In [1]:
```
# importing necessary libraries

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
# loading the dataset

crop_data=pd.read_csv("C:\\Users\\Admin\\Downloads\\crop_production.csv")
crop_data
```

Out[2]:

	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	Rice	306.0	801.0
246087	West Bengal	PURULIA	2014	Summer	Sesamum	627.0	463.0
246088	West Bengal	PURULIA	2014	Whole Year	Sugarcane	324.0	16250.0
246089	West Bengal	PURULIA	2014	Winter	Rice	279151.0	597899.0
246090	West Bengal	PURULIA	2014	Winter	Sesamum	175.0	88.0

246091 rows × 7 columns

Exploratory Data Analysis and Data Pre-processing

In [3]:
```
crop_data.shape

#rows X columns
```

Out[3]:
```
(246091, 7)
```

In [4]:
```
# dataset columns
crop_data.columns
```

Out[4]:
```
Index(['State_Name', 'District_Name', 'Crop_Year', 'Season', 'Crop', 'Area',
       'Production'],
      dtype='object')
```

In [5]:
```
# statistical inference of the dataset

crop_data.describe()
```

Out[5]:

	Crop_Year	Area	Production
count	246091.000000	2.460910e+05	2.423610e+05
mean	2005.643018	1.200282e+04	5.825034e+05
std	4.952164	5.052340e+04	1.706581e+07
min	1997.000000	4.000000e-02	0.000000e+00
25%	2002.000000	8.000000e+01	8.800000e+01
50%	2006.000000	5.820000e+02	7.290000e+02
75%	2010.000000	4.392000e+03	7.023000e+03
max	2015.000000	8.580100e+06	1.250800e+09

In [6]:
```
# viewing unique crops available in the dataset

print(crop_data['Crop'].unique())
```

```
['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' 'Bajra' 'Castor seed'
 'Cotton(lint)' 'Horse-gram' 'Jowar' 'Korra' 'Ragi' 'Tobacco' 'Gram'
 'Wheat' 'Masoor' 'Sesamum' 'Linseed' 'Safflower' 'Onion'
 'other misc. pulses' 'Samai' 'Small millets' 'Coriander' 'Potato'
 '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)' 'Lemon'
 'Pome Granet' 'Sapota' 'Cabbage' 'Peas  (vegetable)' 'Niger seed'
 'Bottle Gourd' 'Sannhamp' 'Varagu' 'Garlic' 'Ginger' 'Oilseeds total'
 'Pulses total' 'Jute' 'Peas & beans (Pulses)' 'Blackgram' 'Paddy'
 'Pineapple' 'Barley' 'Khesari' 'Guar seed' 'Moth'
 'Other Cereals & Millets' 'Cond-spcs other' 'Turnip' 'Carrot' 'Redish'
 'Arcanut (Processed)' 'Atcanut (Raw)' 'Cashewnut Processed'
 'Cashewnut Raw' 'Cardamom' 'Rubber' 'Bitter Gourd' 'Drum Stick'
 'Jack Fruit' 'Snak Guard' 'Pump Kin' 'Tea' 'Coffee' 'Cauliflower'
 'Other Citrus Fruit' 'Water Melon' 'Total foodgrain' 'Kapas' 'Colocosia'
 'Lentil' 'Bean' 'Jobster' 'Perilla' 'Rajmash Kholar' 'Ricebean (nagadal)'
 'Ash Gourd' 'Beet Root' 'Lab-Lab' 'Ribed Guard' 'Yam' 'Apple' 'Peach'
 'Pear' 'Plums' 'Litchi' 'Ber' 'Other Dry Fruit' 'Jute & mesta']
```

In [7]:
```
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
```

In [8]:
```
# Checking missing values of the dataset in each column
crop_data.isnull().sum()
```

Out[8]:
```
State_Name          0
District_Name       0
Crop_Year           0
Season              0
Crop                0
Area                0
Production       3730
dtype: int64
```

In [9]:
```
# Dropping missing values
crop_data = crop_data.dropna()
crop_data
```

Out[9]:

	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	Rice	306.0	801.0
246087	West Bengal	PURULIA	2014	Summer	Sesamum	627.0	463.0
246088	West Bengal	PURULIA	2014	Whole Year	Sugarcane	324.0	16250.0
246089	West Bengal	PURULIA	2014	Winter	Rice	279151.0	597899.0
246090	West Bengal	PURULIA	2014	Winter	Sesamum	175.0	88.0

242361 rows × 7 columns

In [10]:
```
#checking
crop_data.isnull().values.any()
```

Out[10]:
```
False
```

In [11]:
```
# Displaying State Names present in the dataset
crop_data.State_Name.unique()
```

Out[11]:
```
array(['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'],
      dtype=object)
```

In [12]:
```
# Adding a new column Yield which indicates Production per unit Area.

crop_data['Yield'] = (crop_data['Production'] / crop_data['Area'])
crop_data.head(10)
```

```
<ipython-input-12-21ef19bb9e83>:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  crop_data['Yield'] = (crop_data['Production'] / crop_data['Area'])
```

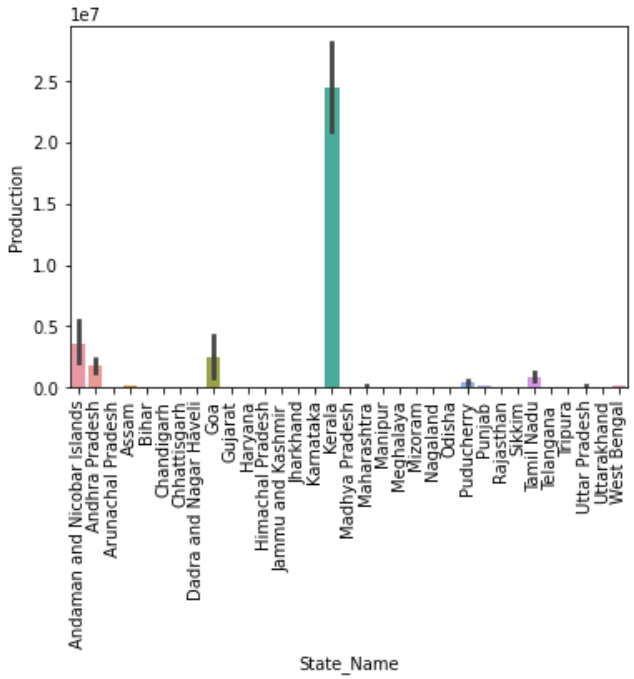
Out[12]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production	Yield
0	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	Arecanut	1254.0	2000.0	1.594896
1	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	Other Kharif pulses	2.0	1.0	0.500000
2	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	Rice	102.0	321.0	3.147059
3	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	Banana	176.0	641.0	3.642045
4	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	Cashewnut	720.0	165.0	0.229167
5	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	Coconut	18168.0	65100000.0	3583.223250
6	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	Dry ginger	36.0	100.0	2.777778
7	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	Sugarcane	1.0	2.0	2.000000
8	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	Sweet potato	5.0	15.0	3.000000
9	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	Tapioca	40.0	169.0	4.225000

Visualizing the dataset:

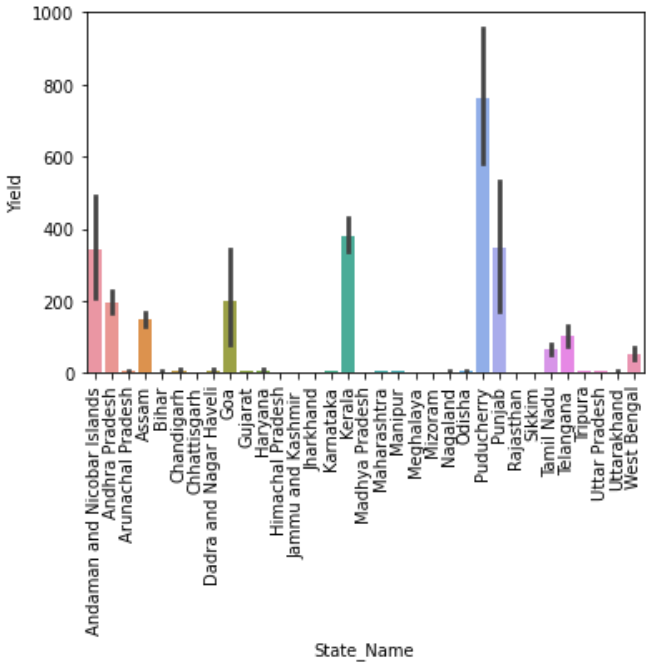
In [13]:
```
sns.barplot(crop_data["State_Name"], crop_data["Production"])
plt.xticks(rotation = 90)
```

