

```
In [1]: import matplotlib.pyplot as plt
import plotly.express as px
import pandas as pd
import numpy as np
import seaborn as sns
from datetime import datetime, tzinfo
import pytz
```

```
In [2]: agri_data = pd.read_csv("India Agriculture Crop Production.csv")
agri_data.dropna(inplace = True)
agri_data
```

Out[2]:

	State	District	Crop	Year	Season	Area	Area Units	Production	Production Units	Yield
0	Andaman and Nicobar Islands	NICOBARS	Arecanut	2001-02	Kharif	1254.0	Hectare	2061.0	Tonnes	1.643541
1	Andaman and Nicobar Islands	NICOBARS	Arecanut	2002-03	Whole Year	1258.0	Hectare	2083.0	Tonnes	1.655803
2	Andaman and Nicobar Islands	NICOBARS	Arecanut	2003-04	Whole Year	1261.0	Hectare	1525.0	Tonnes	1.209358
3	Andaman and Nicobar Islands	NORTH AND MIDDLE ANDAMAN	Arecanut	2001-02	Kharif	3100.0	Hectare	5239.0	Tonnes	1.690000
4	Andaman and Nicobar Islands	SOUTH ANDAMANS	Arecanut	2002-03	Whole Year	3105.0	Hectare	5267.0	Tonnes	1.696296
...	...	...	...	...	...	...	...	...	...	...
345370	West Bengal	PURBA BARDHAMAN	Wheat	2000-01	Rabi	6310.0	Hectare	15280.0	Tonnes	2.421553
345371	West Bengal	PURULIA	Wheat	1997-98	Rabi	1895.0	Hectare	2760.0	Tonnes	1.456464
345372	West Bengal	PURULIA	Wheat	1998-99	Rabi	3736.0	Hectare	5530.0	Tonnes	1.480193
345373	West Bengal	PURULIA	Wheat	1999-00	Rabi	2752.0	Hectare	6928.0	Tonnes	2.517442
345374	West Bengal	PURULIA	Wheat	2000-01	Rabi	2979.0	Hectare	7430.0	Tonnes	2.494126

340414 rows × 10 columns

```
In [3]: round(pd.pivot_table(agri_data, index = ["Year"], values=["Yield"], columns=["State"]),2)
```

Out[3]:

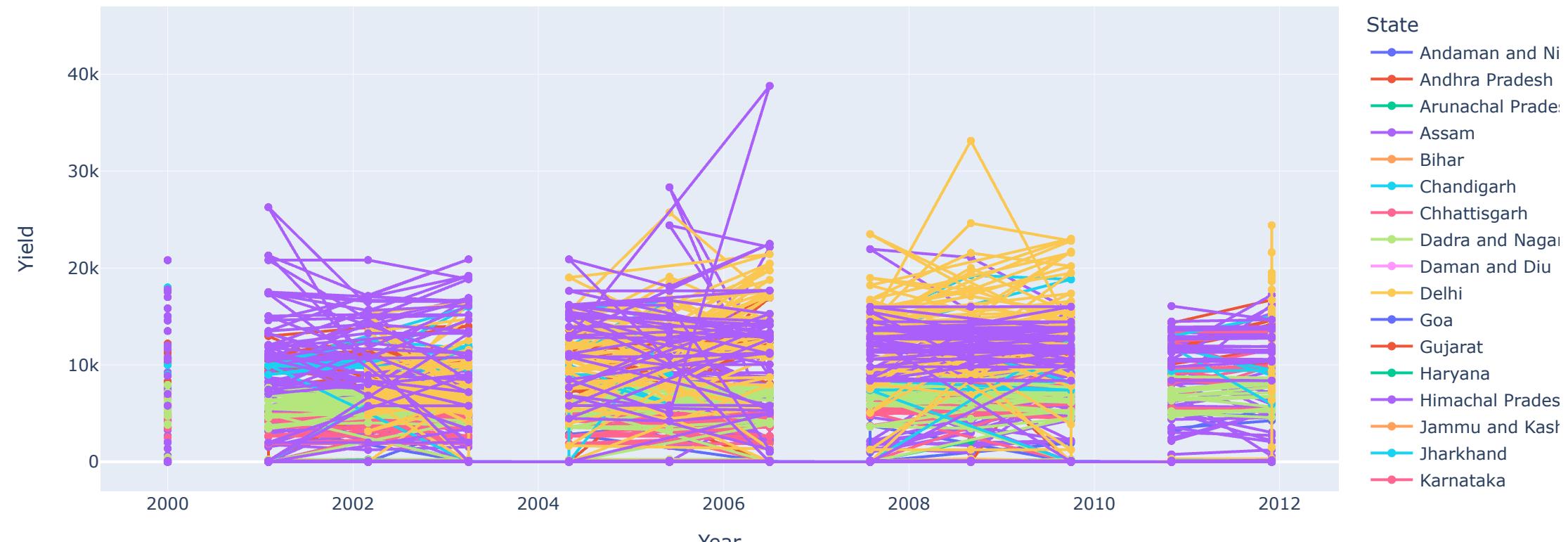
State	Andaman and Nicobar Islands	Andhra Pradesh	Arunachal Pradesh	Assam	Bihar	Chandigarh	Chhattisgarh	Dadra and Nagar Haveli	Daman and Diu	Delhi	...	Puducherry	Punjab	Rajasthan	Sikkim	Tamil Nadu	Telangana	Trip
Year																		
1997-98	Nan	3.86	2.39	215.52	3.95	Nan	Nan	Nan	Nan	Nan	...	Nan	6.91	4.44	1.08	Nan	Nan	N
1998-99	Nan	4.08	2.65	225.00	3.57	6.13	Nan	23.26	1.25	7.59	...	9.13	6.87	2.87	0.88	11.33	Nan	3
1999-00	Nan	4.08	3.39	210.38	3.97	5.14	Nan	28.76	1.16	6.70	...	1054.74	7.20	2.47	1.15	9.59	Nan	10
2000-01	337.64	197.46	3.61	214.88	3.57	5.75	2.12	30.07	1.60	6.94	...	908.31	7.90	2.32	0.97	8.91	Nan	11
2001-02	449.48	191.77	3.79	249.13	3.91	6.48	2.18	21.13	0.76	7.90	...	958.40	8.52	2.55	0.96	10.13	Nan	12
2002-03	398.34	192.12	3.80	225.14	3.49	9.41	2.04	21.76	0.95	8.10	...	1313.50	6.72	2.29	1.34	339.57	Nan	8
2003-04	397.05	191.36	3.72	225.73	3.43	9.82	2.11	20.25	1.94	8.86	...	1237.29	6.16	2.85	1.38	303.56	Nan	9
2004-05	407.79	217.70	3.71	2.92	3.13	9.20	1.94	18.49	2.09	9.38	...	1119.33	6.65	2.87	1.46	423.49	Nan	3
2005-06	399.85	168.07	3.62	237.46	3.32	9.32	1.95	18.64	1.16	8.26	...	1192.91	6.77	3.15	2.53	464.64	Nan	3
2006-07	342.55	255.00	3.71	202.35	1.58	8.93	2.09	19.77	1.61	10.00	...	13.22	2.03	3.33	1.48	529.50	Nan	3
2007-08	159.79	5.30	3.74	220.72	3.43	9.23	2.08	1.10	1.41	12.53	...	735.91	2.27	2.98	1.22	517.47	Nan	3
2008-09	86.35	200.22	3.76	244.20	3.59	9.82	1.88	1.10	1.35	12.03	...	756.68	2.26	3.10	1.07	598.24	Nan	4

State	Andaman and Nicobar Islands	Andhra Pradesh	Arunachal Pradesh	Assam	Bihar	Chandigarh	Chhattisgarh	Dadra and Nagar Haveli	Daman and Diu	Delhi	...	Puducherry	Punjab	Rajasthan	Sikkim	Tamil Nadu	Telangana	Trip
Year																		
2009-10	82.01	214.18	3.97	265.19	3.15	9.89	2.74	0.93	1.00	40.11	...	731.43	2.64	3.41	1.18	564.44	NaN	4
2010-11	228.23	247.54	4.09	226.07	3.90	10.11	1.98	5.28	1.26	47.83	...	753.05	2.35	3.66	1.58	9.76	NaN	4
2011-12	268.82	269.87	4.12	233.07	1.96	9.18	2.29	5.41	1.10	47.44	...	683.97	8.98	3.76	1.08	450.19	NaN	3
2012-13	309.72	357.90	4.19	198.38	4.10	11.73	1.58	5.46	1.25	14.92	...	792.92	8.46	3.89	1.11	8.95	NaN	4
2013-14	294.39	316.47	4.33	207.41	4.05	11.41	2.46	1.32	1.57	14.92	...	551.77	9.49	3.89	1.13	283.03	101.68	4
2014-15	296.59	278.99	4.46	216.43	4.47	10.64	2.41	1.33	1.84	7.32	...	803.80	8.81	3.82	1.13	309.27	126.74	4
2015-16	319.56	269.59	4.58	246.30	4.46	9.45	1.85	6.97	1.24	2.94	...	913.75	8.78	4.22	1.14	341.12	5.68	3
2016-17	344.99	288.36	2.58	274.18	4.95	4.97	1.87	5.79	1.31	2.92	...	738.05	8.94	4.14	1.14	321.27	5.73	3
2017-18	617.88	305.36	2.58	286.26	4.88	5.10	1.64	6.79	1.28	2.58	...	756.58	8.84	4.98	1.15	246.41	7.62	3
2018-19	392.01	371.38	2.69	272.64	5.14	5.15	1.77	7.36	1.29	2.91	...	537.85	8.12	4.15	1.15	298.44	7.12	3
2019-20	376.00	385.10	2.71	279.95	5.03	4.33	2.18	NaN	NaN	3.03	...	639.61	9.22	3.93	1.16	253.91	7.20	3
2020-21	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN

24 rows × 36 columns

```
In [4]: fig=px.line(agri_data,x="Year",y="Yield",color="State",title="Indian Agriculture States",markers=True)
fig.show()
```

## Indian Agriculture States



```
In [5]: df= agri_data[["Year","State",'District',"Season","Crop",'Yield']].sort_values("Yield",ascending = False).round(2)
df
```

Out[5]:

	Year	State	District	Season	Crop	Yield
<b>228210</b>	2018-19	Assam	TINSUKIA	Whole Year	Coconut	43958.33
<b>83550</b>	2006-07	West Bengal	BIRBHUM	Whole Year	Coconut	38800.00
<b>119409</b>	2008-09	Tamil Nadu	ERODE	Whole Year	Coconut	33133.61
<b>279641</b>	2019-20	Assam	TINSUKIA	Whole Year	Coconut	32957.75
<b>225028</b>	2018-19	Andhra Pradesh	PRAKASAM	Whole Year	Coconut	31578.95
...	...	...	...	...	...	...
<b>323808</b>	1999-00	Maharashtra	NASHIK	Rabi	Sesamum	0.00
<b>12267</b>	2002-03	Haryana	FARIDABAD	Whole Year	Banana	0.00
<b>12268</b>	2003-04	Haryana	FARIDABAD	Whole Year	Banana	0.00
<b>12269</b>	2002-03	Haryana	JHAJJAR	Whole Year	Banana	0.00
<b>72026</b>	2004-05	Punjab	GURDASPUR	Kharif	Moth	0.00

340414 rows × 6 columns

In [6]: `df.describe().round(2)`

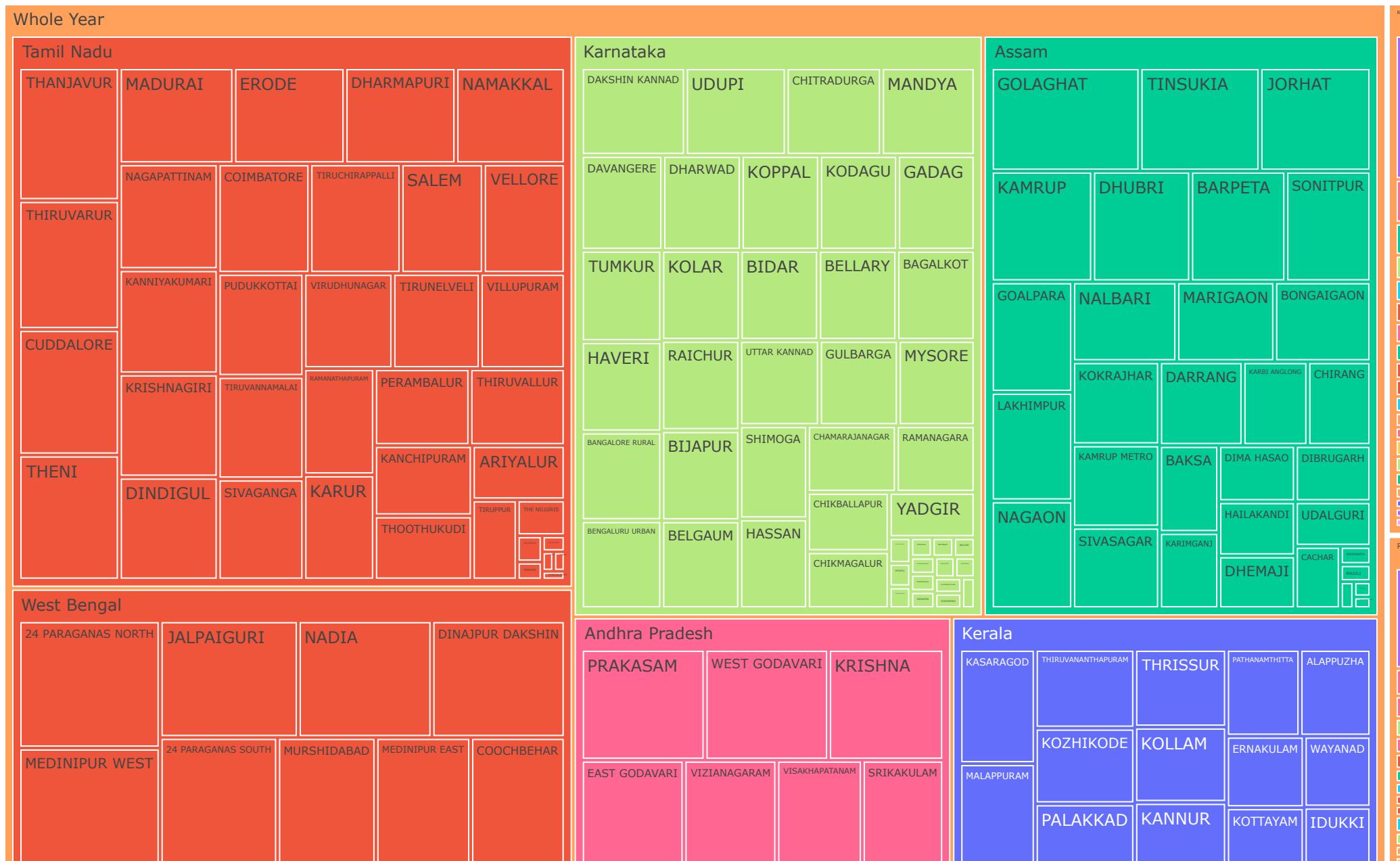
Out[6]:

**Yield**

<b>count</b>	340414.00
<b>mean</b>	80.56
<b>std</b>	923.23
<b>min</b>	0.00
<b>25%</b>	0.57
<b>50%</b>	1.02
<b>75%</b>	2.50
<b>max</b>	43958.33

