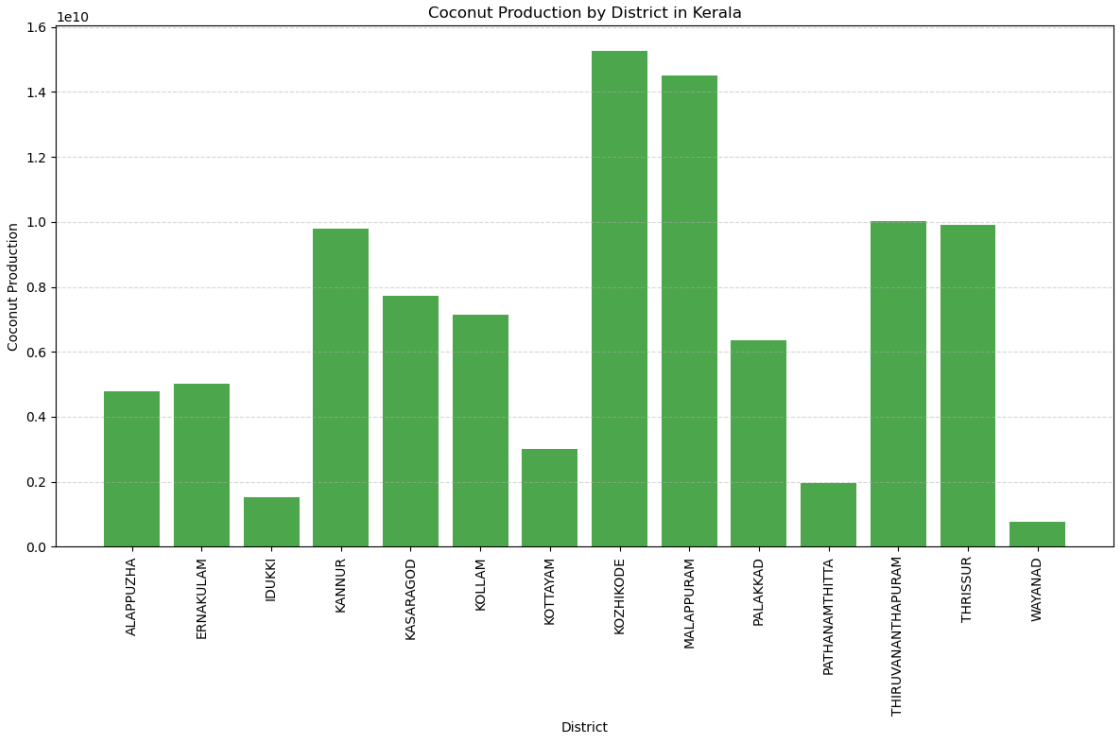
[30]:
```
import pandas as pd
import matplotlib.pyplot as plt

crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()

coconut_data = crop_data[crop_data['crop'].str.contains('Coconut', case=False)]

coconut_production_by_state = coconut_data.groupby(['state_name',␣
 ↪'crop_year'])['production'].sum().reset_index()

plt.figure(figsize=(12, 8))

for state_name in coconut_production_by_state['state_name'].unique():
    state_data =␣
 ↪coconut_production_by_state[coconut_production_by_state['state_name'] ==␣
 ↪state_name]
    plt.plot(state_data['crop_year'], state_data['production'],␣
 ↪label=state_name)

plt.xlabel('Crop Year')
plt.ylabel('Coconut Production')
plt.title('Coconut Production by State over Time')
plt.legend()
plt.grid(True)
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```



" KERALA "IS THE STATE WHICH IS PRODUCING HIGHEST COCONUT CROP ALL OVER THE INDIA CONSTANTLY

[31]:
```
import pandas as pd
import matplotlib.pyplot as plt

crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()

kerala_coconut_data = crop_data[(crop_data['state_name'] == 'Kerala') &
                                (crop_data['crop'].str.contains('Coconut',␣
 ↪case=False))]


district_coconut_production = kerala_coconut_data.
 ↪groupby('district_name')['production'].sum()


plt.figure(figsize=(12, 8))


labels = district_coconut_production.index
values = district_coconut_production.values
```