Out[13]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32]),
 <a list of 33 Text major ticklabel objects>)
```



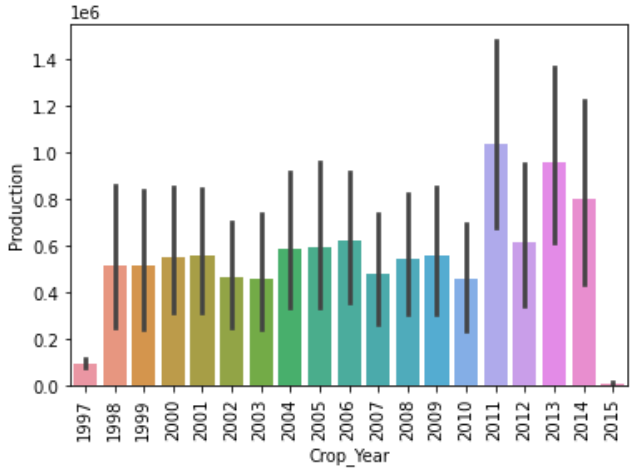
In [14]:
```
sns.barplot(crop_data["State_Name"], crop_data["Yield"])
plt.xticks(rotation = 90)
```

Out[14]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32]),
 <a list of 33 Text major ticklabel objects>)
```



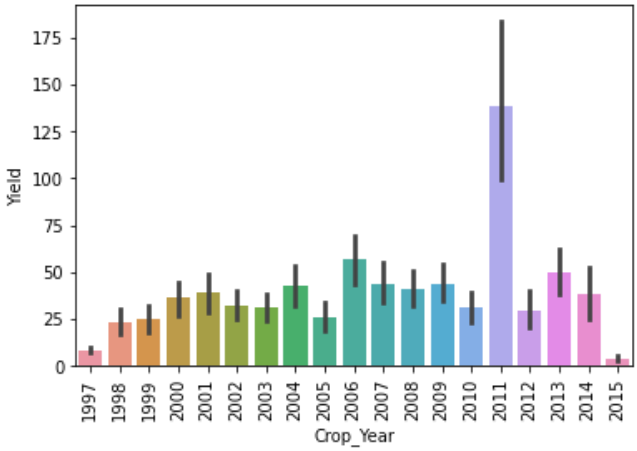
In [15]:
```
sns.barplot(crop_data["Crop_Year"], crop_data["Production"])
plt.xticks(rotation = 90)
```

Out[15]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18]),
 <a list of 19 Text major ticklabel objects>)
```



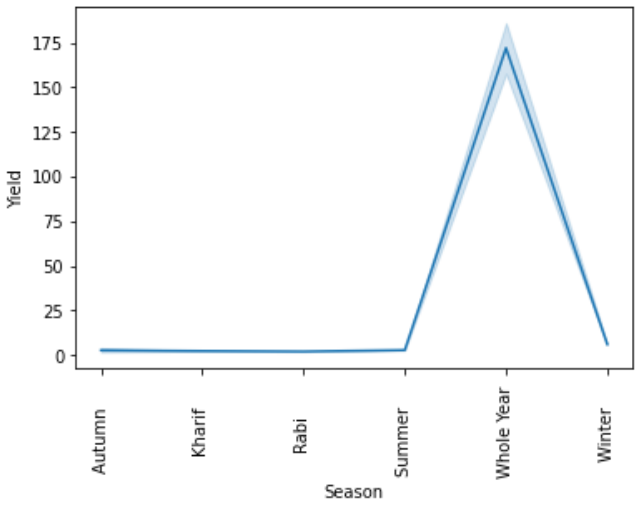
In [16]:
```
sns.barplot(crop_data["Crop_Year"], crop_data["Yield"])
plt.xticks(rotation = 90)
```

Out[16]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18]),
 <a list of 19 Text major ticklabel objects>)
```



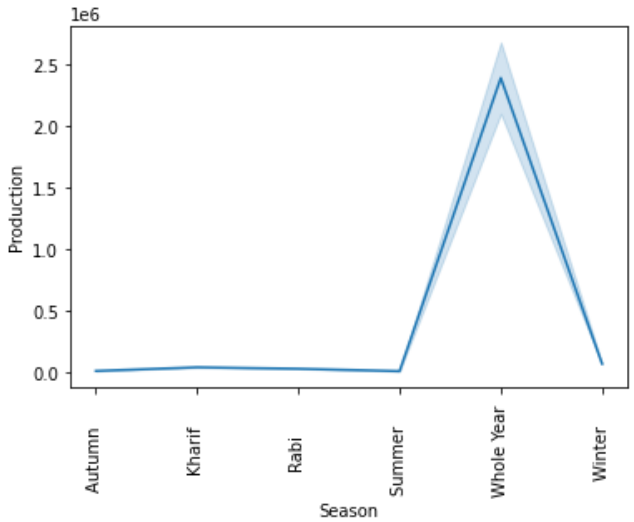
In [17]:
```
sns.lineplot(crop_data["Season"], crop_data["Yield"])
plt.xticks(rotation = 90)
```

Out[17]:
```
([0, 1, 2, 3, 4, 5], <a list of 6 Text major ticklabel objects>)
```



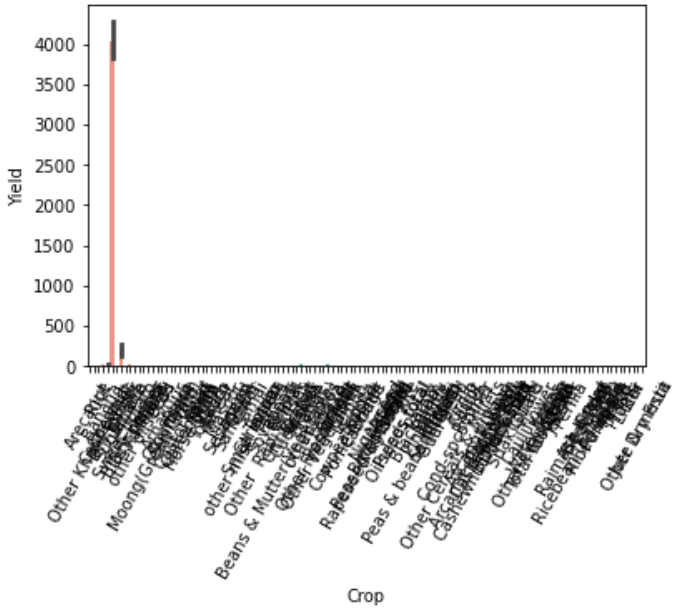
In [18]:
```
sns.lineplot(crop_data["Season"], crop_data["Production"])
plt.xticks(rotation = 90)
```

Out[18]:
```
([0, 1, 2, 3, 4, 5], <a list of 6 Text major ticklabel objects>)
```



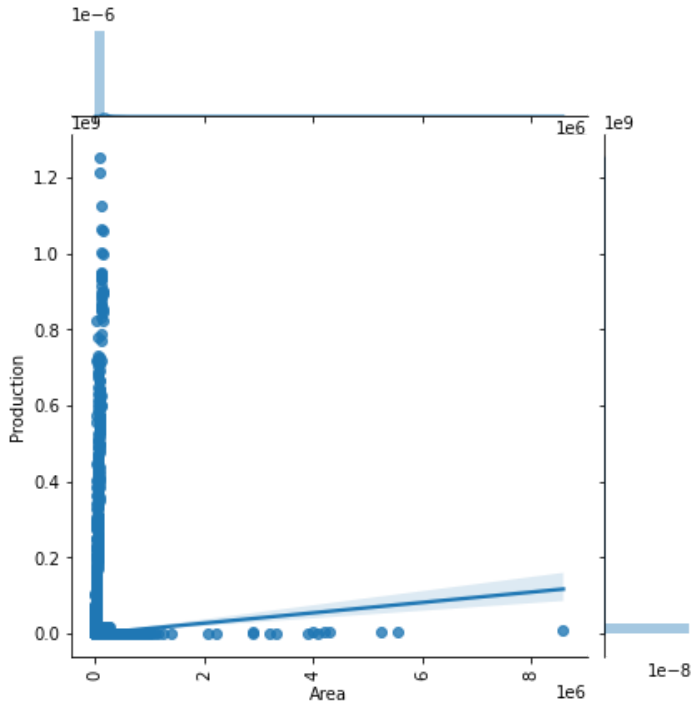
In [19]:
```
sns.barplot(crop_data["Crop"], crop_data["Yield"])
plt.xticks(rotation = 60)
```