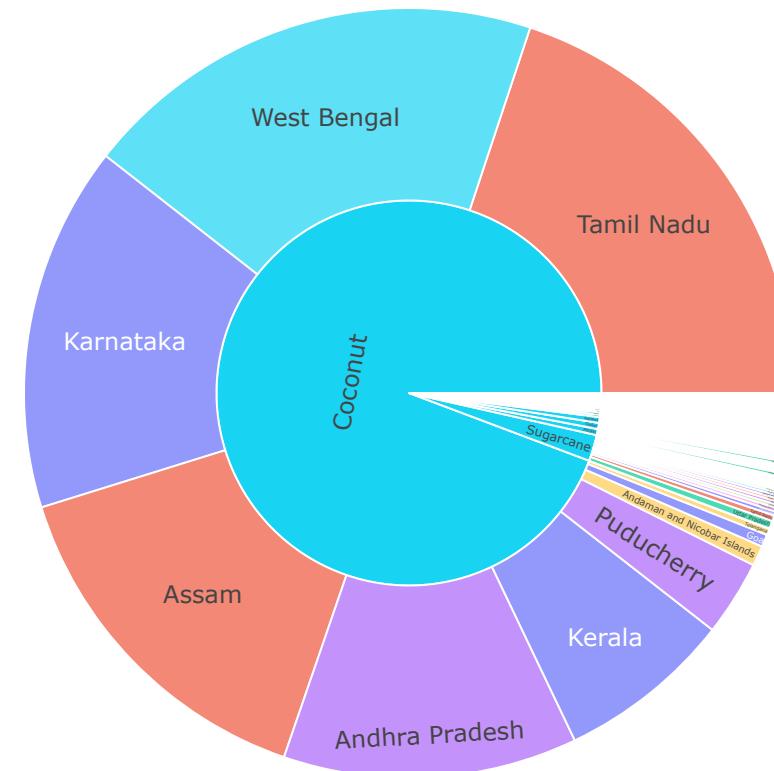
In [7]:

```
px.treemap(df, values="Yield", color="State", path=["Season", "State", "District"], height=1000)
```



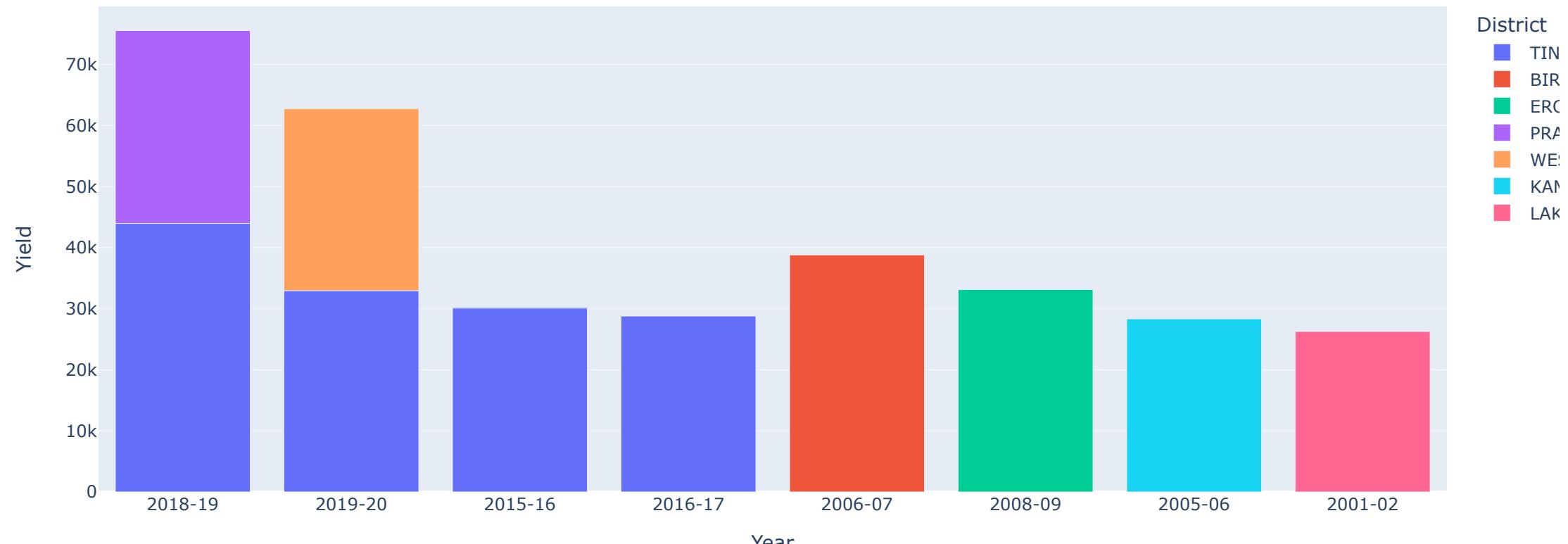


```
In [8]: px.sunburst(df, values="Yield", color="State", path=["Crop", "State"])
```



```
In [9]: px.bar(df.head(10), x="Year",y="Yield", hover_data=["State","District","Season","Crop"],title="Top 10 Yields",color="District")
```

## Top 10 Yields



```
In [10]: df1 = agri_data[["Year", "State", 'District', "Season", "Crop", 'Yield']].sort_values("Year", ascending = False).round(2)
df1
```

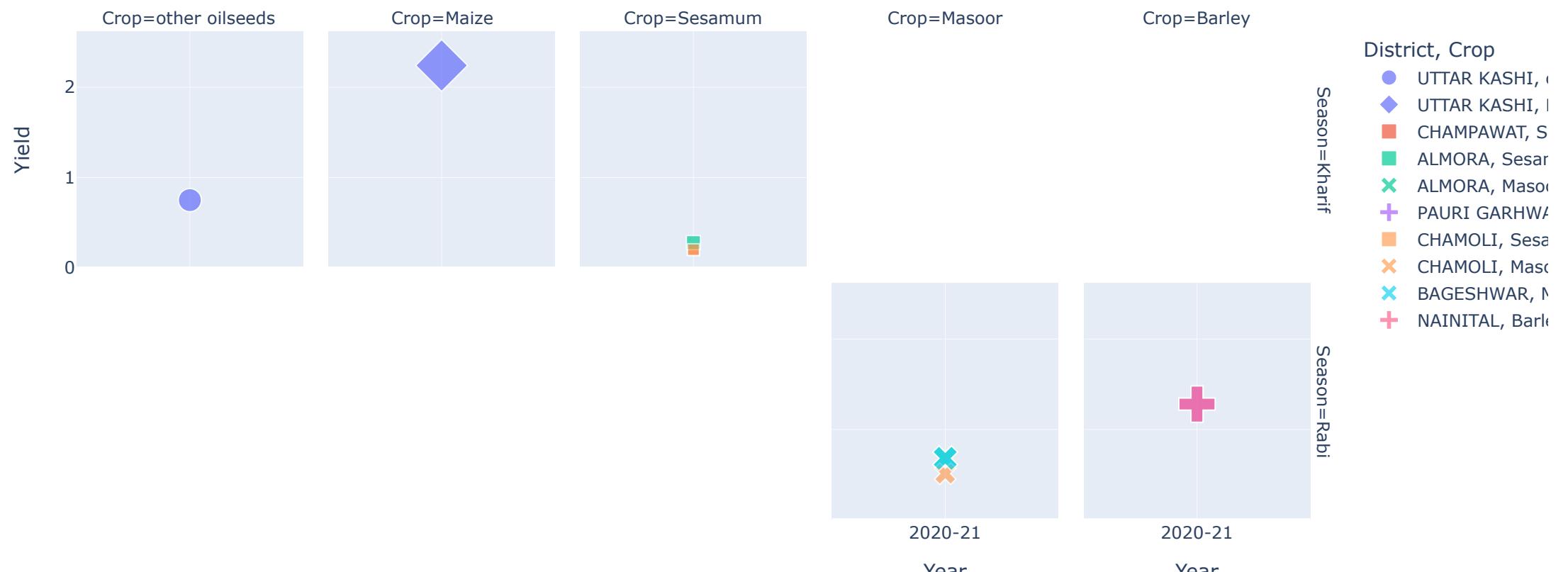
Out[10]:

	Year	State	District	Season	Crop	Yield
<b>297030</b>	2020-21	Uttarakhand	UTTAR KASHI	Kharif	other oilseeds	0.75
<b>296901</b>	2020-21	Uttarakhand	UTTAR KASHI	Kharif	Maize	2.24
<b>297190</b>	2020-21	Uttarakhand	CHAMPAWAT	Kharif	Sesamum	0.21
<b>296903</b>	2020-21	Uttarakhand	ALMORA	Rabi	Masoor	0.68
<b>296755</b>	2020-21	Uttarakhand	PAURI GARHWAL	Rabi	Barley	1.28
...	...	...	...	...	...	...
<b>328501</b>	1997-98	Odisha	KENDUJHAR	Winter	Sesamum	0.20
<b>302433</b>	1997-98	Assam	NALBARI	Rabi	Other Rabi pulses	0.64
<b>328508</b>	1997-98	Odisha	KHORDHA	Summer	Sesamum	0.31
<b>328509</b>	1997-98	Odisha	KHORDHA	Winter	Sesamum	0.09
<b>315037</b>	1997-98	Karnataka	TUMKUR	Kharif	Jowar	0.59

340414 rows × 6 columns

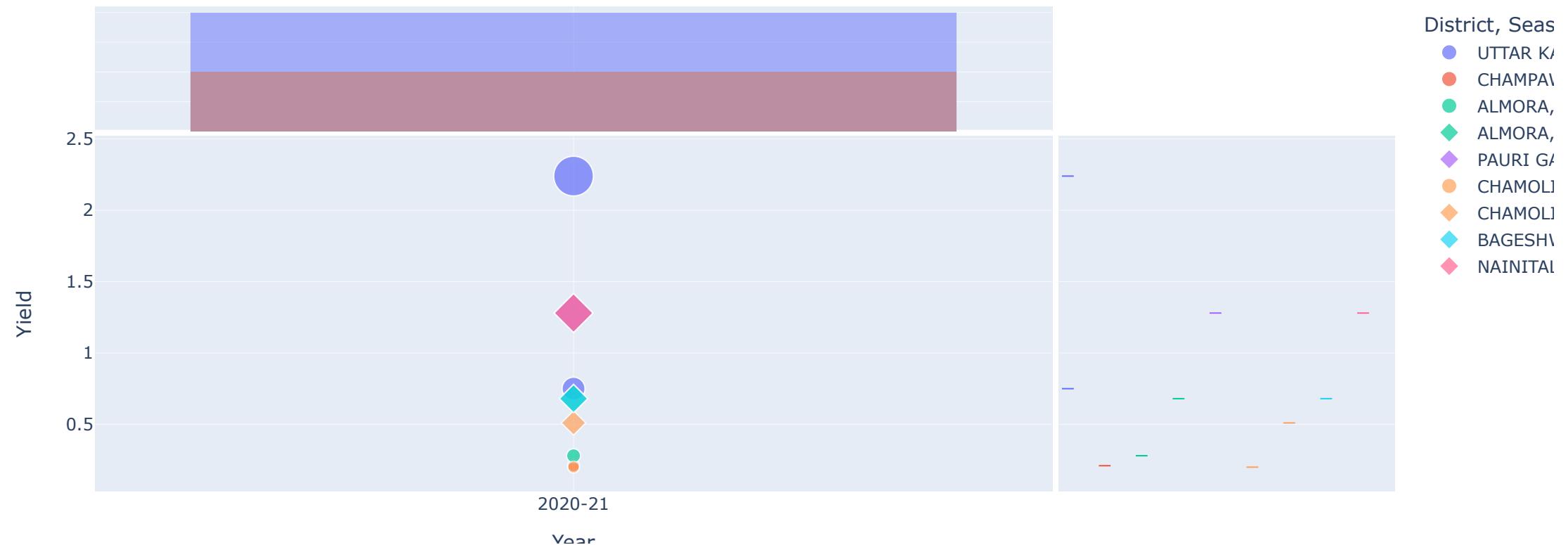
```
In [11]: fig=px.scatter(df1.head(10),y = "Yield",x = "Year", hover_data = ["State","District","Season","Crop"],title = "Top 10 Crops (2020-21)", color ="District",facet_col = "Crop",facet_row = "Season",symbol="Crop",size="Yield")
fig.show()
```

## Top 10 Crops (2020-21)



```
In [12]: fig=px.scatter(df1.head(10),y = "Yield",x = "Year", hover_data = ["State","District","Season","Crop"],title = "Top 10 Crops (2020-21)", color ="District",marginal_x = "histogram",marginal_y = "rug",symbol="Season",size="Yield")
fig.show()
```

## Top 10 Crops (2020-21)



```
In [13]: data_WB = agri_data.query("State=='West Bengal'")  
data_WB
```

Out[13]:

	State	District	Crop	Year	Season	Area	Area Units	Production	Production Units	Yield
40471	West Bengal	24 PARAGANAS NORTH	Arecanut	2001-02	Whole Year	1452.0	Hectare	2680.0	Tonnes	1.845730
40472	West Bengal	24 PARAGANAS NORTH	Arecanut	2002-03	Whole Year	1486.0	Hectare	3856.0	Tonnes	2.594886
40473	West Bengal	24 PARAGANAS NORTH	Arecanut	2003-04	Whole Year	1540.0	Hectare	4457.0	Tonnes	2.894156
40474	West Bengal	24 PARAGANAS SOUTH	Arecanut	2001-02	Whole Year	875.0	Hectare	1575.0	Tonnes	1.800000
40475	West Bengal	24 PARAGANAS SOUTH	Arecanut	2002-03	Whole Year	889.0	Hectare	1645.0	Tonnes	1.850394
...	...	...	...	...	...	...	...	...	...	...
345370	West Bengal	PURBA BARDHAMAN	Wheat	2000-01	Rabi	6310.0	Hectare	15280.0	Tonnes	2.421553
345371	West Bengal	PURULIA	Wheat	1997-98	Rabi	1895.0	Hectare	2760.0	Tonnes	1.456464
345372	West Bengal	PURULIA	Wheat	1998-99	Rabi	3736.0	Hectare	5530.0	Tonnes	1.480193
345373	West Bengal	PURULIA	Wheat	1999-00	Rabi	2752.0	Hectare	6928.0	Tonnes	2.517442
345374	West Bengal	PURULIA	Wheat	2000-01	Rabi	2979.0	Hectare	7430.0	Tonnes	2.494126

12580 rows × 10 columns

In [14]:

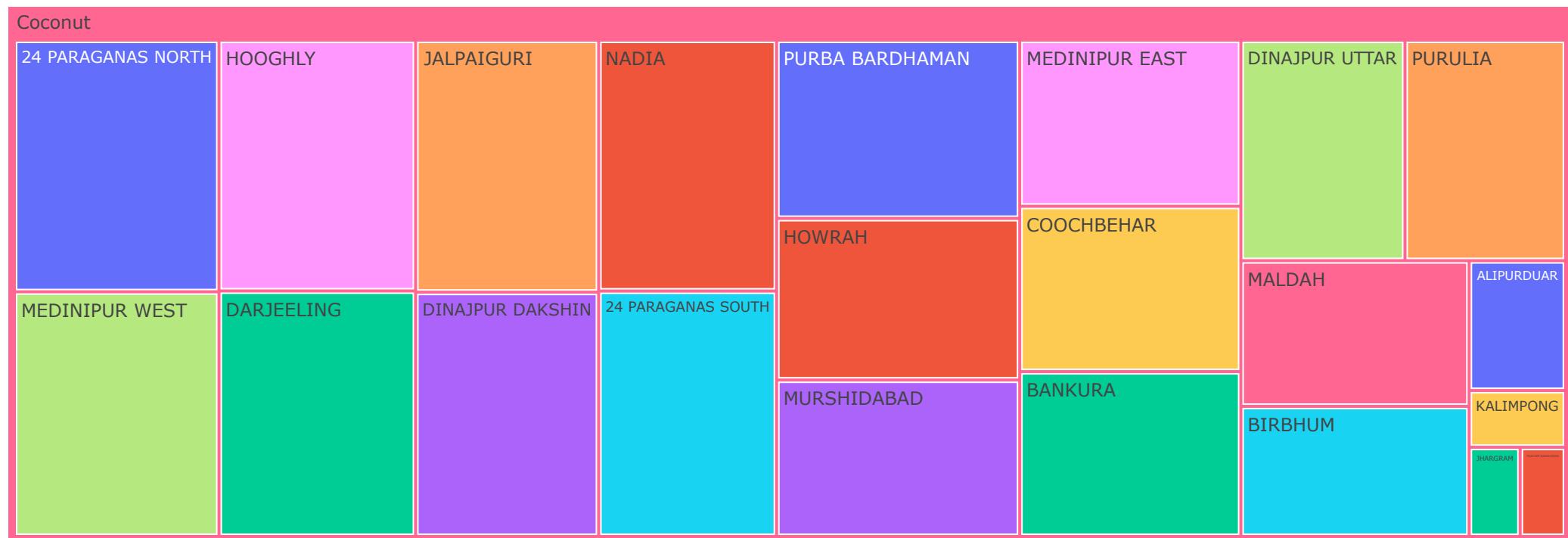
```
df2 = data_WB[["Year", "District", "Season", "Crop", 'Yield']].sort_values("Yield", ascending = False).round(2)
df2
```