```
# Plotting the bar chart
plt.bar(labels, values, color='green', alpha=0.7)

plt.xlabel('District')
plt.ylabel('Coconut Production')
plt.title('Coconut Production by District in Kerala')
plt.xticks(rotation=90)
plt.grid(axis='y', linestyle='--', alpha=0.5)
plt.tight_layout()
plt.show()
```



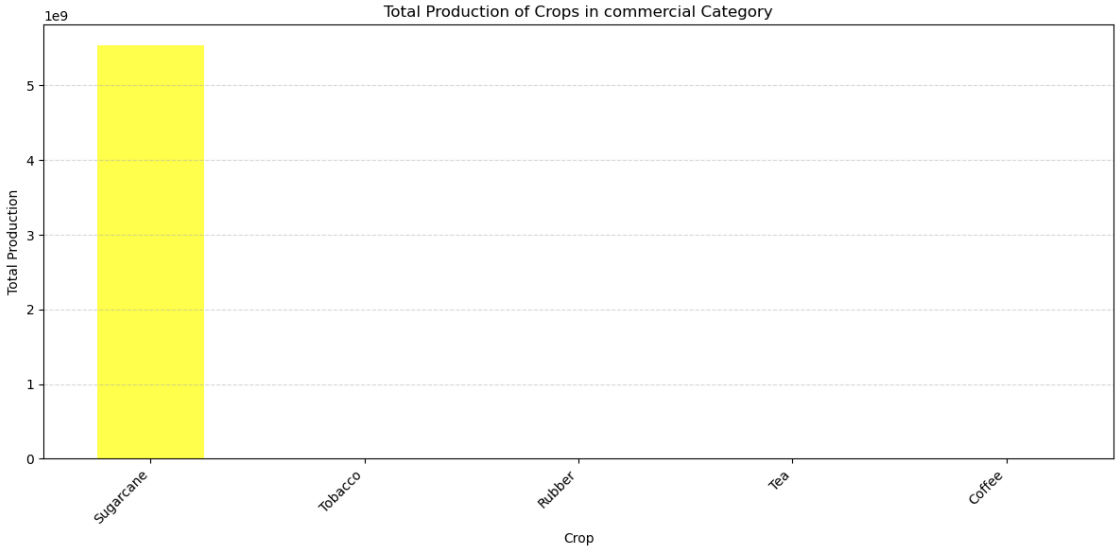
"kozhikode" is the district which is producing highest coconut crop in "kerala".

"malappuram" is the district which is producing second highest coconut crop in "kerala"

13 THE SECOND HIGHEST CATEGORY : COMMERCIAL CROPS

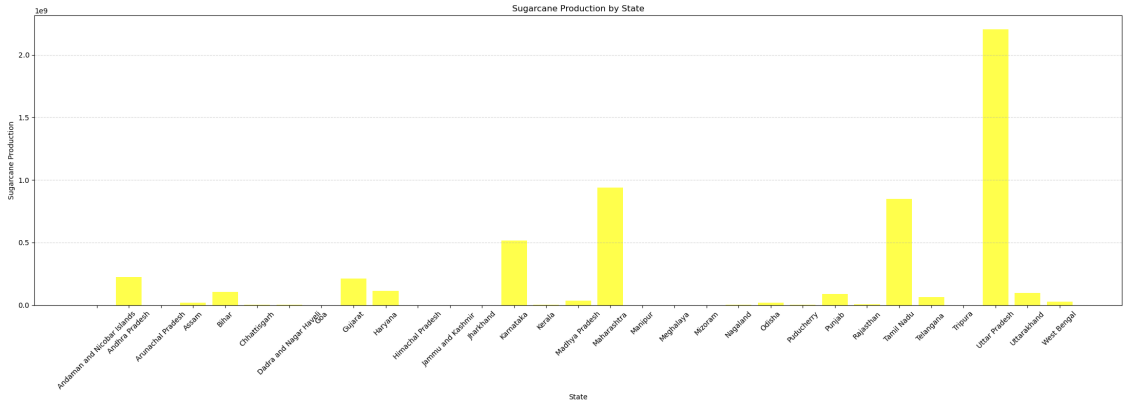
[32]:
```
crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()
crop_data['category_of_crop'] = crop_data['crop'].apply(categorize_crop)
```