Out[19]:
```
(array([  0,   1,   2,   3,   4,   5,   6,   7,   8,   9,  10,  11,  12,
         13,  14,  15,  16,  17,  18,  19,  20,  21,  22,  23,  24,  25,
         26,  27,  28,  29,  30,  31,  32,  33,  34,  35,  36,  37,  38,
         39,  40,  41,  42,  43,  44,  45,  46,  47,  48,  49,  50,  51,
         52,  53,  54,  55,  56,  57,  58,  59,  60,  61,  62,  63,  64,
         65,  66,  67,  68,  69,  70,  71,  72,  73,  74,  75,  76,  77,
         78,  79,  80,  81,  82,  83,  84,  85,  86,  87,  88,  89,  90,
         91,  92,  93,  94,  95,  96,  97,  98,  99, 100, 101, 102, 103,
        104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116,
        117, 118, 119, 120, 121, 122, 123]),
 <a list of 124 Text major ticklabel objects>)
```



In [20]:
```
sns.jointplot("Area","Production",data=crop_data,kind="reg")
plt.xticks(rotation=90)
```

Out[20]:
```
(array([-2000000.,        0.,  2000000.,  4000000.,  6000000.,  8000000.,
        10000000.]),
 <a list of 7 Text major ticklabel objects>)
```



Conclusions Obtained from the dataset:

1. Kerela is the largest producer of crop in India.
2. Production per unit area (Yield) of Puducherry is maximum.
3. In the year 2011, crop yield was maximum.

Analyzing each type of Crop:

1. RICE

In [21]:
```
rice_data = crop_data[crop_data["Crop"]=="Rice"]
rice_data
```

Out[21]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production	Yield
2	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	Rice	102.00	321.00	3.147059
12	Andaman and Nicobar Islands	NICOBARS	2001	Kharif	Rice	83.00	300.00	3.614458
18	Andaman and Nicobar Islands	NICOBARS	2002	Kharif	Rice	189.20	510.84	2.700000
27	Andaman and Nicobar Islands	NICOBARS	2003	Kharif	Rice	52.00	90.17	1.734038
36	Andaman and Nicobar Islands	NICOBARS	2004	Kharif	Rice	52.94	72.57	1.370797
...	...	...	...	...	...	...	...	...
246049	West Bengal	PURULIA	2013	Summer	Rice	516.00	1274.00	2.468992
246052	West Bengal	PURULIA	2013	Winter	Rice	302274.00	730136.00	2.415477
246058	West Bengal	PURULIA	2014	Autumn	Rice	264.00	721.00	2.731061
246086	West Bengal	PURULIA	2014	Summer	Rice	306.00	801.00	2.617647
246089	West Bengal	PURULIA	2014	Winter	Rice	279151.00	597899.00	2.141848

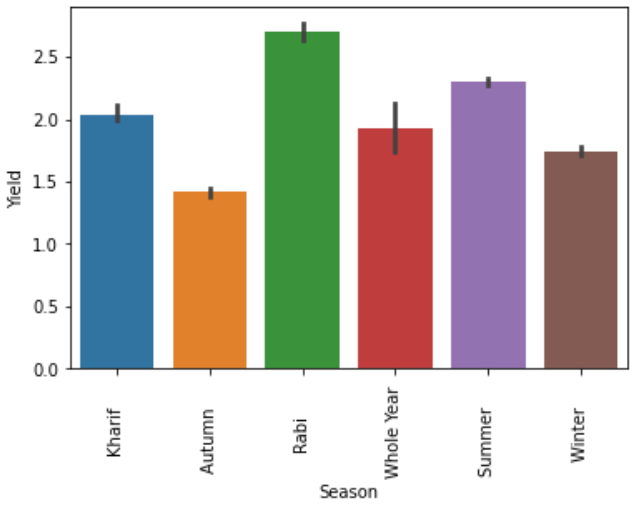
15082 rows × 8 columns

In [22]:
```
rice_data.shape
```

Out[22]:
```
(15082, 8)
```

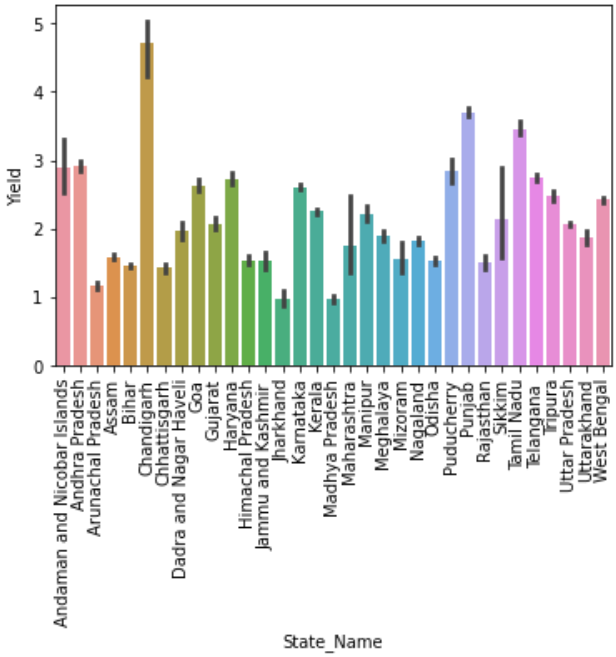
In [23]:
```
sns.barplot("Season","Yield",data = rice_data)
plt.xticks(rotation = 90)
```

Out[23]:
```
(array([0, 1, 2, 3, 4, 5]), <a list of 6 Text major ticklabel objects>)
```



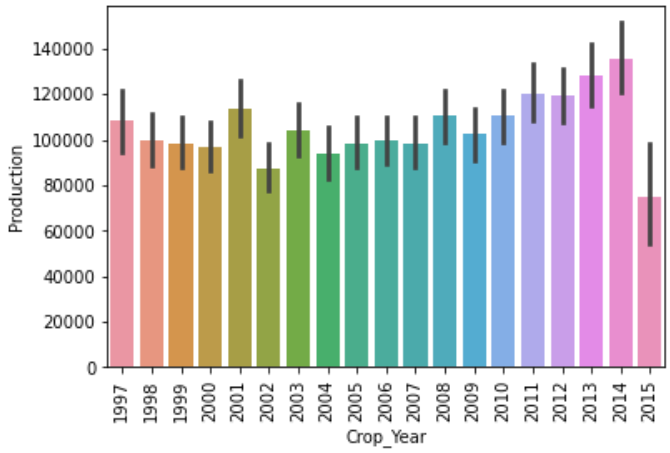
In [24]:
```
sns.barplot("State_Name","Yield",data=rice_data)
plt.xticks(rotation=90)
```

Out[24]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32]),
 <a list of 33 Text major ticklabel objects>)
```



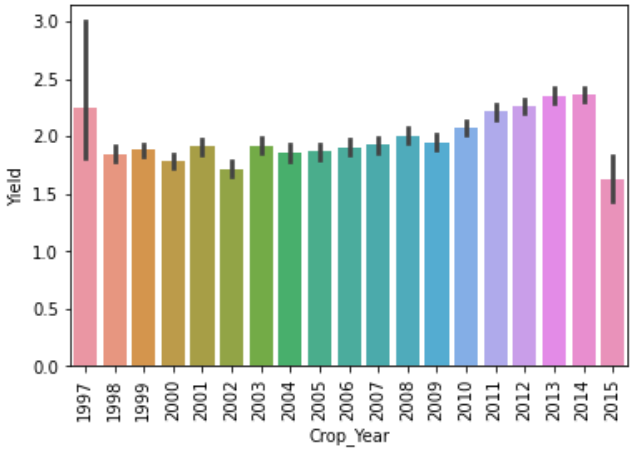
In [25]:
```
sns.barplot("Crop_Year","Production",data=rice_data)
plt.xticks(rotation=90)
```

Out[25]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18]),
 <a list of 19 Text major ticklabel objects>)
```



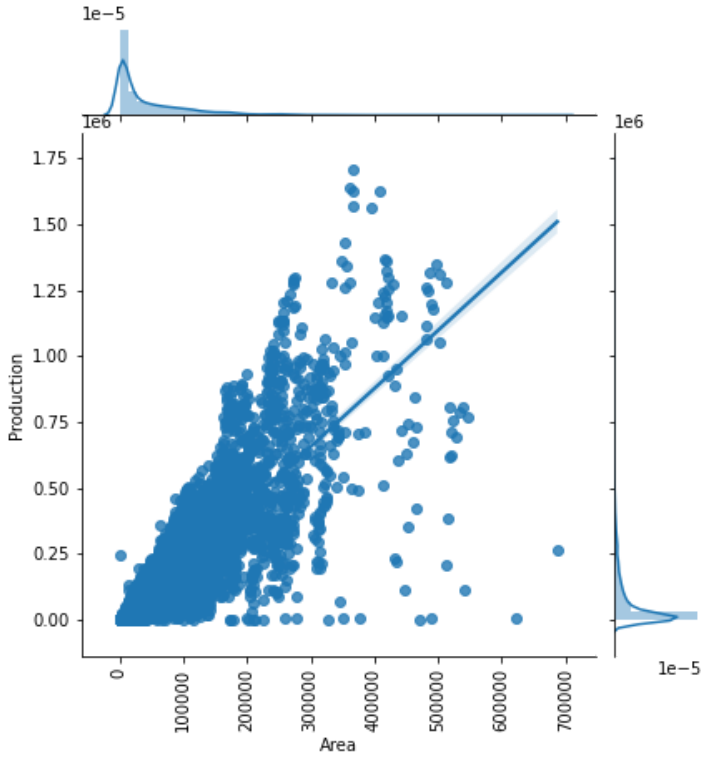
In [26]:
```
sns.barplot("Crop_Year","Yield",data=rice_data)
plt.xticks(rotation=90)
```

Out[26]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18]),
 <a list of 19 Text major ticklabel objects>)
```



In [27]:
```
sns.jointplot("Area","Production",data=rice_data,kind="reg")
plt.xticks(rotation=90)
```

Out[27]:
```
(array([-100000.,       0.,  100000.,  200000.,  300000.,  400000.,
         500000.,  600000.,  700000.,  800000.]),
 <a list of 10 Text major ticklabel objects>)
```



Observations :

1. Rice yield is maximum in Rabi season.
2. Rice yield is maximum in Chandigarh.
3. Rice yield has been growing a little from the year 2009 to 2014.

2. WHEAT

In [28]:
```
wheat_data = crop_data[crop_data["Crop"]=="Wheat"]
wheat_data
```

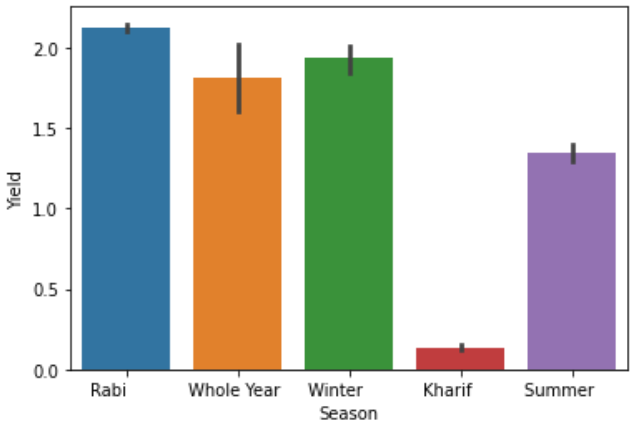
Out[28]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production	Yield
230	Andhra Pradesh	ANANTAPUR	1997	Rabi	Wheat	300.0	200.0	0.666667
255	Andhra Pradesh	ANANTAPUR	1998	Rabi	Wheat	400.0	200.0	0.500000
284	Andhra Pradesh	ANANTAPUR	1999	Rabi	Wheat	439.0	294.0	0.669704
326	Andhra Pradesh	ANANTAPUR	2000	Rabi	Wheat	520.0	297.0	0.571154
372	Andhra Pradesh	ANANTAPUR	2001	Rabi	Wheat	307.0	213.0	0.693811
...	...	...	...	...	...	...	...	...
245949	West Bengal	PURULIA	2010	Rabi	Wheat	2013.0	5152.0	2.559364
245980	West Bengal	PURULIA	2011	Rabi	Wheat	1880.0	4206.0	2.237234
246012	West Bengal	PURULIA	2012	Rabi	Wheat	1648.0	3310.0	2.008495
246047	West Bengal	PURULIA	2013	Rabi	Wheat	1187.0	2675.0	2.253580
246084	West Bengal	PURULIA	2014	Rabi	Wheat	1622.0	3663.0	2.258323

7878 rows × 8 columns

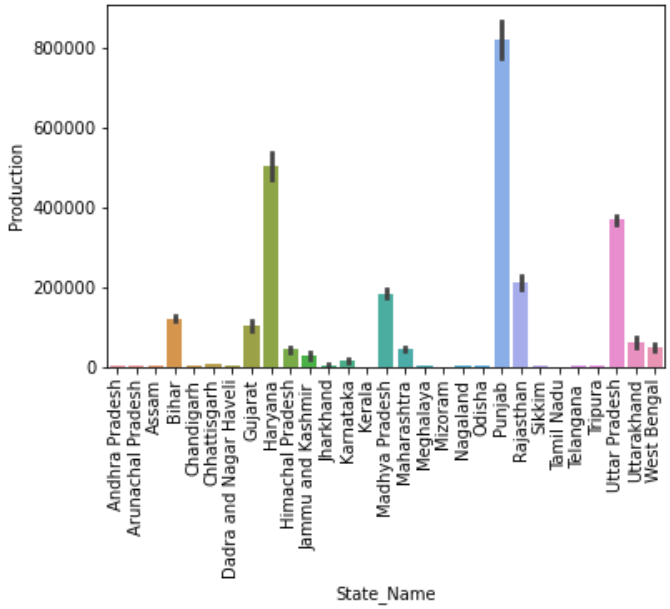
In [29]:
```
sns.barplot("Season","Yield",data = wheat_data)
```

Out[29]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x12bab172a90>
```



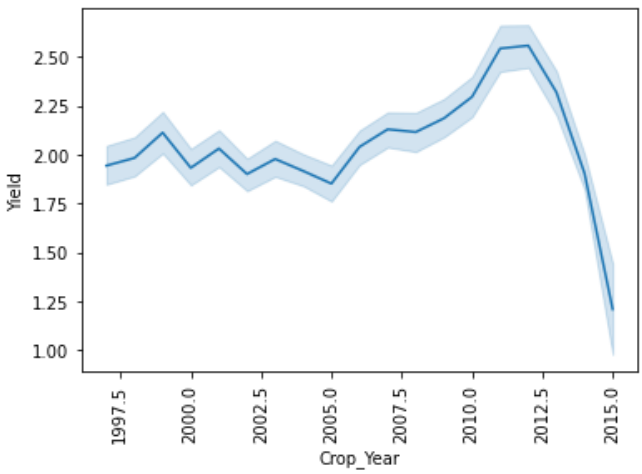
In [30]:
```
sns.barplot("State_Name","Production",data = wheat_data)
plt.xticks(rotation = 90)
```

Out[30]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28]),
 <a list of 29 Text major ticklabel objects>)
```



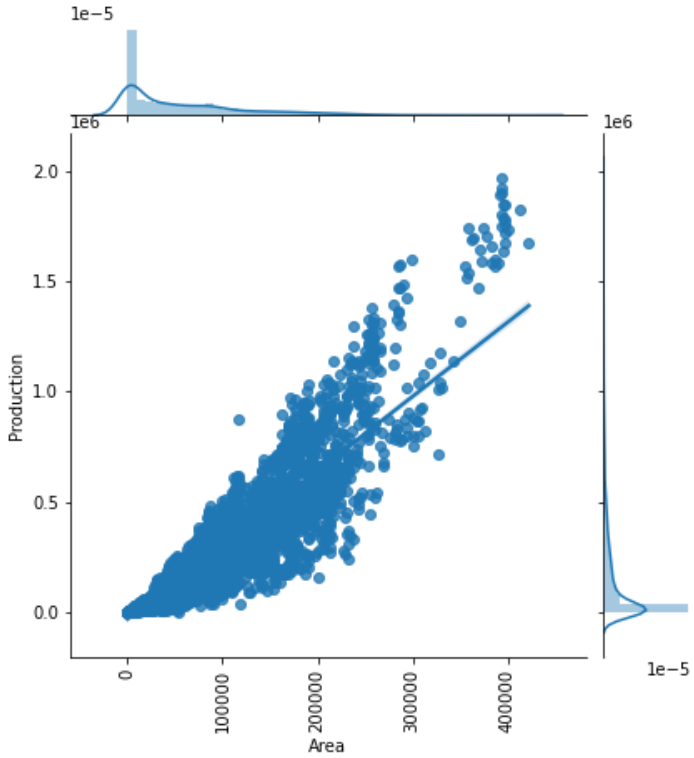
In [31]:
```
sns.lineplot("Crop_Year","Yield",data=wheat_data)
plt.xticks(rotation=90)
```

Out[31]:
```
(array([1995. , 1997.5, 2000. , 2002.5, 2005. , 2007.5, 2010. , 2012.5,
        2015. , 2017.5]),
 <a list of 10 Text major ticklabel objects>)
```



In [32]:
```
sns.jointplot("Area","Production",data=wheat_data,kind="reg")
plt.xticks(rotation=90)
```

Out[32]:
```
(array([-100000.,       0.,  100000.,  200000.,  300000.,  400000.,
         500000.]),
 <a list of 7 Text major ticklabel objects>)
```



Conclusions obtained :

1. Rice yield is maximum in Rabi season.
2. Rice yield is maximum in Punjab.
3. Rice yield has been growing a little from the year 2009 to 2014.

3. COCONUT

In [33]:
```
coconut_data = crop_data[crop_data["Crop"]=="Urad"]
coconut_data
```

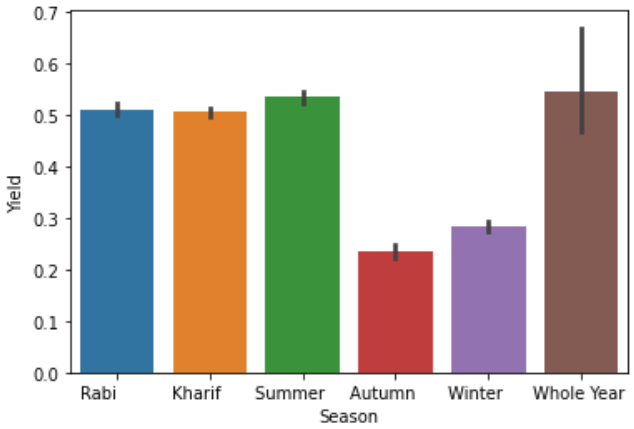
Out[33]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production	Yield
75	Andaman and Nicobar Islands	NICOBARS	2010	Rabi	Urad	1.5	1.16	0.773333
125	Andaman and Nicobar Islands	NORTH AND MIDDLE ANDAMAN	2010	Rabi	Urad	1059.5	458.79	0.433025
199	Andaman and Nicobar Islands	SOUTH ANDAMANS	2010	Rabi	Urad	34.0	15.05	0.442647
270	Andhra Pradesh	ANANTAPUR	1999	Kharif	Urad	4.0	2.00	0.500000
309	Andhra Pradesh	ANANTAPUR	2000	Kharif	Urad	135.0	8.00	0.059259
...	...	...	...	...	...	...	...	...
246000	West Bengal	PURULIA	2012	Kharif	Urad	9258.0	2910.00	0.314323
246011	West Bengal	PURULIA	2012	Rabi	Urad	259.0	133.00	0.513514
246033	West Bengal	PURULIA	2013	Kharif	Urad	12986.0	2877.00	0.221546
246070	West Bengal	PURULIA	2014	Kharif	Urad	11493.0	3287.00	0.286000
246083	West Bengal	PURULIA	2014	Rabi	Urad	220.0	113.00	0.513636

9710 rows × 8 columns

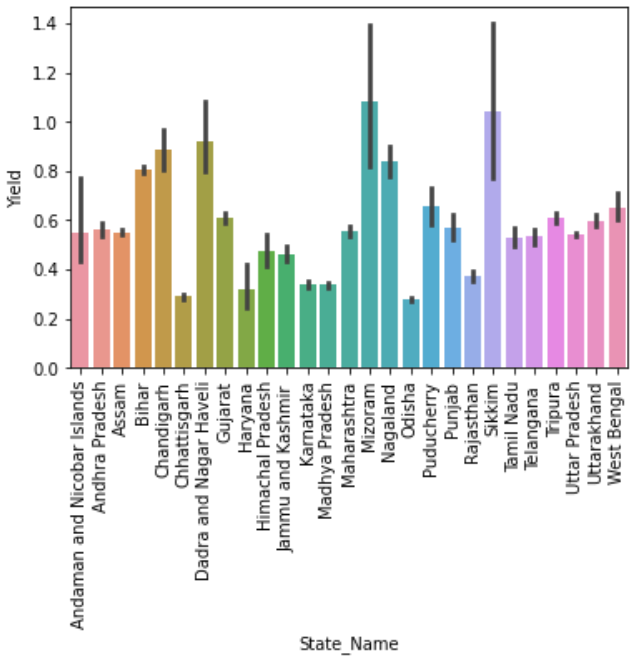
In [34]:
```
sns.barplot("Season","Yield",data = coconut_data)
```

Out[34]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x12bab10e820>
```



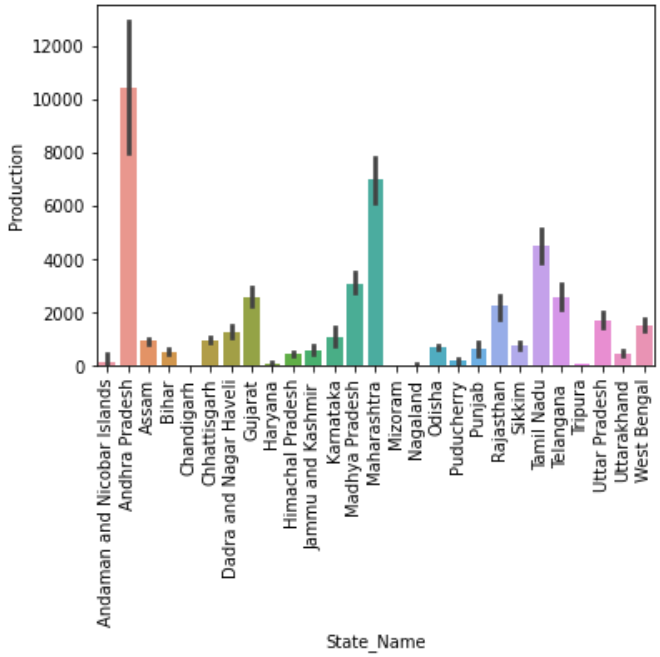
In [35]:
```
sns.barplot("State_Name","Yield",data = coconut_data)
plt.xticks(rotation = 90)
```

Out[35]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19, 20, 21, 22, 23, 24, 25, 26]),
 <a list of 27 Text major ticklabel objects>)
```



In [36]:
```
sns.barplot("State_Name","Production",data = coconut_data)
plt.xticks(rotation = 90)
```

Out[36]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19, 20, 21, 22, 23, 24, 25, 26]),
 <a list of 27 Text major ticklabel objects>)
```

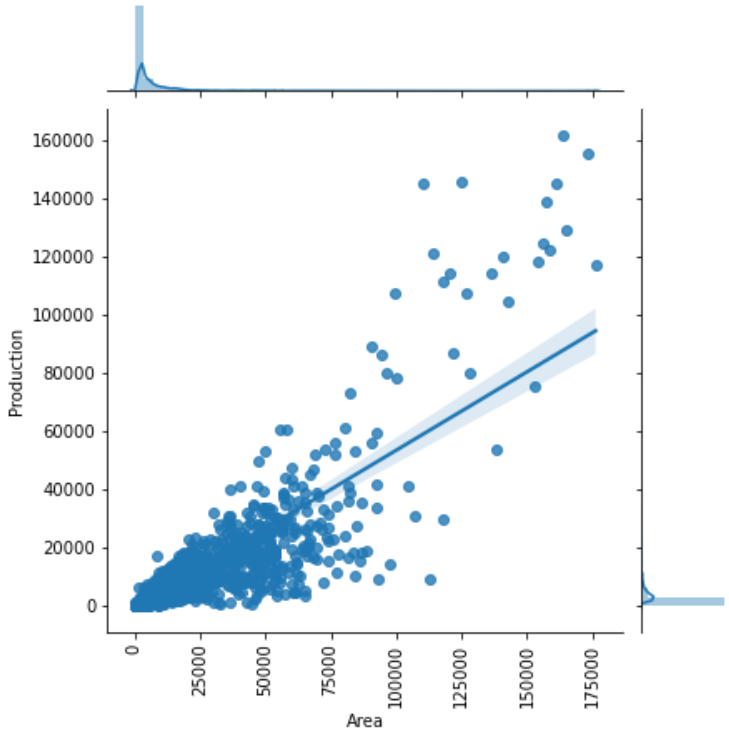


In [37]:
```
sns.lineplot("Crop_Year","Yield",data=coconut_data)
plt.xticks(rotation=90)
```

Out[37]:
```
(array([1995. , 1997.5, 2000. , 2002.5, 2005. , 2007.5, 2010. , 2012.5,
        2015. , 2017.5]),
 <a list of 10 Text major ticklabel objects>)
```

In [38]:
```
sns.jointplot("Area","Production",data=coconut_data,kind="reg")
plt.xticks(rotation=90)
```

Out[38]:
```
(array([-25000.,      0.,  25000.,  50000.,  75000., 100000., 125000.,
        150000., 175000., 200000.]),
 <a list of 10 Text major ticklabel objects>)
```



Observations obtained :

1. Andhra Pradesh is the largest producing cocnut states.
2. Production per unit area is higher in Mizoram ans Sikkim.
3. Coconut yield is decreasing in the year 2012 to 2015.

4. POTATO

In [39]:
```
potato_data = crop_data[crop_data["Crop"]=="Potato"]
potato_data
```

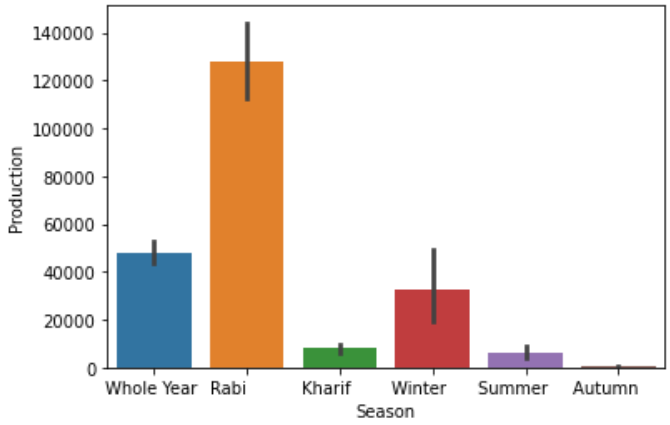
Out[39]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production	Yield
331	Andhra Pradesh	ANANTAPUR	2000	Whole Year	Potato	4.0	34.0	8.500000
433	Andhra Pradesh	ANANTAPUR	2002	Whole Year	Potato	2.0	17.0	8.500000
530	Andhra Pradesh	ANANTAPUR	2004	Whole Year	Potato	2.0	20.0	10.000000
745	Andhra Pradesh	ANANTAPUR	2010	Whole Year	Potato	21.0	236.0	11.238095
792	Andhra Pradesh	ANANTAPUR	2011	Whole Year	Potato	18.0	181.0	10.055556
...	...	...	...	...	...	...	...	...
245945	West Bengal	PURULIA	2010	Rabi	Potato	977.0	15920.0	16.294780
245976	West Bengal	PURULIA	2011	Rabi	Potato	1077.0	17412.0	16.167131
246008	West Bengal	PURULIA	2012	Rabi	Potato	913.0	17203.0	18.842278
246043	West Bengal	PURULIA	2013	Rabi	Potato	1726.0	43703.0	25.320394
246080	West Bengal	PURULIA	2014	Rabi	Potato	477.0	9995.0	20.953878

6914 rows × 8 columns

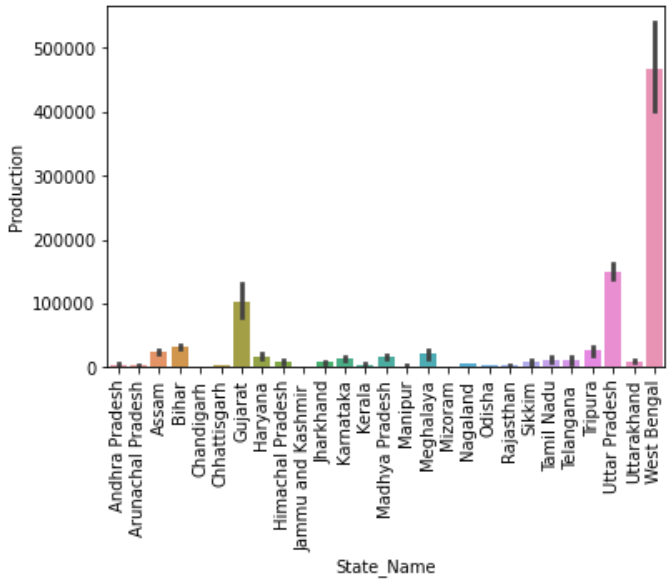
In [40]:
```
sns.barplot("Season","Production",data = potato_data)
```

Out[40]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x12bae5a72b0>
```



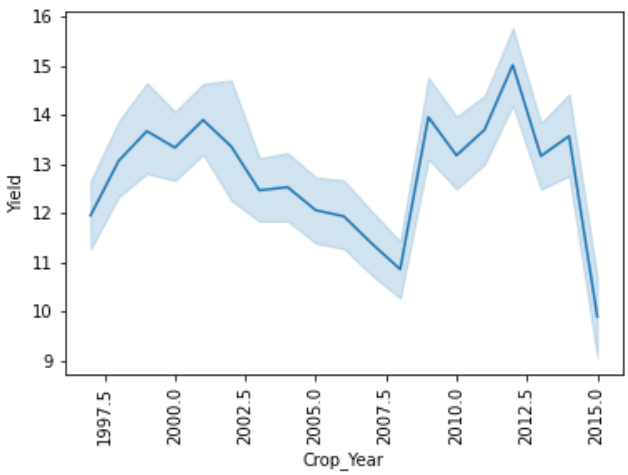
In [41]:
```
sns.barplot("State_Name","Production",data = potato_data)
plt.xticks(rotation = 90)
```

Out[41]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19, 20, 21, 22, 23, 24, 25, 26]),
 <a list of 27 Text major ticklabel objects>)
```



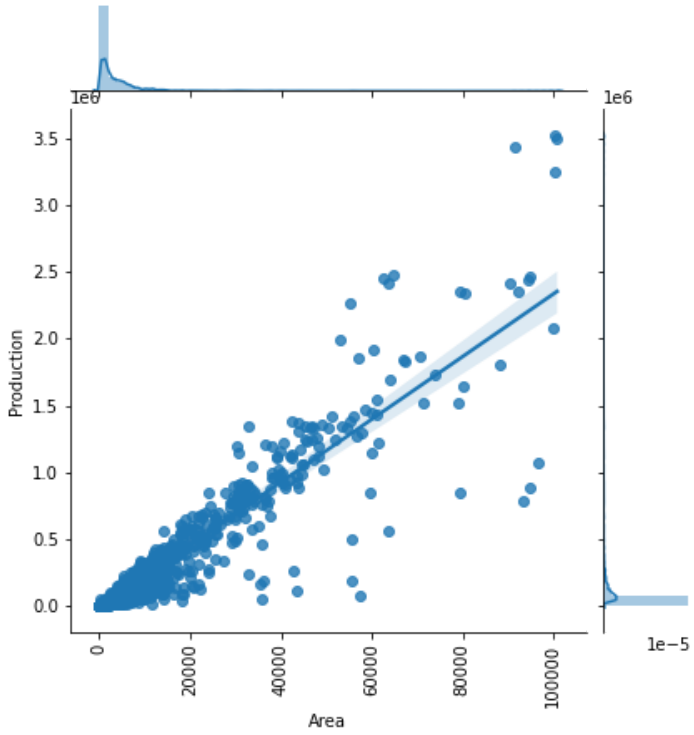
In [42]:
```
sns.lineplot("Crop_Year","Yield",data=potato_data)
plt.xticks(rotation=90)
```

Out[42]:
```
(array([1995. , 1997.5, 2000. , 2002.5, 2005. , 2007.5, 2010. , 2012.5,
        2015. , 2017.5]),
 <a list of 10 Text major ticklabel objects>)
```



In [43]:
```
sns.jointplot("Area","Production",data=potato_data,kind="reg")
plt.xticks(rotation=90)
```

Out[43]:
```
(array([-20000.,      0.,  20000.,  40000.,  60000.,  80000., 100000.,
        120000.]),
 <a list of 8 Text major ticklabel objects>)
```



Conclusions obtained :

1. Potato is a Rabi crop.
2. West Bengal is the largest producer of potatoes.

5. ONION

In [44]:
```
onion_data = crop_data[crop_data["Crop"]=="Onion"]
onion_data
```

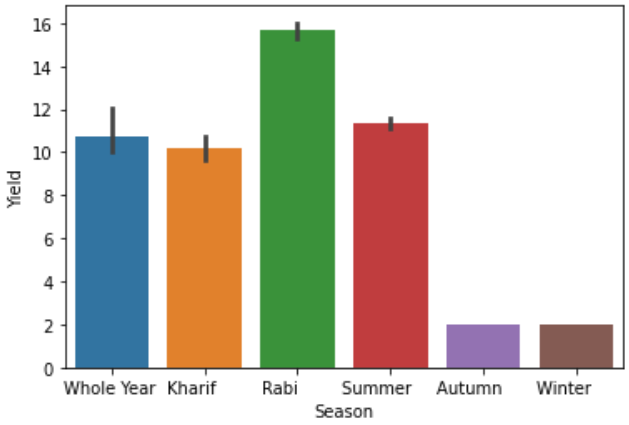
Out[44]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production	Yield
286	Andhra Pradesh	ANANTAPUR	1999	Whole Year	Onion	1770.0	32364.0	18.284746
300	Andhra Pradesh	ANANTAPUR	2000	Kharif	Onion	1103.0	15470.0	14.025385
320	Andhra Pradesh	ANANTAPUR	2000	Rabi	Onion	482.0	11514.0	23.887967
348	Andhra Pradesh	ANANTAPUR	2001	Kharif	Onion	1165.0	19232.0	16.508155
365	Andhra Pradesh	ANANTAPUR	2001	Rabi	Onion	380.0	8465.0	22.276316
...	...	...	...	...	...	...	...	...
236375	Uttarakhand	UTTAR KASHI	2010	Whole Year	Onion	47.0	306.0	6.510638
236398	Uttarakhand	UTTAR KASHI	2011	Whole Year	Onion	8.0	52.0	6.500000
236420	Uttarakhand	UTTAR KASHI	2012	Whole Year	Onion	23.0	150.0	6.521739
236443	Uttarakhand	UTTAR KASHI	2013	Whole Year	Onion	32.0	212.0	6.625000
236473	Uttarakhand	UTTAR KASHI	2014	Whole Year	Onion	26.0	172.0	6.615385

6984 rows × 8 columns

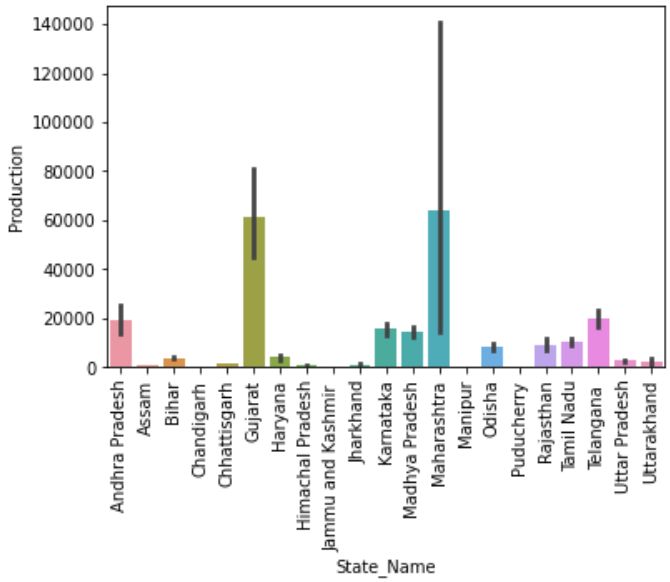
In [45]:
```
sns.barplot("Season","Yield",data = onion_data)
```

Out[45]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x12bad5b07c0>
```



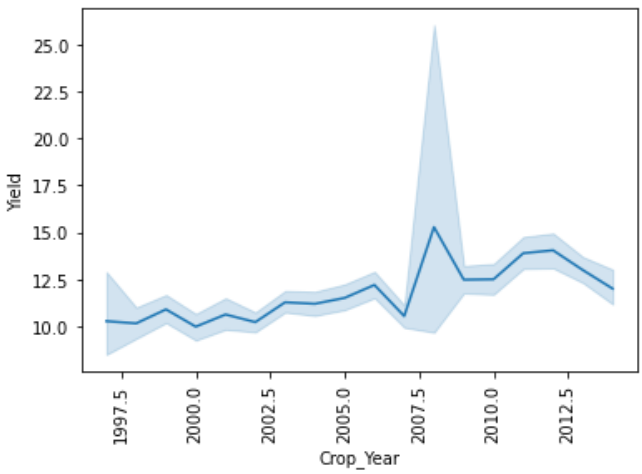
In [46]:
```
sns.barplot("State_Name","Production",data = onion_data)
plt.xticks(rotation = 90)
```

Out[46]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19, 20]),
 <a list of 21 Text major ticklabel objects>)
```



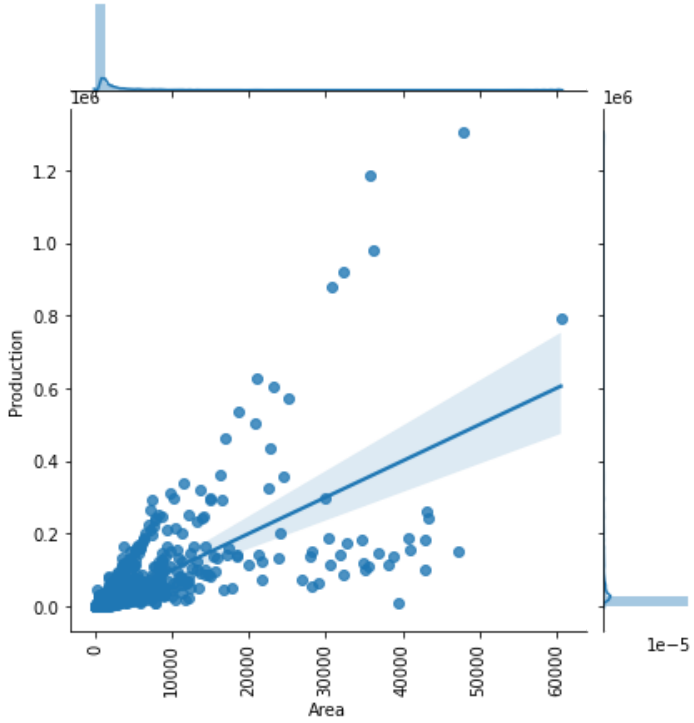
In [47]:
```
sns.lineplot("Crop_Year","Yield",data=onion_data)
plt.xticks(rotation=90)
```