Out[14]:

	Year	District	Season	Crop	Yield
<b>83550</b>	2006-07	BIRBHUM	Whole Year	Coconut	38800.00
<b>83541</b>	2006-07	24 PARAGANAS NORTH	Whole Year	Coconut	22497.00
<b>40598</b>	2001-02	24 PARAGANAS NORTH	Whole Year	Coconut	21294.00
<b>343440</b>	1997-98	DINAJPUR UTTAR	Whole Year	Coconut	20975.18
<b>83539</b>	2004-05	24 PARAGANAS NORTH	Whole Year	Coconut	20899.00
...	...	...	...	...	...
<b>344221</b>	1997-98	COOCHBEHAR	Summer	Moong(Green Gram)	0.02
<b>344220</b>	1997-98	COOCHBEHAR	Rabi	Moong(Green Gram)	0.02
<b>276958</b>	2018-19	PURBA BARDHAMAN	Kharif	Jute	0.02
<b>345094</b>	1997-98	24 PARAGANAS SOUTH	Whole Year	Sunflower	0.00
<b>343405</b>	1997-98	DARJEELING	Whole Year	Cardamom	0.00

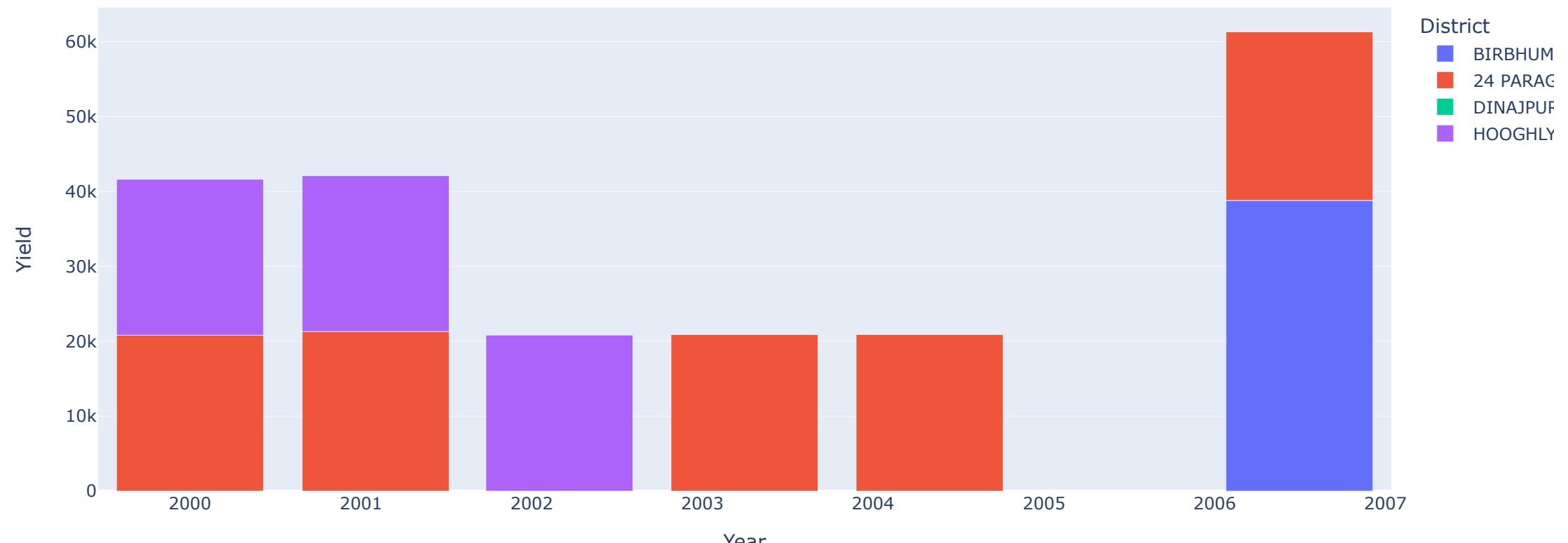
12580 rows × 5 columns

In [15]: px.treemap(df2, values="Yield", color="District", path=["Crop", "District"])



```
In [16]: px.bar(df2.head(10), x="Year",y="Yield", hover_data=["District","Season","Crop"],title="Top 10 Yields of WB",color="District")
```

## Top 10 Yields of WB



```
In [17]: df3 = data_WB[["Year", "District", "Season", "Crop", "Yield"]].sort_values("Year", ascending = False).round(2)
df3
```

Out[17]:

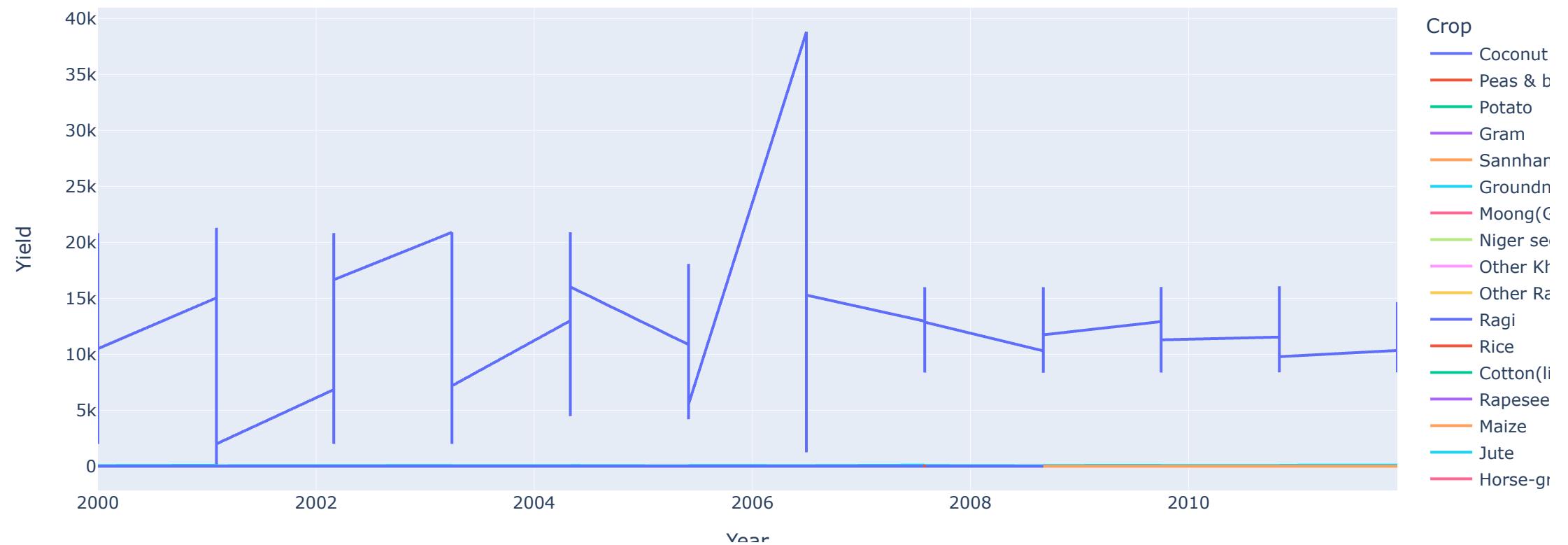
	Year	District	Season	Crop	Yield
<b>297386</b>	2019-20	MALDAH	Whole Year	Coconut	13403.88
<b>297677</b>	2019-20	NADIA	Rabi	Peas & beans (Pulses)	0.81
<b>297684</b>	2019-20	BIRBHUM	Rabi	Potato	28.19
<b>297407</b>	2019-20	MEDINIPUR WEST	Rabi	Gram	1.60
<b>297683</b>	2019-20	BANKURA	Rabi	Potato	17.09
...	...	...	...	...	...
<b>343436</b>	1997-98	DINAJPUR DAKSHIN	Whole Year	Coconut	18234.69
<b>344574</b>	1997-98	HOOGHLY	Whole Year	Rapeseed &Mustard	0.76
<b>344578</b>	1997-98	HOWRAH	Whole Year	Rapeseed &Mustard	0.58
<b>344582</b>	1997-98	JALPAIGURI	Whole Year	Rapeseed &Mustard	0.44
<b>344522</b>	1997-98	COOCHBEHAR	Autumn	Ragi	0.40

12580 rows × 5 columns

In [18]:

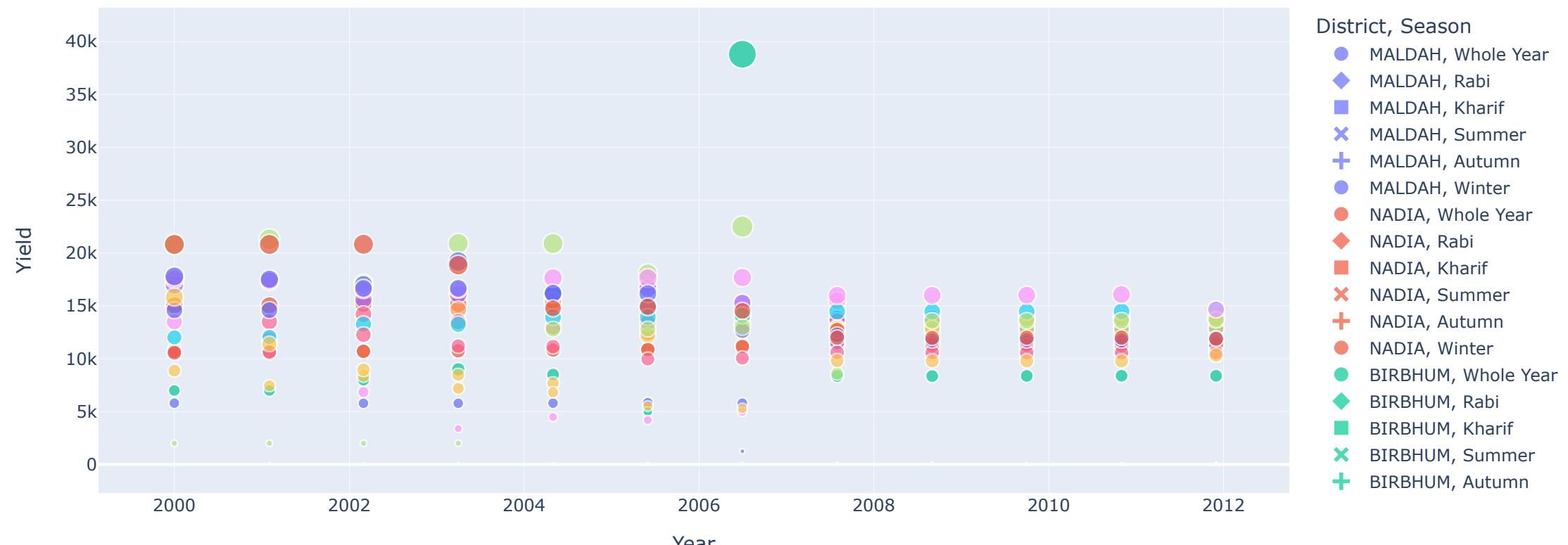
```
fig=px.line(df3,x="Year",y="Yield",color="Crop",title="WB Agriculture")
fig.show()
```

## WB Agriculture



```
In [19]: fig=px.scatter(df3,y = "Yield",x = "Year", hover_data = ["District","Season","Crop"],title = "Crops in WB",
                     color ="District",symbol="Season",size="Yield")
fig.show()
```

## Crops in WB



```
In [20]: df4=round(pd.pivot_table(data_WB, index = ["Year"], values=["Yield"], columns=[ "District"]),2)
df4
```

Out[20]:

District	24 PARAGANAS NORTH	24 PARAGANAS SOUTH	ALIPURDUAR	BANKURA	BIRBHUM	COOCHBEHAR	DARJEELING	DINAJPUR DAKSHIN	DINAJPUR UTTAR	HOOGHLY	...	JHARGRAM	KALIMPONG	N
Year														
1997-98	524.38	504.86	NaN	172.30	155.30	446.67	193.33	680.29	727.99	873.79	...	NaN	NaN	NaN
1998-99	721.50	448.91	NaN	176.99	155.04	402.22	193.10	582.10	437.99	873.85	...	NaN	NaN	NaN
1999-00	618.79	448.82	NaN	256.98	144.09	357.32	587.04	599.50	446.62	772.38	...	NaN	NaN	NaN
2000-01	838.03	442.33	NaN	304.54	230.21	66.72	676.87	661.59	513.18	776.27	...	NaN	NaN	NaN
2001-02	794.14	545.32	NaN	316.39	209.84	71.80	580.97	703.07	340.03	777.29	...	NaN	NaN	NaN
2002-03	690.96	622.88	NaN	265.26	246.42	62.64	474.93	619.39	246.03	910.71	...	NaN	NaN	NaN
2003-04	779.97	569.85	NaN	370.22	294.61	65.01	519.63	672.13	244.54	760.49	...	NaN	NaN	NaN
2004-05	842.15	571.40	NaN	421.63	297.56	417.61	570.72	739.45	215.61	647.39	...	NaN	NaN	NaN
2005-06	675.60	484.49	NaN	297.46	165.73	415.32	536.27	737.51	168.56	627.69	...	NaN	NaN	NaN
2006-07	871.00	539.72	NaN	317.02	1255.78	424.96	537.64	57.05	170.85	563.85	...	NaN	NaN	NaN
2007-08	453.98	491.39	NaN	273.00	224.62	241.81	415.35	514.05	268.36	487.71	...	NaN	NaN	NaN
2008-09	484.95	528.06	NaN	310.31	243.09	369.67	414.76	562.44	243.68	467.66	...	NaN	NaN	NaN