```
other_crop_data = crop_data[crop_data['category_of_crop'] == 'Commercial']

other_crop_production = other_crop_data.groupby('crop')['production'].sum()


plt.figure(figsize=(12, 6))
other_crop_production.sort_values(ascending=False).plot(kind='bar',␣
 ↪color='yellow', alpha=0.7)

plt.xlabel('Crop')
plt.ylabel('Total Production')
plt.title('Total Production of Crops in commercial Category')
plt.xticks(rotation=45, ha='right')
plt.grid(axis='y', linestyle='--', alpha=0.5)
plt.tight_layout()
plt.show()
```



[33]:
```
import pandas as pd
import matplotlib.pyplot as plt

crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()

sugarcane_data = crop_data[crop_data['crop'].str.contains('Sugarcane',␣
 ↪case=False)]
```

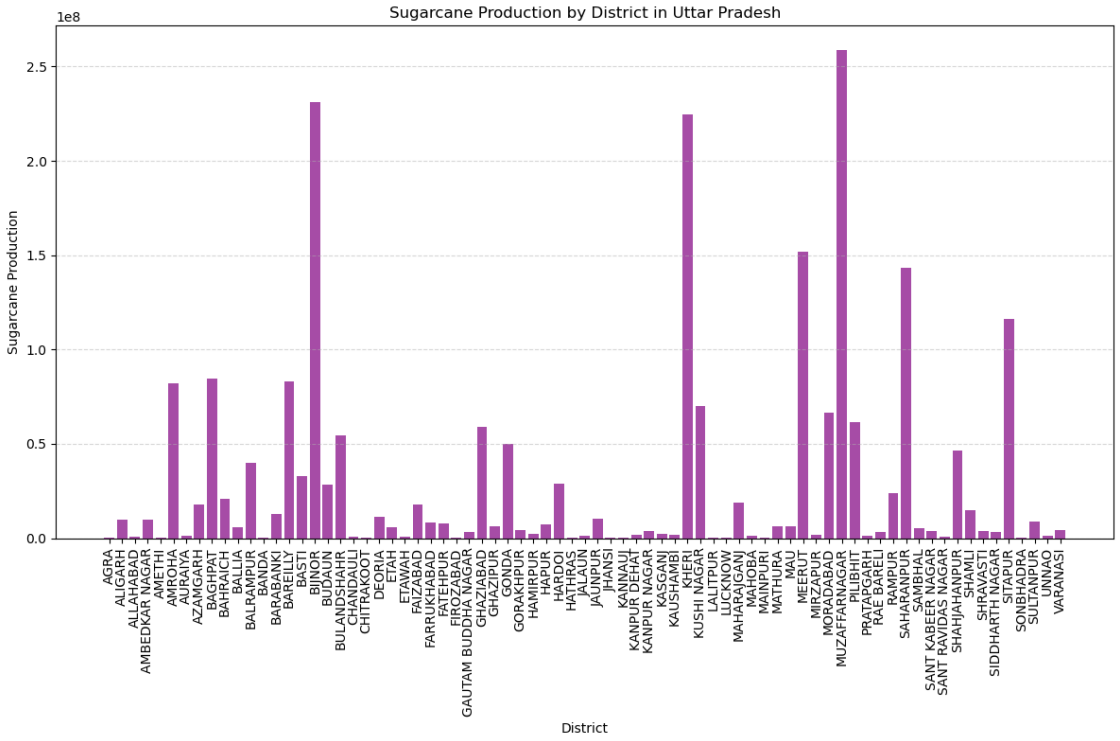
```
sugarcane_production_by_state = sugarcane_data.
 ↪groupby('state_name')['production'].sum()

plt.figure(figsize=(22, 8))
labels = sugarcane_production_by_state.index
values = sugarcane_production_by_state.values

plt.bar(labels, values, color='yellow', alpha=0.7)

plt.xlabel('State')
plt.ylabel('Sugarcane Production')
plt.title('Sugarcane Production by State')
plt.xticks(rotation=45)
plt.grid(axis='y', linestyle='--', alpha=0.5)
plt.tight_layout()
plt.show()
```



" UTTAR PRADESH" "IS THE STATE WHICH IS PRODUCING HIGHEST"SUGARCANE" CROP ALL OVER THE INDIA CONSTANTLY

[34]:
```
import pandas as pd
import matplotlib.pyplot as plt

crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()

up_sugarcane_data = crop_data[(crop_data['state_name'] == 'Uttar Pradesh') &
                              (crop_data['crop'].str.contains('Sugarcane',␣
 ↪case=False))]