Out[47]:
```
(array([1995. , 1997.5, 2000. , 2002.5, 2005. , 2007.5, 2010. , 2012.5,
        2015. ]),
 <a list of 9 Text major ticklabel objects>)
```



In [48]:
```
sns.jointplot("Area","Production",data=onion_data,kind="reg")
plt.xticks(rotation=90)
```

Out[48]:
```
(array([-10000.,      0.,  10000.,  20000.,  30000.,  40000.,  50000.,
         60000.,  70000.]),
 <a list of 9 Text major ticklabel objects>)
```



Observations :

1. Onion is a Rabi crop.
2. Gujrat and Maharastra are the major onion-producing states.

6. MAIZE

In [49]:
```
maize_data = crop_data[crop_data["Crop"]=="Maize"]
maize_data
```

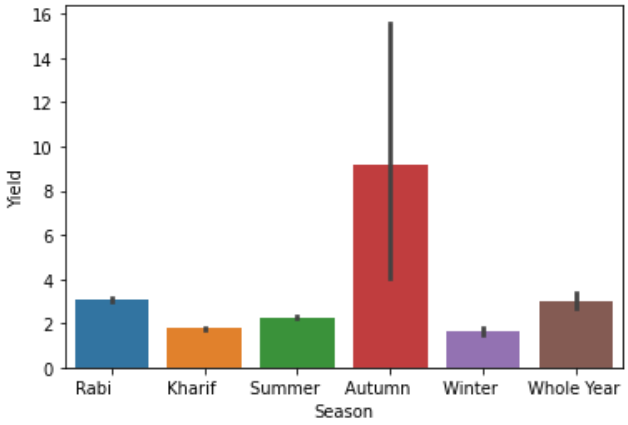
Out[49]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production	Yield
71	Andaman and Nicobar Islands	NICOBARS	2010	Rabi	Maize	3.84	18.22	4.744792
120	Andaman and Nicobar Islands	NORTH AND MIDDLE ANDAMAN	2010	Rabi	Maize	86.70	96.40	1.111880
194	Andaman and Nicobar Islands	SOUTH ANDAMANS	2010	Rabi	Maize	73.00	253.00	3.465753
212	Andhra Pradesh	ANANTAPUR	1997	Kharif	Maize	2800.00	4900.00	1.750000
226	Andhra Pradesh	ANANTAPUR	1997	Rabi	Maize	600.00	2400.00	4.000000
...	...	...	...	...	...	...	...	...
246013	West Bengal	PURULIA	2012	Summer	Maize	290.00	476.00	1.641379
246020	West Bengal	PURULIA	2013	Autumn	Maize	6189.00	10665.00	1.723219
246048	West Bengal	PURULIA	2013	Summer	Maize	325.00	522.00	1.606154
246056	West Bengal	PURULIA	2014	Autumn	Maize	6317.00	13337.00	2.111287
246085	West Bengal	PURULIA	2014	Summer	Maize	325.00	2039.00	6.273846

13787 rows × 8 columns

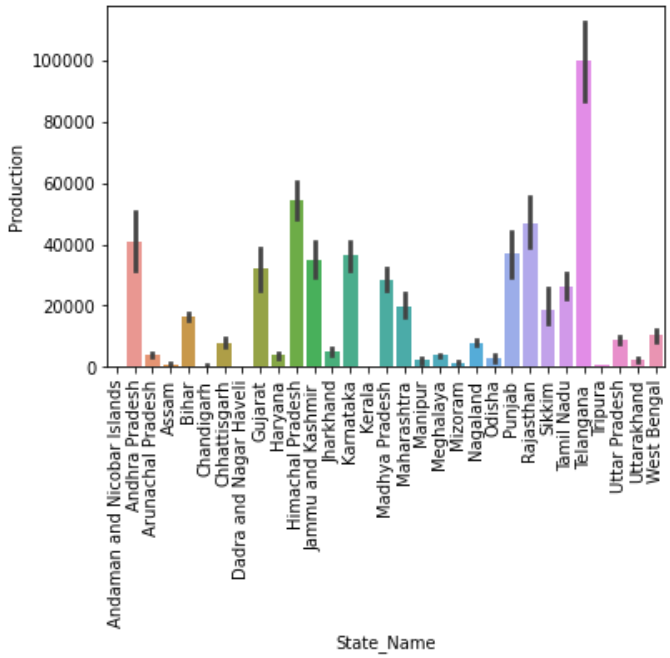
In [50]:
```
sns.barplot("Season","Yield",data = maize_data)
```

Out[50]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x12bb420deb0>
```



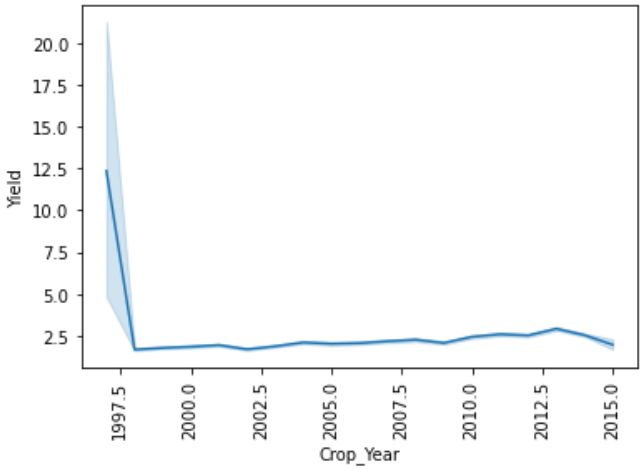
In [51]:
```
sns.barplot("State_Name","Production",data = maize_data)
plt.xticks(rotation = 90)
```

Out[51]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30]),
 <a list of 31 Text major ticklabel objects>)
```



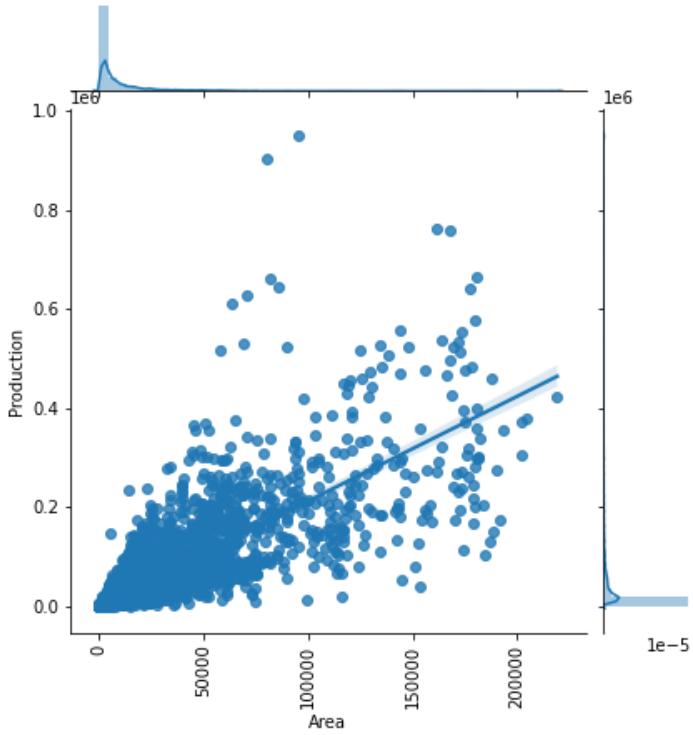
In [52]:
```
sns.lineplot("Crop_Year","Yield",data=maize_data)
plt.xticks(rotation=90)
```

Out[52]:
```
(array([1995. , 1997.5, 2000. , 2002.5, 2005. , 2007.5, 2010. , 2012.5,
        2015. , 2017.5]),
 <a list of 10 Text major ticklabel objects>)
```



In [53]:
```
sns.jointplot("Area","Production",data=maize_data,kind="reg")
plt.xticks(rotation=90)
```

Out[53]:
```
(array([-50000.,      0.,  50000., 100000., 150000., 200000., 250000.]),
 <a list of 7 Text major ticklabel objects>)
```



Observations Obtained -

1. Maize is produced in the autumn season
2. Telangana is the major maize-producing states.
3. There was a sudden decline in maize production from the year 2000.