District	24 PARAGANAS NORTH	24 PARAGANAS SOUTH	ALIPURDUAR	BANKURA	BIRBHUM	COOCHBEHAR	DARJEELING	DINAJPUR DAKSHIN	DINAJPUR UTTAR	HOOGHLY	...	JHARGRAM	KALIMPONG	N
Year														
2009-10	522.90	621.80	NaN	369.47	285.43	428.09	476.26	695.23	329.59	578.74	...	NaN	NaN	N
2010-11	524.72	572.70	NaN	368.56	295.06	427.94	464.39	694.42	285.35	551.04	...	NaN	NaN	N
2011-12	546.59	658.66	NaN	384.93	294.84	433.84	436.99	807.76	310.68	576.11	...	NaN	NaN	N
2012-13	548.70	630.28	NaN	437.27	276.35	446.02	440.52	779.46	365.71	552.30	...	NaN	NaN	N
2013-14	551.03	629.74	NaN	436.67	292.77	417.35	526.87	729.59	398.13	596.32	...	NaN	NaN	N
2014-15	508.90	629.11	14610.43	420.33	283.62	418.12	449.73	729.31	361.25	546.07	...	NaN	NaN	N
2015-16	507.30	630.33	14639.64	410.81	273.43	405.39	436.96	649.92	340.03	541.92	...	NaN	NaN	N
2016-17	470.16	629.37	480.65	390.77	266.39	408.56	418.52	606.71	339.91	499.53	...	7.51	2.68	N
2017-18	481.44	621.96	456.73	336.67	275.28	418.00	331.79	556.96	366.88	555.11	...	565.55	802.42	N
2018-19	480.62	601.96	417.62	358.62	293.51	430.95	397.11	544.06	407.38	530.09	...	446.74	844.63	N
2019-20	478.93	592.13	425.88	339.80	268.82	414.28	476.18	538.45	427.65	498.99	...	394.19	906.91	N

23 rows × 22 columns

```
In [21]: df4.shape
```

```
Out[21]: (23, 22)
```

```
In [22]: df4.index
```

```
Out[22]: Index(['1997-98', '1998-99', '1999-00', '2000-01', '2001-02', '2002-03',
 '2003-04', '2004-05', '2005-06', '2006-07', '2007-08', '2008-09',
 '2009-10', '2010-11', '2011-12', '2012-13', '2013-14', '2014-15',
 '2015-16', '2016-17', '2017-18', '2018-19', '2019-20'],
 dtype='object', name='Year')
```

```
In [23]: df4.columns
```

```
Out[23]: MultiIndex([('Yield', '24 PARAGANAS NORTH'),
 ('Yield', '24 PARAGANAS SOUTH'),
 ('Yield', 'ALIPURDUAR'),
 ('Yield', 'BANKURA'),
 ('Yield', 'BIRBHUM'),
 ('Yield', 'COOCHBEHAR'),
 ('Yield', 'DARJEELING'),
 ('Yield', 'DINAJPUR DAKSHIN'),
 ('Yield', 'DINAJPUR UTTAR'),
 ('Yield', 'HOOGHLY'),
 ('Yield', 'HOWRAH'),
 ('Yield', 'JALPAIGURI'),
 ('Yield', 'JHARGRAM'),
 ('Yield', 'KALIMPONG'),
 ('Yield', 'MALDAH'),
 ('Yield', 'MEDINIPUR EAST'),
 ('Yield', 'MEDINIPUR WEST'),
 ('Yield', 'MURSHIDABAD'),
 ('Yield', 'NADIA'),
 ('Yield', 'PASCHIM BARDHAMAN'),
 ('Yield', 'PURBA BARDHAMAN'),
 ('Yield', 'PURULIA')], names=[None, 'District'])
```

```
In [24]: type(df4)
```

Out[24]: pandas.core.frame.DataFrame

In [25]: len(df4)

Out[25]: 23

In [26]: max(df4.index)

Out[26]: '2019-20'

In [27]: min(df4)

Out[27]: ('Yield', '24 PARAGANAS NORTH')

In [28]: df4.describe().round(2)

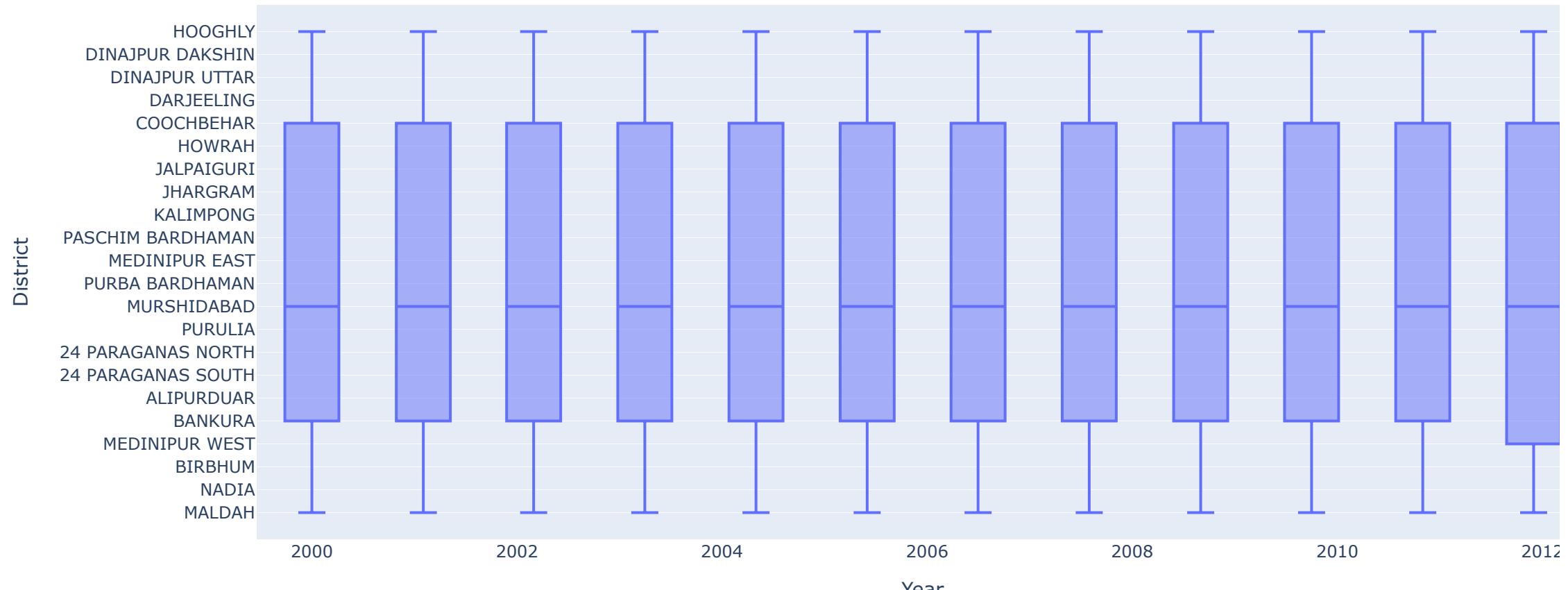
Out[28]:

District	24 PARAGANAS NORTH	24 PARAGANAS SOUTH	ALIPURDUAR	BANKURA	BIRBHUM	COOCHBEHAR	DARJEELING	DINAJPUR DAKSHIN	DINAJPUR UTTAR	HOOGHLY	...	JHARGRAM	KALIMPONG	M
count	23.00	23.00	6.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	...	4.00	4.00	
mean	605.08	565.92	5171.82	336.35	292.51	347.40	458.95	628.71	345.91	633.27	...	353.50	639.16	
std	138.80	67.99	7322.47	74.12	215.95	138.06	112.96	148.92	122.09	136.95	...	241.54	426.49	
min	453.98	442.33	417.62	172.30	144.09	62.64	193.10	57.05	168.56	467.66	...	7.51	2.68	
25%	496.12	516.46	433.59	301.00	227.42	363.50	416.94	572.27	257.20	544.00	...	297.52	602.48	
50%	546.59	572.70	468.69	339.80	273.43	415.32	464.39	661.59	340.03	576.11	...	420.46	823.52	
75%	706.23	626.00	11077.98	387.85	293.14	426.45	531.57	716.19	402.76	766.44	...	476.44	860.20	
max	871.00	658.66	14639.64	437.27	1255.78	446.67	676.87	807.76	727.99	910.71	...	565.55	906.91	

8 rows × 22 columns



```
In [29]: fig=px.box(df3,y="District",x="Year")
fig.show()
```



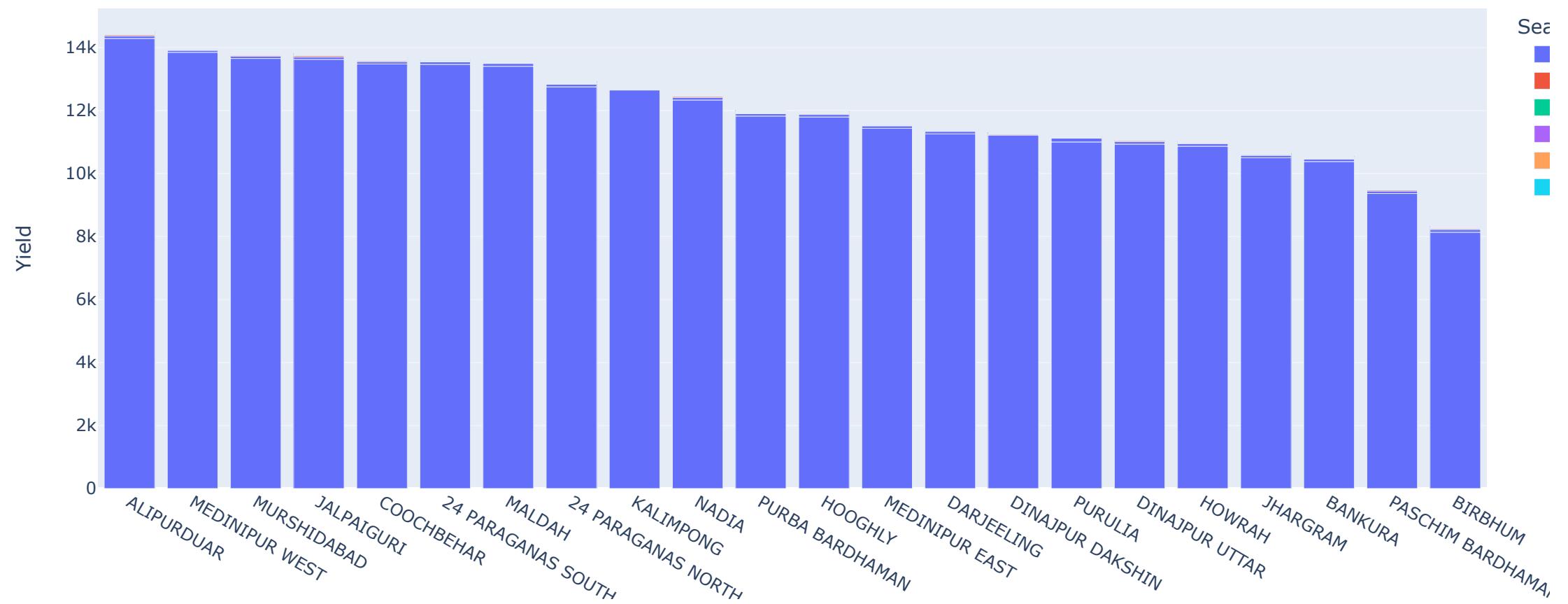
```
In [30]: df5 = df3.query("Year=='2019-20'")
df6=df5.sort_values("Yield",ascending = False)
df6
```

Out[30]:

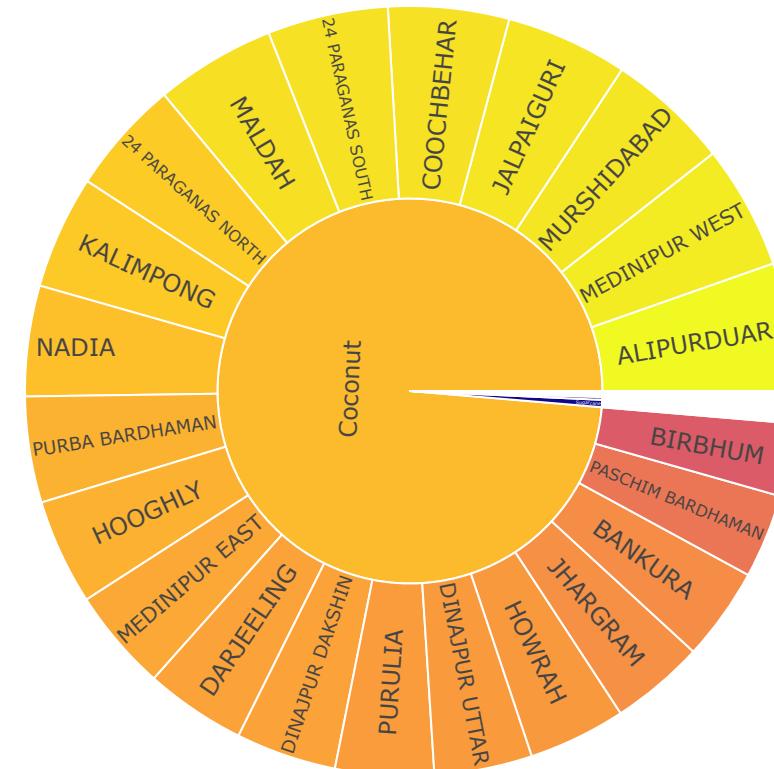
	Year	District	Season	Crop	Yield
<b>297374</b>	2019-20	ALIPURDUAR	Whole Year	Coconut	14288.54
<b>297388</b>	2019-20	MEDINIPUR WEST	Whole Year	Coconut	13847.05
<b>297389</b>	2019-20	MURSHIDABAD	Whole Year	Coconut	13651.41
<b>297383</b>	2019-20	JALPAIGURI	Whole Year	Coconut	13623.96
<b>297377</b>	2019-20	COOCHBEHAR	Whole Year	Coconut	13477.72
...	...	...	...	...	...
<b>297512</b>	2019-20	MEDINIPUR WEST	Rabi	Linseed	0.20
<b>297504</b>	2019-20	BANKURA	Rabi	Linseed	0.20
<b>297516</b>	2019-20	PURULIA	Rabi	Linseed	0.17
<b>297627</b>	2019-20	HOWRAH	Summer	Moong(Green Gram)	0.08
<b>297817</b>	2019-20	HOWRAH	Summer	Sesamum	0.07

577 rows × 5 columns

In [31]: px.bar(df6, x="District", y="Yield", hover\_data=["Season", "Crop"], color="Season")



```
In [32]: px.sunburst(df6, values="Yield", color="Yield", path=[ "Crop", "District"])
```



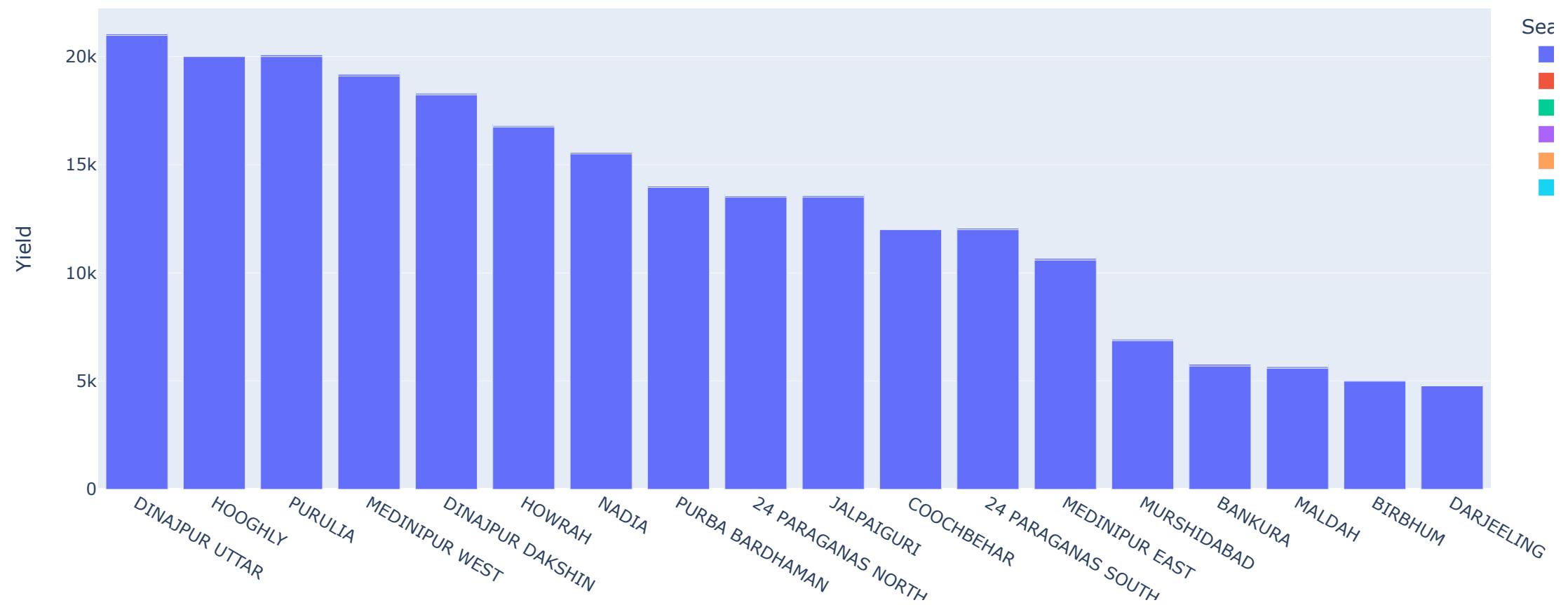
```
In [33]: df51 = df3.query("Year=='1997-98'")  
df61=df51.sort_values("Yield",ascending = False)  
df61
```

Out[33]:

	Year	District	Season	Crop	Yield
<b>343440</b>	1997-98	DINAJPUR UTTAR	Whole Year	Coconut	20975.18
<b>343444</b>	1997-98	HOOGHLY	Whole Year	Coconut	20000.00
<b>343480</b>	1997-98	PURULIA	Whole Year	Coconut	20000.00
<b>343464</b>	1997-98	MEDINIPUR WEST	Whole Year	Coconut	19100.00
<b>343436</b>	1997-98	DINAJPUR DAKSHIN	Whole Year	Coconut	18234.69
...	...	...	...	...	...
<b>344291</b>	1997-98	MURSHIDABAD	Summer	Moong(Green Gram)	0.02
<b>344221</b>	1997-98	COOCHBEHAR	Summer	Moong(Green Gram)	0.02
<b>344220</b>	1997-98	COOCHBEHAR	Rabi	Moong(Green Gram)	0.02
<b>343405</b>	1997-98	DARJEELING	Whole Year	Cardamom	0.00
<b>345094</b>	1997-98	24 PARAGANAS SOUTH	Whole Year	Sunflower	0.00

502 rows × 5 columns

In [34]: px.bar(df61, x="District", y="Yield", hover\_data=["Season", "Crop"], color="Season")



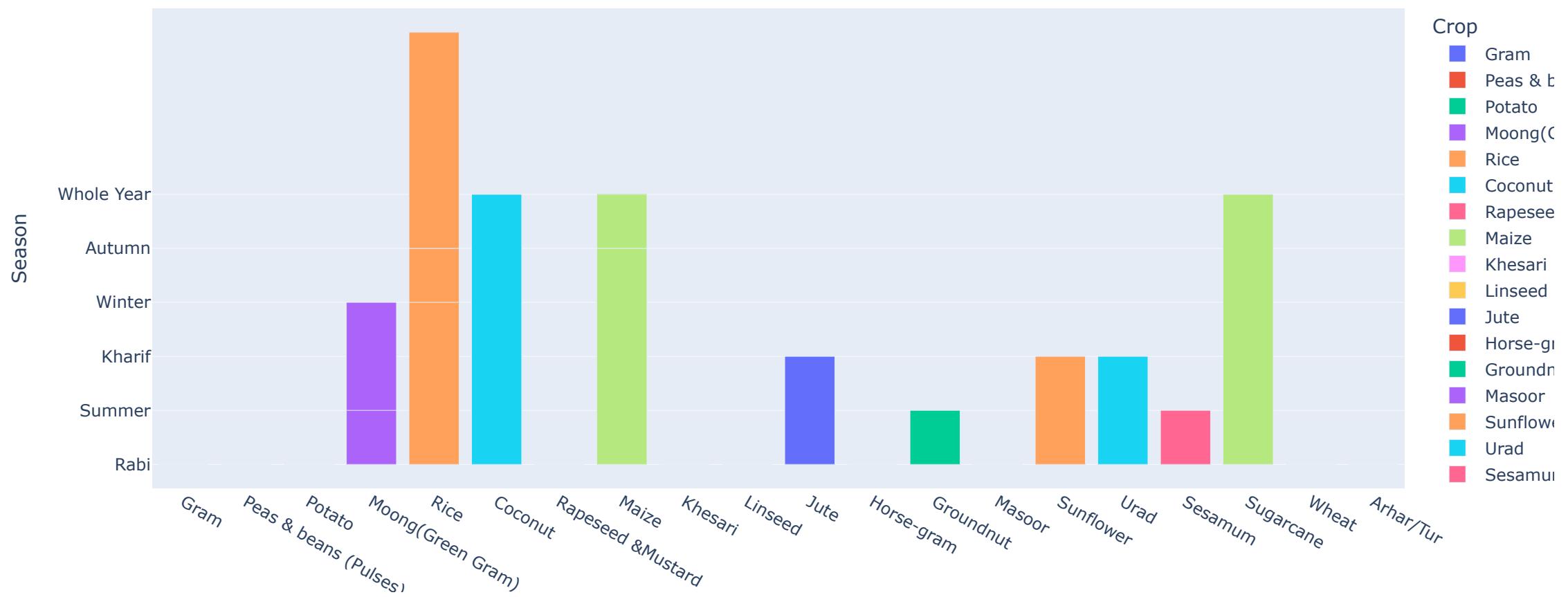
```
In [35]: df7 = df5.query("District=='MEDINIPUR WEST'")
df7.sort_values("Yield", ascending = False)
```

Out[35]:

	Year	District	Season	Crop	Yield
<b>297388</b>	2019-20	MEDINIPUR WEST	Whole Year	Coconut	13847.05
<b>297854</b>	2019-20	MEDINIPUR WEST	Whole Year	Sugarcane	64.26
<b>297698</b>	2019-20	MEDINIPUR WEST	Rabi	Potato	22.79
<b>297476</b>	2019-20	MEDINIPUR WEST	Kharif	Jute	17.99
<b>297556</b>	2019-20	MEDINIPUR WEST	Rabi	Maize	3.47
<b>297777</b>	2019-20	MEDINIPUR WEST	Summer	Rice	3.36
<b>297557</b>	2019-20	MEDINIPUR WEST	Summer	Maize	3.32
<b>297778</b>	2019-20	MEDINIPUR WEST	Winter	Rice	2.70
<b>297439</b>	2019-20	MEDINIPUR WEST	Rabi	Groundnut	2.42
<b>297776</b>	2019-20	MEDINIPUR WEST	Autumn	Rice	2.39
<b>297555</b>	2019-20	MEDINIPUR WEST	Autumn	Maize	2.37
<b>297440</b>	2019-20	MEDINIPUR WEST	Summer	Groundnut	2.14
<b>297924</b>	2019-20	MEDINIPUR WEST	Rabi	Wheat	1.85
<b>297407</b>	2019-20	MEDINIPUR WEST	Rabi	Gram	1.60
<b>297588</b>	2019-20	MEDINIPUR WEST	Rabi	Masoor	1.24
<b>297363</b>	2019-20	MEDINIPUR WEST	Rabi	Arhar/Tur	1.16
<b>297870</b>	2019-20	MEDINIPUR WEST	Kharif	Sunflower	1.14
<b>297495</b>	2019-20	MEDINIPUR WEST	Rabi	Khesari	1.10
<b>297724</b>	2019-20	MEDINIPUR WEST	Rabi	Rapeseed & Mustard	1.01
<b>297675</b>	2019-20	MEDINIPUR WEST	Rabi	Peas & beans (Pulses)	0.92
<b>297635</b>	2019-20	MEDINIPUR WEST	Kharif	Moong(Green Gram)	0.80
<b>297902</b>	2019-20	MEDINIPUR WEST	Rabi	Urad	0.78

	Year	District	Season	Crop	Yield
<b>297636</b>	2019-20	MEDINIPUR WEST	Rabi	Moong(Green Gram)	0.75
<b>297457</b>	2019-20	MEDINIPUR WEST	Rabi	Horse-gram	0.62
<b>297823</b>	2019-20	MEDINIPUR WEST	Summer	Sesamum	0.54
<b>297901</b>	2019-20	MEDINIPUR WEST	Kharif	Urad	0.45
<b>297637</b>	2019-20	MEDINIPUR WEST	Summer	Moong(Green Gram)	0.40
<b>297512</b>	2019-20	MEDINIPUR WEST	Rabi	Linseed	0.20

In [36]: `px.bar(df7, x="Crop", y="Season", color="Crop", hover_data=["Yield"])`



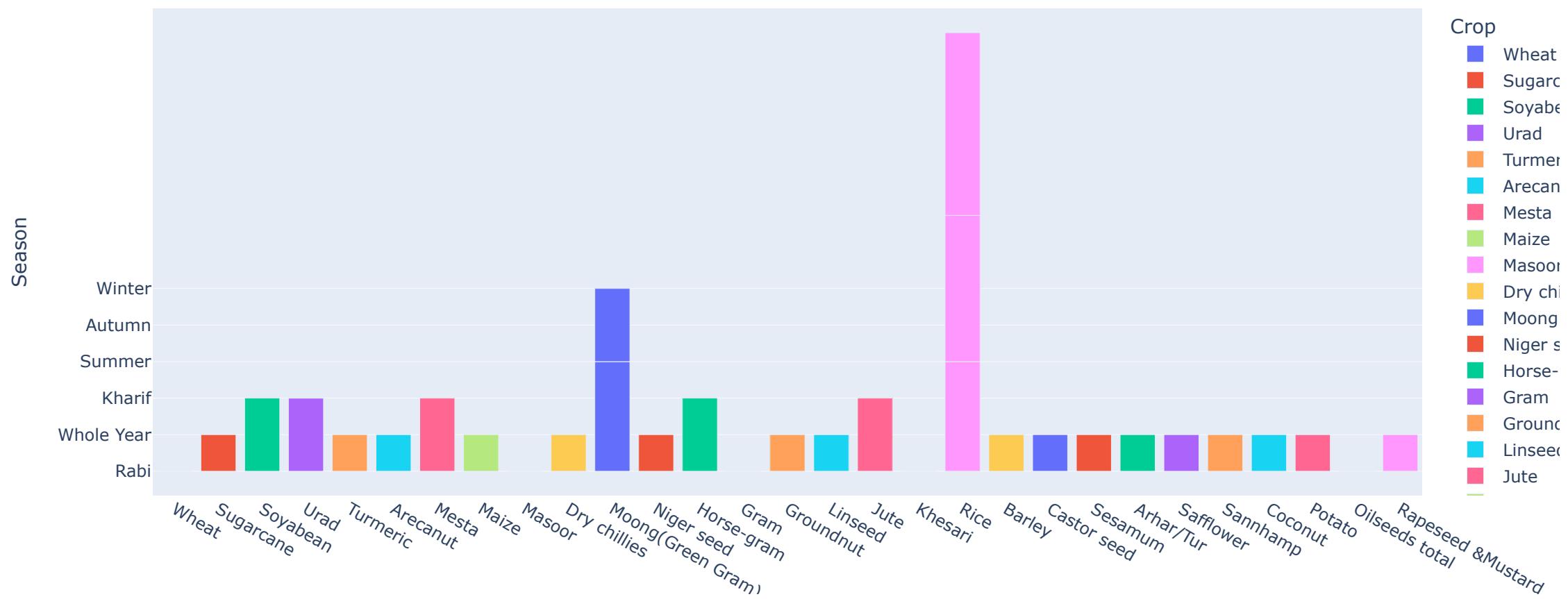
```
In [37]: df71 = df51.query("District=='MEDINIPUR WEST'")
df71.sort_values("Yield", ascending = False)
```

Out[37]:

	Year	District	Season	Crop	Yield
<b>343464</b>	1997-98	MEDINIPUR WEST	Whole Year	Coconut	19100.00
<b>345071</b>	1997-98	MEDINIPUR WEST	Whole Year	Sugarcane	84.46
<b>344502</b>	1997-98	MEDINIPUR WEST	Whole Year	Potato	26.43
<b>343880</b>	1997-98	MEDINIPUR WEST	Kharif	Jute	16.05
<b>343394</b>	1997-98	MEDINIPUR WEST	Whole Year	Barley	10.00
<b>344168</b>	1997-98	MEDINIPUR WEST	Kharif	Mesta	8.97
<b>344861</b>	1997-98	MEDINIPUR WEST	Whole Year	Sannhamp	4.00
<b>344771</b>	1997-98	MEDINIPUR WEST	Summer	Rice	2.49
<b>344772</b>	1997-98	MEDINIPUR WEST	Winter	Rice	2.19
<b>344770</b>	1997-98	MEDINIPUR WEST	Autumn	Rice	1.91
<b>345355</b>	1997-98	MEDINIPUR WEST	Rabi	Wheat	1.83
<b>343940</b>	1997-98	MEDINIPUR WEST	Rabi	Khesari	1.82
<b>343295</b>	1997-98	MEDINIPUR WEST	Whole Year	Arecanut	1.23
<b>345162</b>	1997-98	MEDINIPUR WEST	Whole Year	Turmeric	1.10
<b>343553</b>	1997-98	MEDINIPUR WEST	Whole Year	Dry chillies	0.91
<b>344116</b>	1997-98	MEDINIPUR WEST	Rabi	Masoor	0.82
<b>344048</b>	1997-98	MEDINIPUR WEST	Whole Year	Maize	0.79
<b>344594</b>	1997-98	MEDINIPUR WEST	Whole Year	Rapeseed & Mustard	0.76
<b>344375</b>	1997-98	MEDINIPUR WEST	Rabi	Oilseeds total	0.67
<b>344938</b>	1997-98	MEDINIPUR WEST	Whole Year	Sesamum	0.64
<b>345265</b>	1997-98	MEDINIPUR WEST	Kharif	Urad	0.64
<b>343665</b>	1997-98	MEDINIPUR WEST	Rabi	Gram	0.61

Year	District	Season	Crop	Yield
343735	1997-98 MEDINIPUR WEST	Whole Year	Groundnut	0.59
344277	1997-98 MEDINIPUR WEST	Kharif	Moong(Green Gram)	0.55
343796	1997-98 MEDINIPUR WEST	Kharif	Horse-gram	0.50
344278	1997-98 MEDINIPUR WEST	Rabi	Moong(Green Gram)	0.50
345266	1997-98 MEDINIPUR WEST	Rabi	Urad	0.50
345020	1997-98 MEDINIPUR WEST	Kharif	Soyabean	0.40
343343	1997-98 MEDINIPUR WEST	Whole Year	Arhar/Tur	0.20
343993	1997-98 MEDINIPUR WEST	Whole Year	Linseed	0.11
344354	1997-98 MEDINIPUR WEST	Whole Year	Niger seed	0.10
344838	1997-98 MEDINIPUR WEST	Whole Year	Safflower	0.08
343408	1997-98 MEDINIPUR WEST	Whole Year	Castor seed	0.07
344279	1997-98 MEDINIPUR WEST	Summer	Moong(Green Gram)	0.04

```
In [38]: px.bar(df71, x="Crop",y="Season", color="Crop",hover_data=["Yield"])
```



```
In [39]: data_Assam = agri_data.query("State=='Assam' ")
data_Assam
```

Out[39]:

	State	District	Crop	Year	Season	Area	Area Units	Production	Production Units	Yield
3091	Assam	BARPETA	Arecanut	2001-02	Whole Year	6582.0	Hectare	5326.0	Tonnes	0.809177
3092	Assam	BARPETA	Arecanut	2002-03	Whole Year	6577.0	Hectare	4671.0	Tonnes	0.710202
3093	Assam	BARPETA	Arecanut	2003-04	Whole Year	6610.0	Hectare	7728.0	Tonnes	1.169138
3094	Assam	BONGAIGAON	Arecanut	2001-02	Whole Year	3034.0	Hectare	4024.0	Tonnes	1.326302
3095	Assam	BONGAIGAON	Arecanut	2002-03	Whole Year	3012.0	Hectare	2785.0	Tonnes	0.924635
...	...	...	...	...	...	...	...	...	...	...
303611	Assam	SONITPUR	Wheat	2000-01	Rabi	3690.0	Hectare	4085.0	Tonnes	1.107046
303612	Assam	TINSUKIA	Wheat	1997-98	Rabi	630.0	Hectare	819.0	Tonnes	1.300000
303613	Assam	TINSUKIA	Wheat	1998-99	Rabi	350.0	Hectare	335.0	Tonnes	0.957143
303614	Assam	TINSUKIA	Wheat	1999-00	Rabi	276.0	Hectare	352.0	Tonnes	1.275362
303615	Assam	TINSUKIA	Wheat	2000-01	Rabi	193.0	Hectare	235.0	Tonnes	1.217617

18179 rows × 10 columns

In [40]:

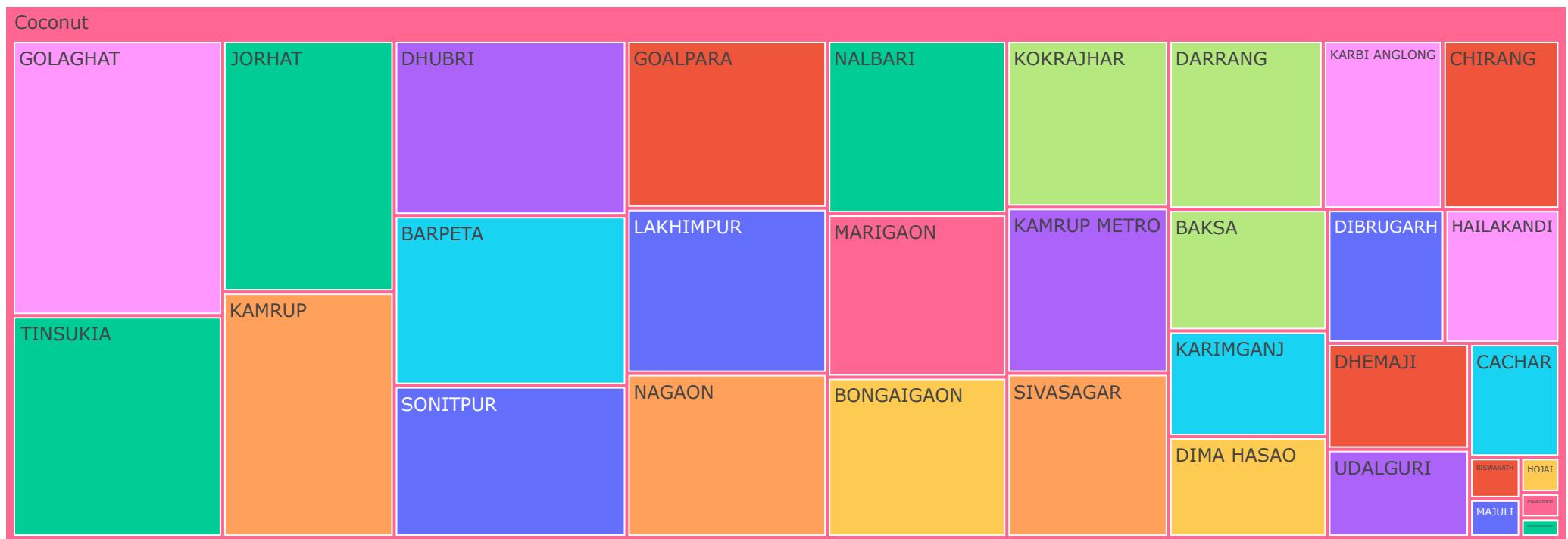
```
df22 = data_Assam[["Year", "District", "Season", "Crop", 'Yield']].sort_values("Yield", ascending = False).round(2)
df22
```

Out[40]:

	Year	District	Season	Crop	Yield
<b>228210</b>	2018-19	TINSUKIA	Whole Year	Coconut	43958.33
<b>279641</b>	2019-20	TINSUKIA	Whole Year	Coconut	32957.75
<b>179341</b>	2015-16	TINSUKIA	Whole Year	Coconut	30093.33
<b>228208</b>	2016-17	TINSUKIA	Whole Year	Coconut	28789.47
<b>45525</b>	2005-06	KAMRUP	Whole Year	Coconut	28334.16
...	...	...	...	...	...
<b>301449</b>	1997-98	KARBI ANGLONG	Kharif	Castor seed	0.00
<b>303401</b>	1997-98	KAMRUP	Whole Year	Tobacco	0.00
<b>4433</b>	2003-04	CACHAR	Summer	Rice	0.00
<b>4505</b>	2003-04	HAILAKANDI	Summer	Rice	0.00
<b>3927</b>	2003-04	GOALPARA	Kharif	Mesta	0.00

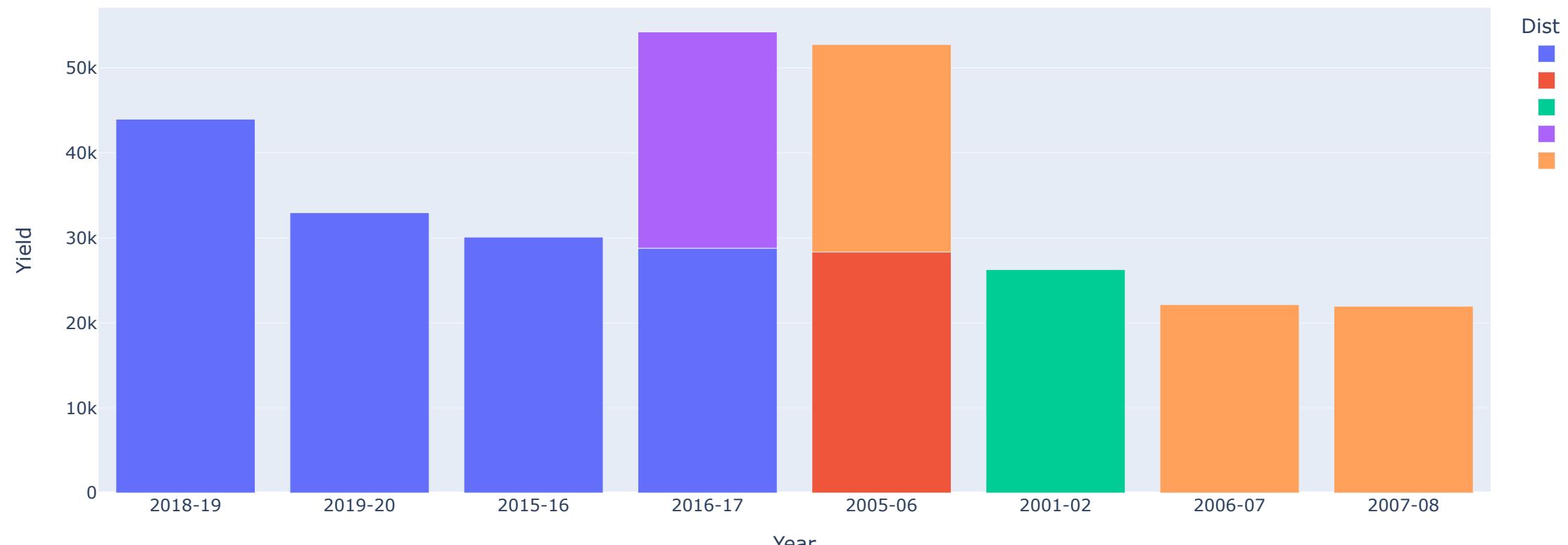
18179 rows × 5 columns

In [41]: px.treemap(df22, values="Yield", color="District", path=["Crop", "District"])



```
In [42]: px.bar(df22.head(10), x="Year",y="Yield", hover_data=["District","Season","Crop"],title="Top 10 Yields of Assam",color="District")
```

## Top 10 Yields of Assam



```
In [43]: df33 = data_Assam[["Year", "District", "Season", "Crop", 'Yield']].sort_values("Year", ascending = False).round(2)
df33
```

Out[43]:

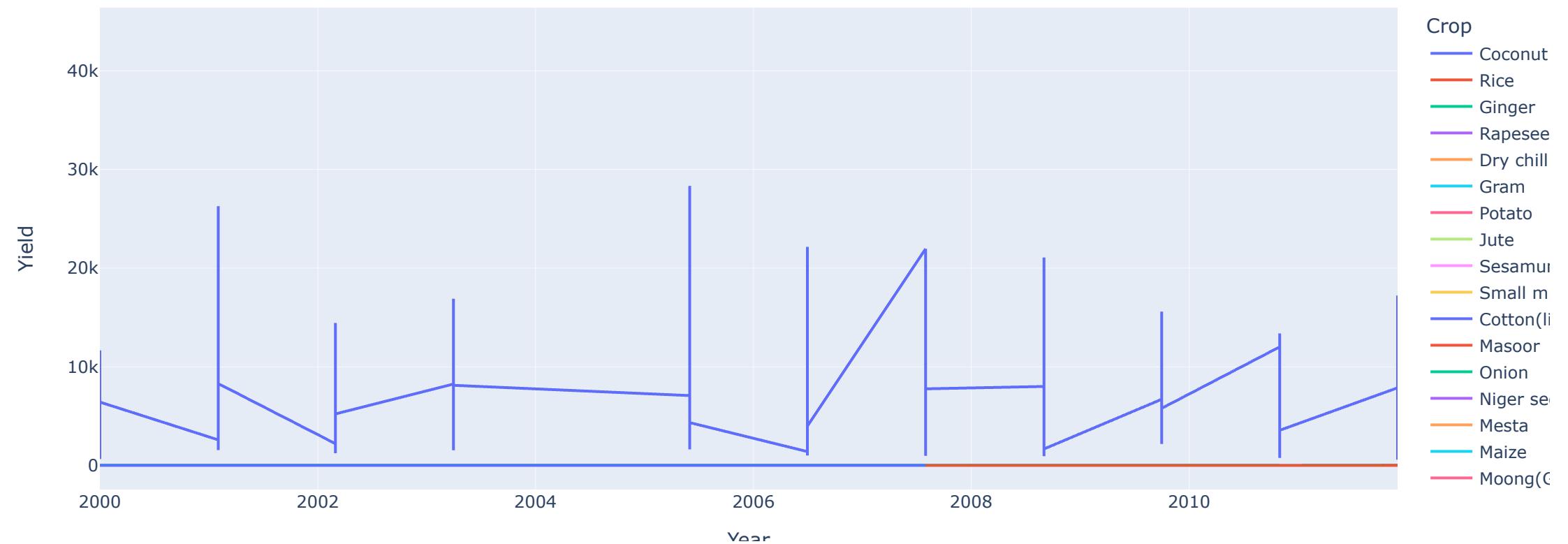
	Year	District	Season	Crop	Yield
<b>279635</b>	2019-20	MAJULI	Whole Year	Coconut	10540.74
<b>280058</b>	2019-20	BAKSA	Winter	Rice	2.04
<b>280065</b>	2019-20	CACHAR	Autumn	Rice	1.82
<b>279698</b>	2019-20	DIMA HASAO	Whole Year	Ginger	9.13
<b>280064</b>	2019-20	BONGAIGAON	Winter	Rice	1.69
...	...	...	...	...	...
<b>302517</b>	1997-98	MARIGAON	Whole Year	Potato	6.36
<b>303191</b>	1997-98	DARRANG	Whole Year	Sweet potato	2.50
<b>302144</b>	1997-98	GOALPARA	Kharif	Mesta	4.86
<b>302140</b>	1997-98	DIMA HASAO	Kharif	Mesta	4.33
<b>302029</b>	1997-98	CACHAR	Kharif	Maize	0.51

18179 rows × 5 columns

In [44]:

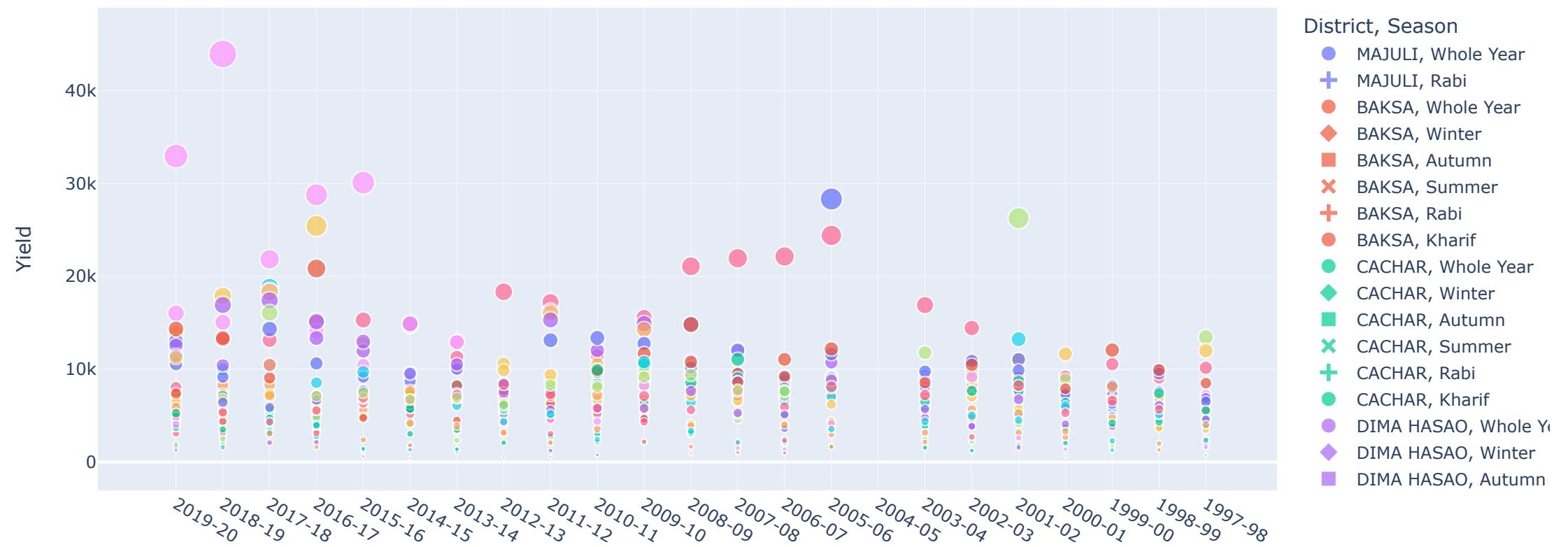
```
fig=px.line(df33,x="Year",y="Yield",color="Crop",title="Assam Agriculture")
fig.show()
```

## Assam Agriculture



```
In [45]: fig=px.scatter(df33,y = "Yield",x = "Year", hover_data = ["District","Season","Crop"],title = "Crops in Assam",
                     color ="District",symbol="Season",size="Yield")
fig.show()
```

## Crops in Assam



```
In [46]: df44=round(pd.pivot_table(data_Assam, index = ["Year"], values=["Yield"], columns=[ "District"]),2)
df44
```

Out[46]:

District	BAKSA	BARPETA	BISWANATH	BONGAIGAON	CACHAR	CHARAIDEO	CHIRANG	DARRANG	DHEMAJI	DHUBRI	...	MAJULI	MARIGAON	NAGAON	NALBARI
Year															
1997-98	NaN	280.88	NaN	102.23	68.81	NaN	NaN	409.05	96.90	81.82	...	NaN	447.37	343.22	188.03
1998-99	NaN	260.33	NaN	138.41	178.66	NaN	NaN	205.63	186.71	234.91	...	NaN	249.94	357.38	220.73
1999-00	NaN	255.45	NaN	219.22	78.57	NaN	NaN	238.71	48.56	139.96	...	NaN	170.25	434.19	226.08
2000-01	NaN	277.42	NaN	208.34	79.14	NaN	NaN	192.04	218.87	149.37	...	NaN	204.19	285.57	210.60
2001-02	NaN	230.42	NaN	250.34	60.68	NaN	NaN	260.01	143.86	51.73	...	NaN	182.31	262.48	213.93
2002-03	NaN	166.28	NaN	264.85	43.09	NaN	NaN	87.50	158.64	124.88	...	NaN	222.43	330.25	123.18
2003-04	NaN	207.18	NaN	269.35	54.93	NaN	NaN	235.77	144.39	157.77	...	NaN	228.34	279.31	187.03
2004-05	NaN	2.60	NaN	3.05	2.98	NaN	NaN	2.81	2.66	2.94	...	NaN	2.63	2.89	2.72
2005-06	3.29	138.70	NaN	225.42	58.54	NaN	3.17	256.21	113.88	298.73	...	NaN	196.89	383.73	278.72
2006-07	241.78	226.36	NaN	220.58	68.72	NaN	241.64	79.04	69.36	261.16	...	NaN	243.58	348.54	162.66
2007-08	231.58	231.52	NaN	195.94	33.14	NaN	231.61	233.67	65.28	367.56	...	NaN	199.42	256.64	159.11
2008-09	287.57	290.77	NaN	215.21	97.64	NaN	287.49	184.16	104.92	355.97	...	NaN	220.65	329.16	235.03

District	BAKSA	BARPETA	BISWANATH	BONGAIGAON	CACHAR	CHARAIDEO	CHIRANG	DARRANG	DHEMAJI	DHUBRI	...	MAJULI	MARIGAON	NAGAON	NALBARI
Year															
2009-10	281.40	270.90	NaN	206.56	291.56	NaN	281.39	232.85	329.03	469.25	...	NaN	176.13	357.72	178.92
2010-11	249.83	246.86	NaN	248.42	98.39	NaN	257.71	184.90	77.23	391.24	...	NaN	206.68	297.18	178.36
2011-12	146.21	495.18	NaN	257.86	89.31	NaN	255.07	239.99	159.36	497.52	...	NaN	297.10	218.19	174.01
2012-13	190.09	134.57	NaN	225.84	68.84	NaN	190.33	264.81	135.32	277.63	...	NaN	302.59	195.15	230.29
2013-14	213.52	396.25	NaN	321.86	38.05	NaN	214.04	230.04	45.52	343.13	...	NaN	210.89	140.20	222.15
2014-15	208.48	292.77	NaN	221.75	98.85	NaN	215.25	213.48	43.90	485.85	...	NaN	232.97	192.88	291.86
2015-16	229.85	320.87	NaN	178.26	38.38	NaN	229.73	220.68	46.94	390.57	...	NaN	225.94	153.12	397.23
2016-17	212.51	417.60	NaN	205.79	85.96	NaN	212.66	172.67	120.73	476.37	...	NaN	172.35	123.02	408.68
2017-18	212.02	544.83	NaN	263.94	103.95	NaN	475.95	136.01	131.26	549.01	...	NaN	216.94	133.14	310.21
2018-19	215.75	447.12	NaN	262.17	58.71	NaN	78.19	167.14	51.43	533.34	...	NaN	203.46	137.29	319.44
2019-20	212.23	490.11	5628.9	235.27	50.27	2636.34	61.87	153.29	112.51	397.62	...	5270.6	200.42	119.90	351.52

23 rows × 33 columns

```
In [47]: max(df44)
```

```
Out[47]: ('Yield', 'WEST KARBI ANGLONG')
```

```
In [48]: df44.describe().round(2)
```

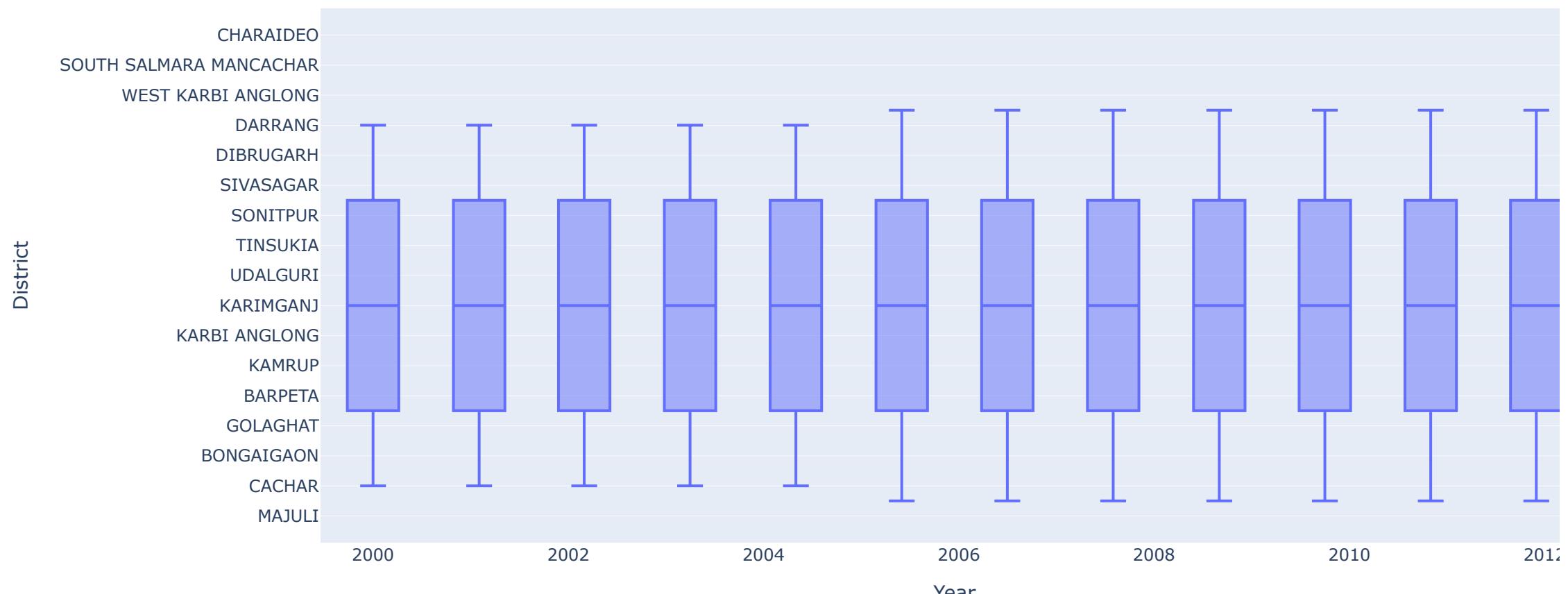
```
Out[48]:
```

District	BAKSA	BARPETA	BISWANATH	BONGAIGAON	CACHAR	CHARAIDEO	CHIRANG	DARRANG	DHEMAJI	DHUBRI	...	MAJULI	MARIGAON	NAGAON	NALBARI
count	15.00	23.00	1.0	23.00	23.00	1.00	15.00	23.00	23.00	23.00	...	1.0	23.00	23.00	23.00
mean	209.07	288.04	5628.9	214.81	80.31	2636.34	215.74	200.02	113.36	306.01	...	5270.6	217.98	247.01	229.15
std	66.45	129.26	NaN	64.61	57.35	NaN	110.21	79.09	70.70	163.41	...	NaN	74.95	108.63	90.64
min	3.29	2.60	5628.9	3.05	2.98	2636.34	3.17	2.81	2.66	2.94	...	5270.6	2.63	2.89	2.72
25%	210.25	228.39	5628.9	206.18	52.60	2636.34	201.50	169.90	58.36	153.57	...	5270.6	198.15	146.66	178.64
50%	213.52	270.90	5628.9	221.75	68.81	2636.34	229.73	213.48	112.51	343.13	...	5270.6	210.89	262.48	220.73
75%	236.68	358.56	5628.9	254.10	93.48	2636.34	256.39	237.24	144.12	433.44	...	5270.6	230.66	336.74	285.29
max	287.57	544.83	5628.9	321.86	291.56	2636.34	475.95	409.05	329.03	549.01	...	5270.6	447.37	434.19	408.68

8 rows × 33 columns



```
In [49]: fig=px.box(df33,y="District",x="Year")
fig.show()
```



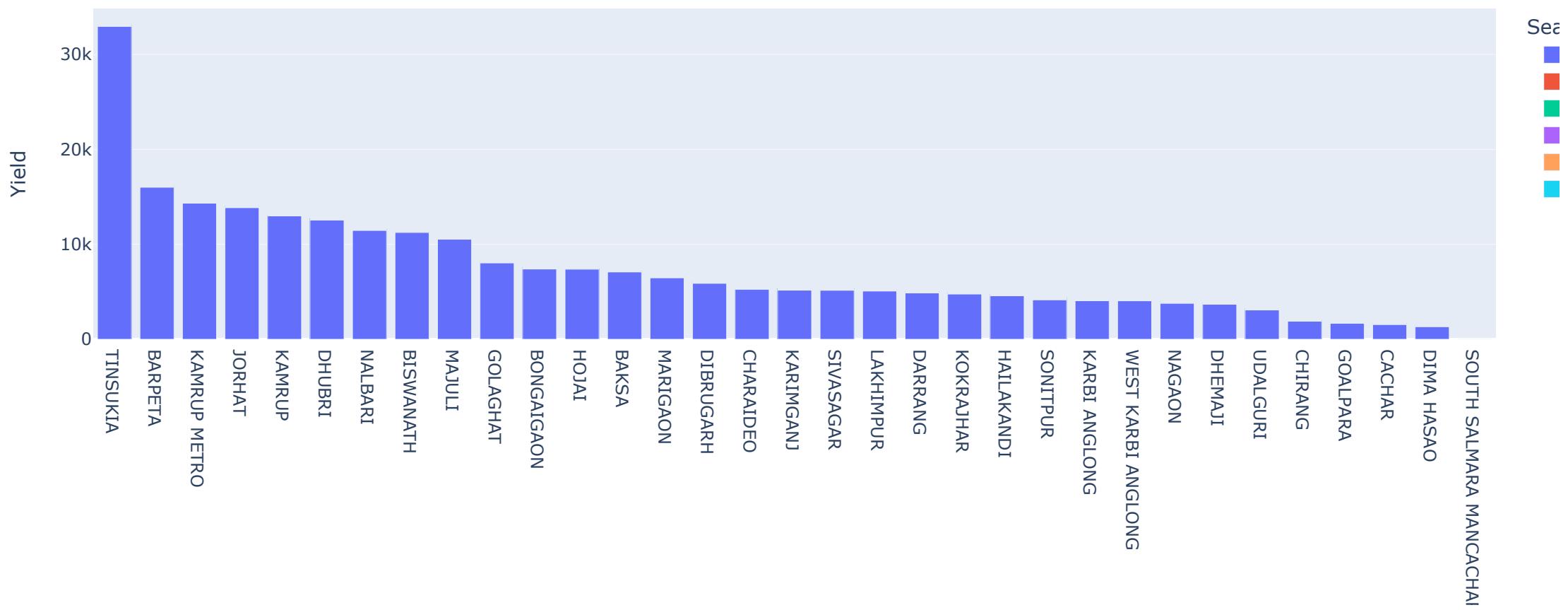
```
In [50]: df55 = df33.query("Year=='2019-20'")
df66=df55.sort_values("Yield",ascending = False)
df66
```

Out[50]:

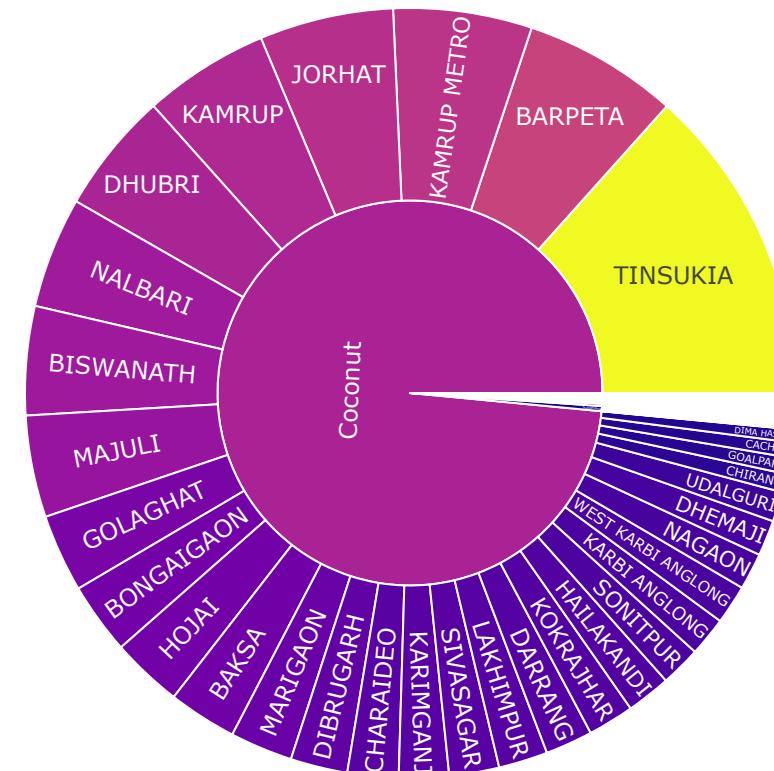
	Year	District	Season	Crop	Yield
<b>279641</b>	2019-20	TINSUKIA	Whole Year	Coconut	32957.75
<b>279613</b>	2019-20	BARPETA	Whole Year	Coconut	16018.95
<b>279630</b>	2019-20	KAMRUP METRO	Whole Year	Coconut	14340.91
<b>279628</b>	2019-20	JORHAT	Whole Year	Coconut	13865.03
<b>279629</b>	2019-20	KAMRUP	Whole Year	Coconut	13004.18
...	...	...	...	...	...
<b>279486</b>	2019-20	DIBRUGARH	Rabi	Arecanut	0.30
<b>279498</b>	2019-20	LAKHIMPUR	Rabi	Arecanut	0.26
<b>280142</b>	2019-20	DHEMAJI	Kharif	Sesamum	0.25
<b>280032</b>	2019-20	CACHAR	Rabi	Rapeseed & Mustard	0.22
<b>280267</b>	2019-20	BAKSA	Whole Year	Tobacco	0.14

880 rows × 5 columns

In [51]: px.bar(df66, x="District", y="Yield", hover\_data=["Season", "Crop"], color="Season")



```
In [52]: px.sunburst(df66, values="Yield", color="Yield", path=["Crop", "District"])
```



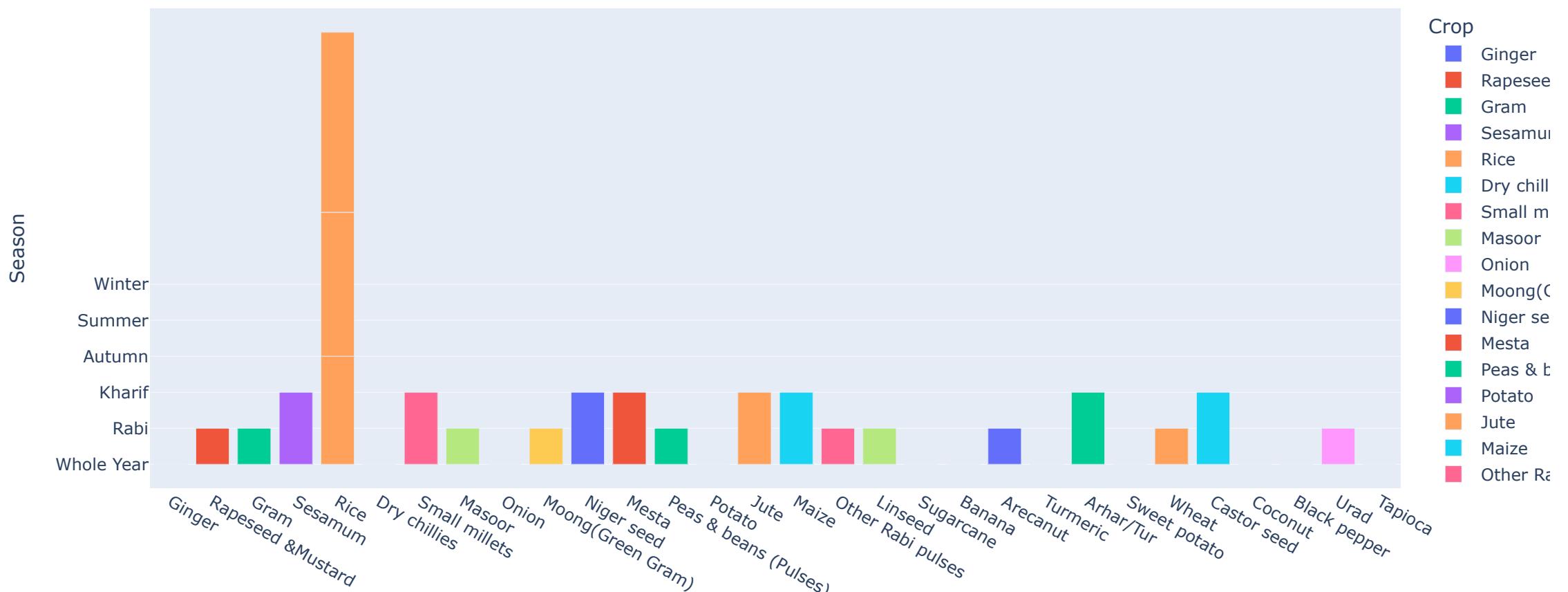
```
In [53]: df77 = df55.query("District=='KAMRUP'")  
df77.sort_values("Yield", ascending = False)
```

Out[53]:

	<b>Year</b>	<b>District</b>	<b>Season</b>	<b>Crop</b>	<b>Yield</b>
<b>279629</b>	2019-20	KAMRUP	Whole Year	Coconut	13004.18
<b>280202</b>	2019-20	KAMRUP	Whole Year	Sugarcane	29.72
<b>279550</b>	2019-20	KAMRUP	Whole Year	Banana	21.04
<b>279935</b>	2019-20	KAMRUP	Whole Year	Onion	14.40
<b>280016</b>	2019-20	KAMRUP	Whole Year	Potato	9.81
<b>279703</b>	2019-20	KAMRUP	Whole Year	Ginger	8.92
<b>280256</b>	2019-20	KAMRUP	Whole Year	Tapioca	7.63
<b>279805</b>	2019-20	KAMRUP	Kharif	Maize	5.97
<b>279858</b>	2019-20	KAMRUP	Kharif	Mesta	5.30
<b>279755</b>	2019-20	KAMRUP	Kharif	Jute	5.27
<b>280229</b>	2019-20	KAMRUP	Whole Year	Sweet potato	4.63
<b>280099</b>	2019-20	KAMRUP	Winter	Rice	2.61
<b>280098</b>	2019-20	KAMRUP	Summer	Rice	2.59
<b>279577</b>	2019-20	KAMRUP	Whole Year	Black pepper	1.82
<b>280292</b>	2019-20	KAMRUP	Whole Year	Turmeric	1.20
<b>279989</b>	2019-20	KAMRUP	Rabi	Peas & beans (Pulses)	1.05
<b>279523</b>	2019-20	KAMRUP	Kharif	Arhar/Tur	0.92
<b>279676</b>	2019-20	KAMRUP	Whole Year	Dry chillies	0.90
<b>280097</b>	2019-20	KAMRUP	Autumn	Rice	0.88
<b>280345</b>	2019-20	KAMRUP	Rabi	Wheat	0.84
<b>280319</b>	2019-20	KAMRUP	Rabi	Urad	0.66
<b>279962</b>	2019-20	KAMRUP	Rabi	Other Rabi pulses	0.64

	Year	District	Season	Crop	Yield
<b>279493</b>	2019-20	KAMRUP	Rabi	Arecanut	0.63
<b>280150</b>	2019-20	KAMRUP	Kharif	Sesamum	0.63
<b>280043</b>	2019-20	KAMRUP	Rabi	Rapeseed &Mustard	0.60
<b>279779</b>	2019-20	KAMRUP	Rabi	Linseed	0.54
<b>280176</b>	2019-20	KAMRUP	Kharif	Small millets	0.54
<b>279832</b>	2019-20	KAMRUP	Rabi	Masoor	0.53
<b>279910</b>	2019-20	KAMRUP	Kharif	Niger seed	0.52
<b>279602</b>	2019-20	KAMRUP	Kharif	Castor seed	0.50
<b>279884</b>	2019-20	KAMRUP	Rabi	Moong(Green Gram)	0.46
<b>279729</b>	2019-20	KAMRUP	Rabi	Gram	0.32

In [54]: px.bar(df77, x="Crop", y="Season", color="Crop", hover\_data=["Yield"])



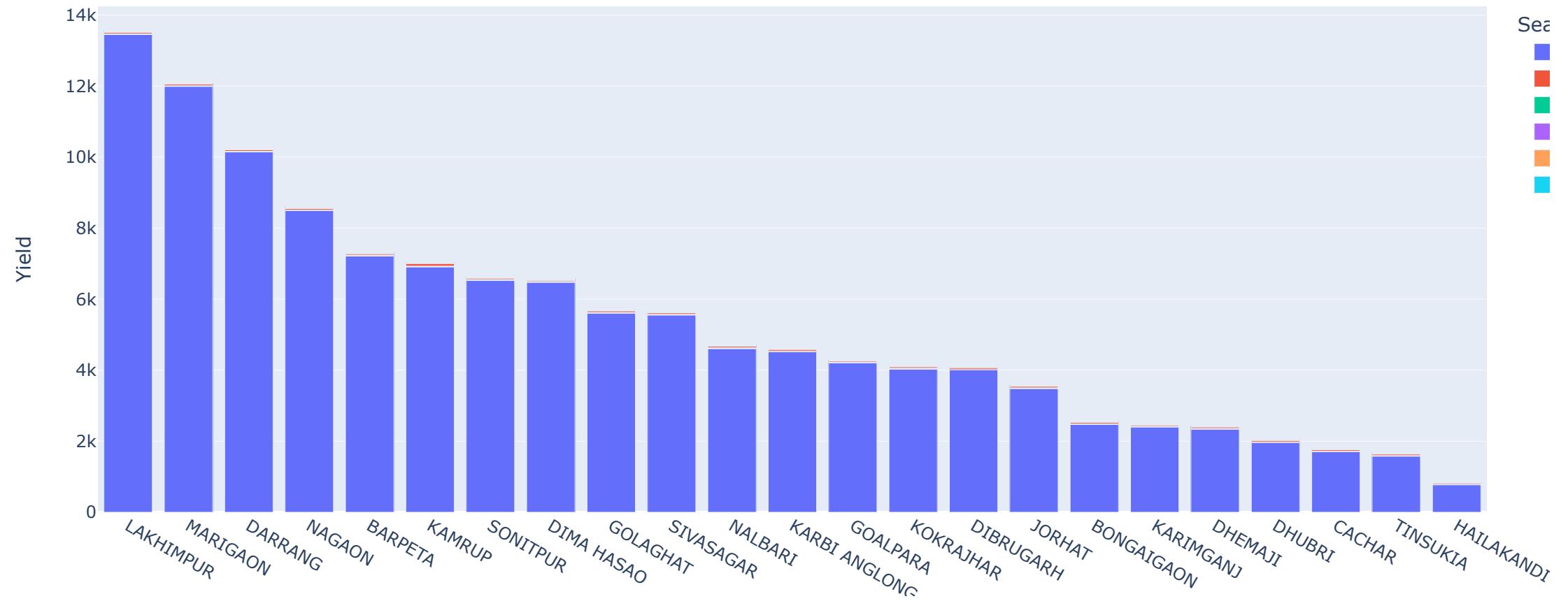
```
In [55]: df551 = df33.query("Year=='1997-98'")
df661=df551.sort_values("Yield",ascending = False)
df661
```

Out[55]:

	Year	District	Season	Crop	Yield
<b>301545</b>	1997-98	LAKHIMPUR	Whole Year	Coconut	13454.55
<b>301549</b>	1997-98	MARIGAON	Whole Year	Coconut	11990.98
<b>301493</b>	1997-98	DARRANG	Whole Year	Coconut	10145.83
<b>301553</b>	1997-98	NAGAON	Whole Year	Coconut	8492.03
<b>301481</b>	1997-98	BARPETA	Whole Year	Coconut	7213.01
...	...	...	...	...	...
<b>301460</b>	1997-98	MARIGAON	Kharif	Castor seed	0.20
<b>303417</b>	1997-98	MARIGAON	Whole Year	Tobacco	0.20
<b>301456</b>	1997-98	LAKHIMPUR	Kharif	Castor seed	0.00
<b>301449</b>	1997-98	KARBI ANGLONG	Kharif	Castor seed	0.00
<b>303401</b>	1997-98	KAMRUP	Whole Year	Tobacco	0.00

568 rows × 5 columns

In [56]: px.bar(df661, x="District", y="Yield", hover\_data=["Season", "Crop"], color="Season")



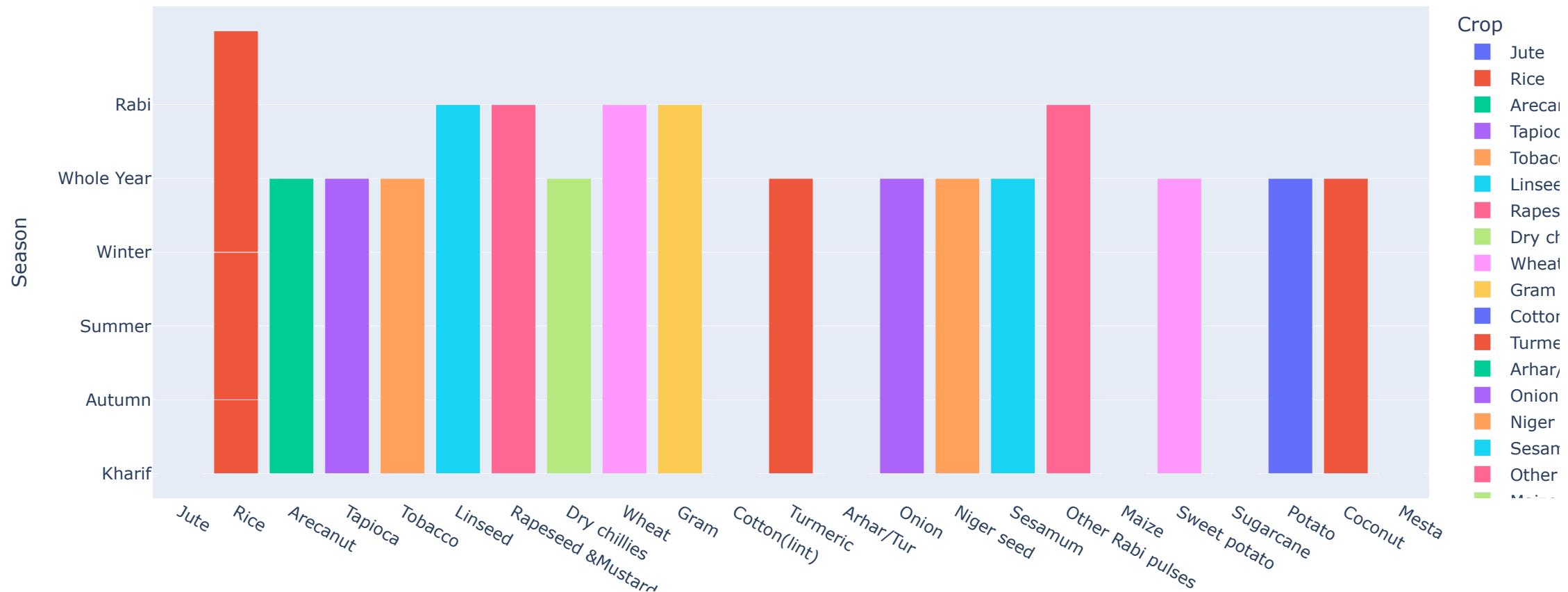
```
In [57]: df771 = df551.query("District=='KAMRUP'")  
df771.sort_values("Yield", ascending = False)
```

Out[57]:

	<b>Year</b>	<b>District</b>	<b>Season</b>	<b>Crop</b>	<b>Yield</b>
<b>301529</b>	1997-98	KAMRUP	Whole Year	Coconut	6908.90
<b>303135</b>	1997-98	KAMRUP	Kharif	Sugarcane	74.99
<b>302497</b>	1997-98	KAMRUP	Whole Year	Potato	10.52
<b>301890</b>	1997-98	KAMRUP	Kharif	Jute	7.60
<b>302151</b>	1997-98	KAMRUP	Kharif	Mesta	4.81
<b>303319</b>	1997-98	KAMRUP	Whole Year	Tapioca	3.60
<b>302313</b>	1997-98	KAMRUP	Whole Year	Onion	2.75
<b>303227</b>	1997-98	KAMRUP	Whole Year	Sweet potato	2.49
<b>302778</b>	1997-98	KAMRUP	Summer	Rice	1.34
<b>303576</b>	1997-98	KAMRUP	Rabi	Wheat	1.18
<b>302779</b>	1997-98	KAMRUP	Winter	Rice	1.03
<b>303485</b>	1997-98	KAMRUP	Whole Year	Turmeric	0.87
<b>301299</b>	1997-98	KAMRUP	Kharif	Arhar/Tur	0.80
<b>302777</b>	1997-98	KAMRUP	Autumn	Rice	0.73
<b>302069</b>	1997-98	KAMRUP	Kharif	Maize	0.62
<b>301207</b>	1997-98	KAMRUP	Whole Year	Arecanut	0.61
<b>302589</b>	1997-98	KAMRUP	Rabi	Rapeseed &Mustard	0.51
<b>302227</b>	1997-98	KAMRUP	Whole Year	Niger seed	0.50
<b>302405</b>	1997-98	KAMRUP	Rabi	Other Rabi pulses	0.49
<b>301621</b>	1997-98	KAMRUP	Kharif	Cotton(lint)	0.48
<b>301712</b>	1997-98	KAMRUP	Whole Year	Dry chillies	0.45
<b>301978</b>	1997-98	KAMRUP	Rabi	Linseed	0.44

Year	District	Season	Crop	Yield
302957	1997-98	KAMRUP	Whole Year	Sesamum 0.41
301803	1997-98	KAMRUP	Rabi	Gram 0.31
303401	1997-98	KAMRUP	Whole Year	Tobacco 0.00

```
In [58]: px.bar(df771, x="Crop", y="Season", color="Crop", hover_data=["Yield"])
```



### 3. Sustainable agricultural practices:

- 1) Rotating crops and embracing diversity
- 2) Adopting agroforestry practices
- 3) Managing whole systems and landscapes
- 4) Polyculture Farming
- 5) Improve Soil Fertility and Soil Management
- 6) Save Transportation Costs
- 7) Better Water Management
- 8) Urban Agriculture
- 9) Improving the ecological conditions