district_sugarcane_production = up_sugarcane_data.
 ↪groupby('district_name')['production'].sum()
```

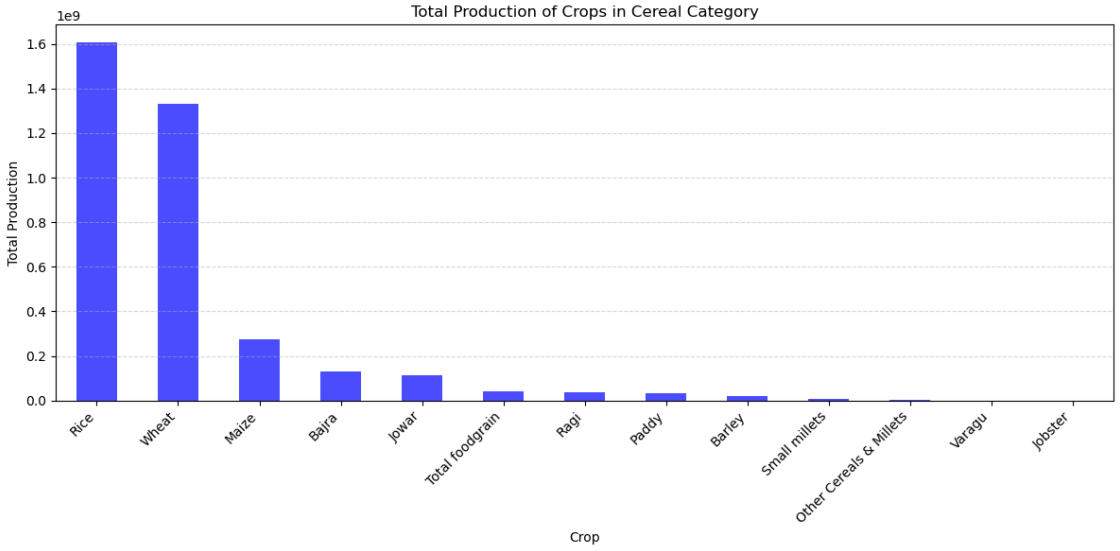
```
plt.figure(figsize=(12, 8))

labels = district_sugarcane_production.index
values = district_sugarcane_production.values

plt.bar(labels, values, color='purple', alpha=0.7)

plt.xlabel('District')
plt.ylabel('Sugarcane Production')
plt.title('Sugarcane Production by District in Uttar Pradesh')
plt.xticks(rotation=90)
plt.grid(axis='y', linestyle='--', alpha=0.5)
plt.tight_layout()
plt.show()
```



"MUZAFFARNAGAR" is the district which is producing highest "SUGARCANE" crop in "UTTAR PRADESH"

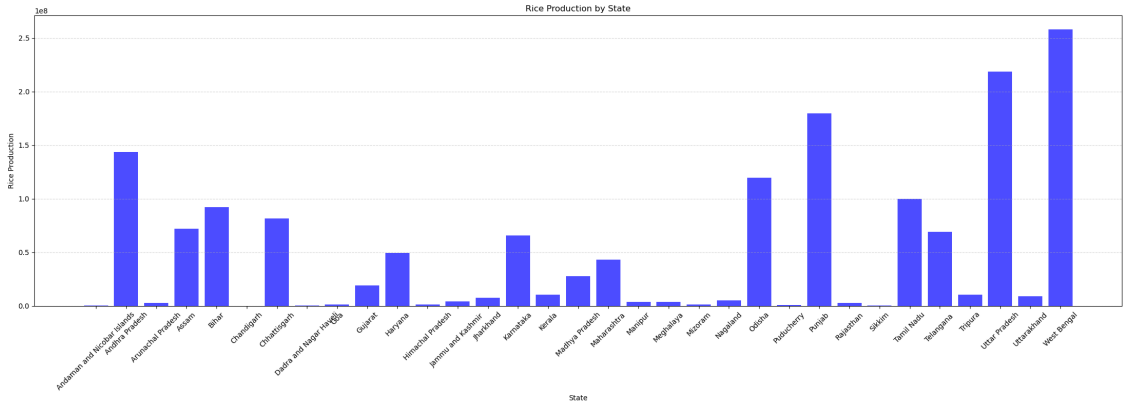
14 THE THIRD HIGHEST CATEGORY : CEREAL CROPS

[35]:
```
crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()
crop_data['category_of_crop'] = crop_data['crop'].apply(categorize_crop)

other_crop_data = crop_data[crop_data['category_of_crop'] == 'Cereal']

other_crop_production = other_crop_data.groupby('crop')['production'].sum()


plt.figure(figsize=(12, 6))
other_crop_production.sort_values(ascending=False).plot(kind='bar',␣
 ↪color='blue', alpha=0.7)

plt.xlabel('Crop')
plt.ylabel('Total Production')
plt.title('Total Production of Crops in Cereal Category')
plt.xticks(rotation=45, ha='right')
plt.grid(axis='y', linestyle='--', alpha=0.5)
plt.tight_layout()
plt.show()
```



15 STATE WHICH IS PRODUCING HIGHEST RICE CROP

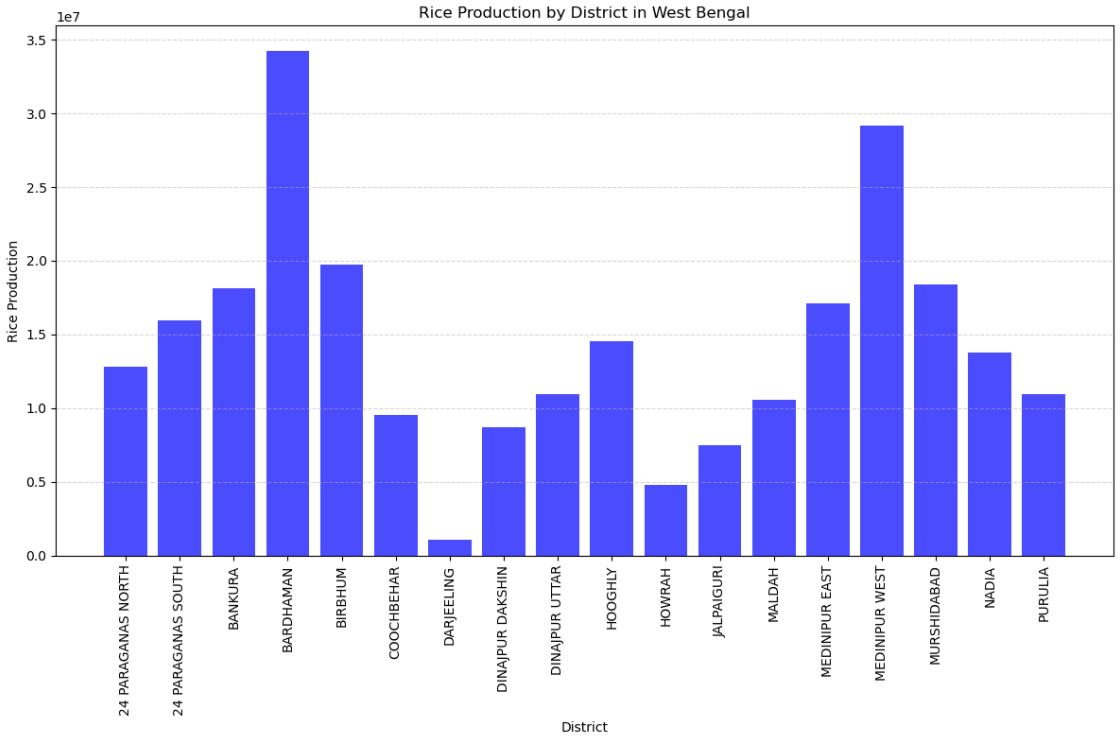
[38]:
```
import pandas as pd
import matplotlib.pyplot as plt

crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()

Rice_data = crop_data[crop_data['crop'].str.contains('Rice', case=False)]

Rice_production_by_state = Rice_data.groupby('state_name')['production'].sum()

plt.figure(figsize=(22, 8))
labels =Rice_production_by_state.index
values = Rice_production_by_state.values

plt.bar(labels, values, color='blue', alpha=0.7)

plt.xlabel('State')
plt.ylabel('Rice Production')
plt.title('Rice Production by State')
plt.xticks(rotation=45)
plt.grid(axis='y', linestyle='--', alpha=0.5)
plt.tight_layout()
plt.show()
```



" WEST BENGAL" "IS THE STATE WHICH IS PRODUCING HIGHEST"RICE" CROP ALL OVER THE INDIA CONSTANTLY

[46]:
```
import pandas as pd
import matplotlib.pyplot as plt
```

```
crop_data = pd.read_csv("Crop Production data.csv")

crop_data.columns = crop_data.columns.str.strip().str.lower()

up_Rice_data = crop_data[(crop_data['state_name'] == 'West Bengal') &
                         (crop_data['crop'].str.contains('Rice',␣
 ↪case=False))]

district_Rice_production = up_Rice_data.groupby('district_name')['production'].
 ↪sum()

plt.figure(figsize=(12, 8))

labels = district_Rice_production.index
values = district_Rice_production.values

plt.bar(labels, values, color='blue', alpha=0.7)

plt.xlabel('District')
plt.ylabel('Rice Production')
plt.title('Rice Production by District in West Bengal')
plt.xticks(rotation=90)
plt.grid(axis='y', linestyle='--', alpha=0.5)
plt.tight_layout()
plt.show()
```



” BARDHAMAN” “IS THE STATE WHICH IS PRODUCING HIGHEST”RICE” CROP in “WEST BENGAL”

[ ]: