

# Omdena - Milan Chapter Agrifoods

## AI for Sustainable agri-food systems: use of Satellite Imagery

### Exploratory analysis of cereals production in Italy 2020-2022

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Here we have analysed the major areas and crop produced in Italy. Crop dataset used in this study was downloaded from the Italian National Institute of Statistics (Istat). The objective is to get some insights about crop production and its respective areas in Italy and how climate change have affected crop production in the last 3 years. Maps was created with dataset from Simone Rigoni, the address to the repository of the dataset i available in [References](#).

ITITER107	Territory	TIPO_DATOS	Data type	AGRI_MADRE	Type of crop	TIME	Select time	Value	Flag	Codes	Flags
0	ITC11	Torino	ART	total area - hectares	COMMEAT	common wheat	2020	2020	15362	NaN	NaN
1	ITC11	Torino	ART	total area - hectares	COMMEAT	common wheat	2021	2021	16831	NaN	NaN
2	ITC11	Torino	ART	total area - hectares	COMMEAT	common wheat	2022	2022	16735	NaN	NaN
3	ITC12	Vercelli	ART	total area - hectares	COMMEAT	common wheat	2020	2020	1285	NaN	NaN
4	ITC12	Vercelli	ART	total area - hectares	COMMEAT	common wheat	2021	2021	1491	NaN	NaN

## Pre-processing dataset

	Territory	Data type	Type of crop	Select time	Value
0	Torino	total area - hectares	common wheat	2020	15362
1	Torino	total area - hectares	common wheat	2021	16831
2	Torino	total area - hectares	common wheat	2022	16735
3	Vercelli	total area - hectares	common wheat	2020	1285
4	Vercelli	total area - hectares	common wheat	2021	1491
...	...	...	...	...	...
4767	Pesaro e Urbino	total area - hectares	rye and winter cereal mixtures (maslin)	2022	3
4768	Roma	total area - hectares	rye and winter cereal mixtures (maslin)	2022	20
4769	Valle d'Aosta / Vallée d'Aoste	total area - hectares	winter barley	2022	1
4770	Torino	total area - hectares	spring barley	2020	220
4771	Valle d'Aosta / Vallée d'Aoste	total area - hectares	oats and spring cereal mixtures (mixed grain o...	2022	3

4772 rows × 5 columns

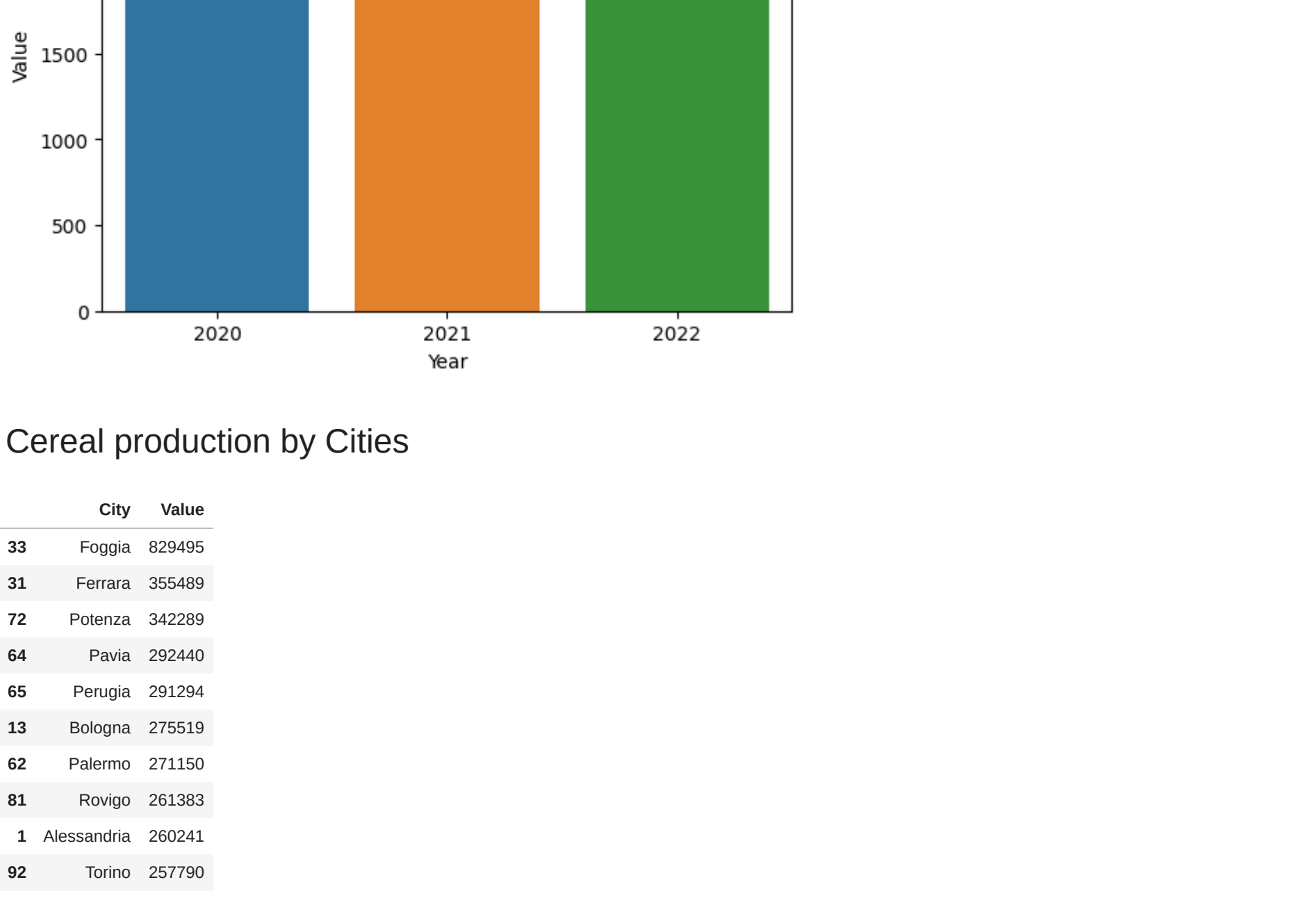
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0   City         4772 non-null    object
1   Data_type    4772 non-null    object
2   Type_crop    4772 non-null    object
3   Year         4772 non-null    int64
4   Value        4772 non-null    int64
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Type_crop    0
Year         0
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dtype: int64
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## Cities in Italy producing cereals

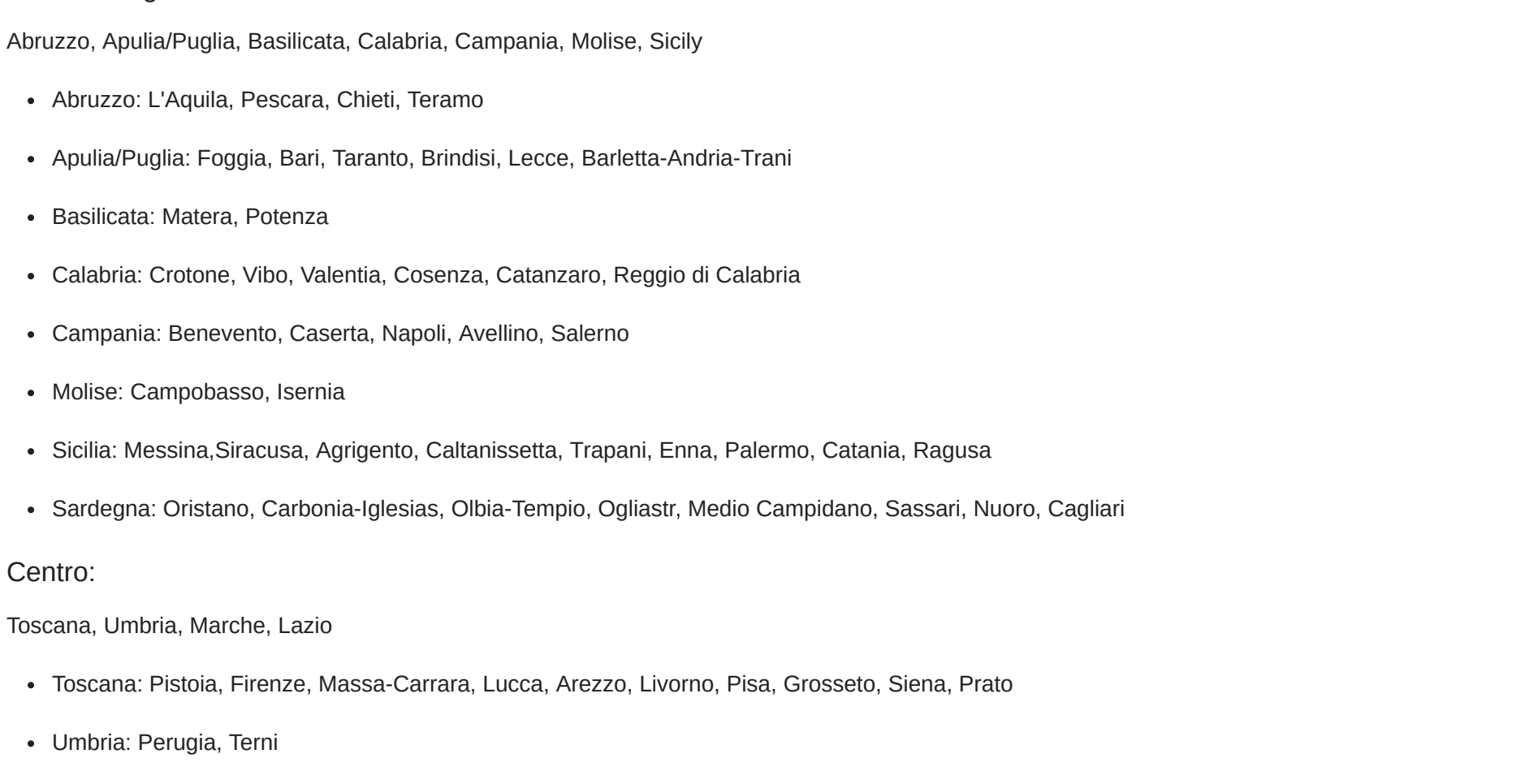
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array(['Torino', 'Vercelli', 'Biella', 'Verbano-Cusio-Ossola', 'Novara', 'Cuneo', 'Asti', 'Alessandria', 'Valle d'Aosta / Vallée d'Aoste', 'Aosta', 'Savona', 'Genova', 'La Spezia', 'Varese', 'Como', 'Lecco', 'Sondrio', 'Milano', 'Bergamo', 'Brescia', 'Pavia', 'Lodi', 'Cremona', 'Mantova', 'Trentino Alto Adige / Sudtirol', 'Verona', 'Vicenza', 'Belluno', 'Treviso', 'Venezia', 'Padova', 'Rovigo', 'Pordenone', 'Udine', 'Gorizia', 'Piacenza', 'Parma', 'Reggio nell'Emilia', 'Modena', 'Bologna', 'Ferrara', 'Ravenna', 'Forlì-Cesena', 'Rimini', 'Massa-Carrara', 'Lucca', 'Pistoia', 'Firenze', 'Prato', 'Livorno', 'Pisa', 'Arezzo', 'Siena', 'Grosseto', 'Perugia', 'Terni', 'Pesaro e Urbino', 'Ancona', 'Macerata', 'Ascoli Piceno', 'Viterbo', 'Rieti', 'Roma', 'Latina', 'Frosinone', 'L'Aquila', 'Teramo', 'Pescara', 'Chieti', 'Isernia', 'Campobasso', 'Caserta', 'Benevento', 'Avellino', 'Salerno', 'Foggia', 'Bari', 'Taranto', 'Brindisi', 'Potenza', 'Matera', 'Cosenza', 'Crotone', 'Catanzaro', 'Vibo Valentia', 'Reggio di Calabria', 'Messina', 'Catania', 'Sassari', 'Nuoro', 'Cagliari', 'Oristano', 'Lecce', 'Trapani', 'Palermo', 'Agrigento', 'Siracusa', 'Caltanissetta', 'Ragusa', 'Napoli', 'Monza e della Brianza', 'Fermo', 'Barletta-Andria-Trani', 'Enna', 'Trieste', 'Imperia', 'Sud Sardegna', 'Bolzano / Bozen', 'Trento'], dtype=object)
```

## Total cereal production in 2020-2022



## Cereal production by Cities

City	Value
33	Foggia 829495
31	Ferrara 355489
72	Potenza 342299
64	Pavia 292440
65	Perugia 291294
13	Bologna 275519
62	Palermo 271150
81	Rovigo 261383
1	Alessandria 260241
92	Torino 257790



## Italy geographic areas is organized in regions, provinces or communes.

The regions are classified as follow:

Sud/Mezzogiorno:

Abruzzo, Apulia/Puglia, Basilicata, Calabria, Campania, Molise, Sicily

- Abruzzo: L'Aquila, Pescara, Chieti, Teramo
- Apulia/Puglia: Foggia, Bari, Taranto, Brindisi, Lecce, Barletta-Andria-Trani
- Basilicata: Matera, Potenza
- Calabria: Crotone, Vibo, Valentia, Cosenza, Catanzaro, Reggio di Calabria
- Campania: Benevento, Caserta, Napoli, Avellino, Salerno
- Molise: Campobasso, Isernia
- Sicilia: Messina, Siracusa, Agrigento, Caltanissetta, Trapani, Enna, Palermo, Catania, Ragusa
- Sardegna: Oristano, Carbonia-Iglesias, Olbia-Tempio, Ogliastr, Medio Campidano, Sassari, Nuoro, Cagliari

Centro:

Toscana, Umbria, Marche, Lazio

- Toscana: Pistoia, Firenze, Massa-Carrara, Lucca, Arezzo, Livorno, Pisa, Grosseto, Siena, Prato
- Umbria: Perugia, Terni
- Marche: Ancona, Macerata, Ascoli Piceno, Pesaro e Urbino, Fermo
- Lazio: Roma, Viterbo, Rieti, Latina, Frosinone

Nord-ovest:

Piemonte, Valle d'Aosta, Lombardia, Liguria

- Liguria: Imperia, Savona, Genova, La Spezia
- Lombardia: Como, Varese, Milano, Pavia, Bergamo, Brescia, Sondrio, Cremona, Mantova, Monza e Della Brianza, Lecco, Lodi
- Piemonte: Vercelli, Novara, Torino, Cuneo, Asti, Alessandria, Biella, Verbano-Cusio-Ossola
- Valdaosta: Valle d'Aosta

Nord-est:

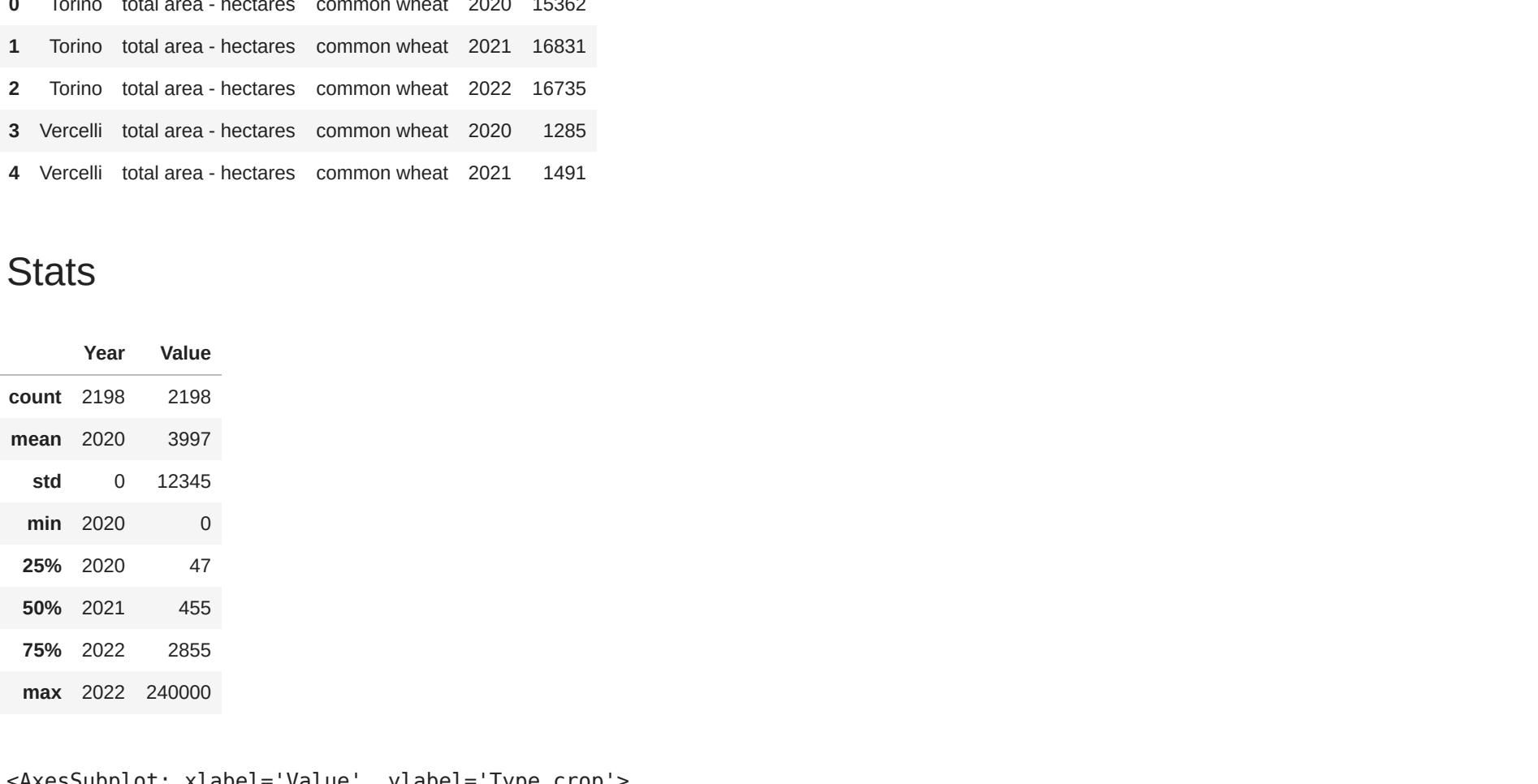
Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, Emilia-Romagna

- Trentino: Bolzano/Bozen, Trento
- Veneto: Belluno, Verona, Padova, Treviso, Venezia, Udine, Pordenone
- Friuli-Venezia Giulia: Trieste, Udine, Gorizia, Pordenone
- Emilia-Romagna: Parma, Reggio nell'Emilia, Piacenza, Forlì-Cesena, Modena, Bologna, Ferrara, Ravenna, Rimini

## The most produced cereals 2020-2022

winter cereal mixtures (maslin)	
potatoes	314
barley	308
oats	289
durum wheat	286
common wheat	284
grain maize	284
broad bean	238
chick-peas	232
other cereals	226
dried kidney bean	218
sorghum	217
oats and spring cereal mixtures (mixed grain other than maslin)	194
protein pea	190
spring barley	187
common winter wheat and spelt	173
lentil	168
rye	163
grain pea	152
triticale	144
early potatoes	134
rye and winter cereal mixtures (maslin)	108
rice	62
sugar beet	68
sweet lupin	46
spring barley	42
common spring wheat and spelt	29
sweet potatoes	23
winter cereal mixtures (maslin)	5
spring cereal mixtures (mixed grain other than maslin)	4
Name: Type_crop, dtype: int64	
29	

Dataset shows there are 29 different types of cereals cultivated in Italy. The top five most produced crops are Wheat, Barley, Maize, Beans and Oats.

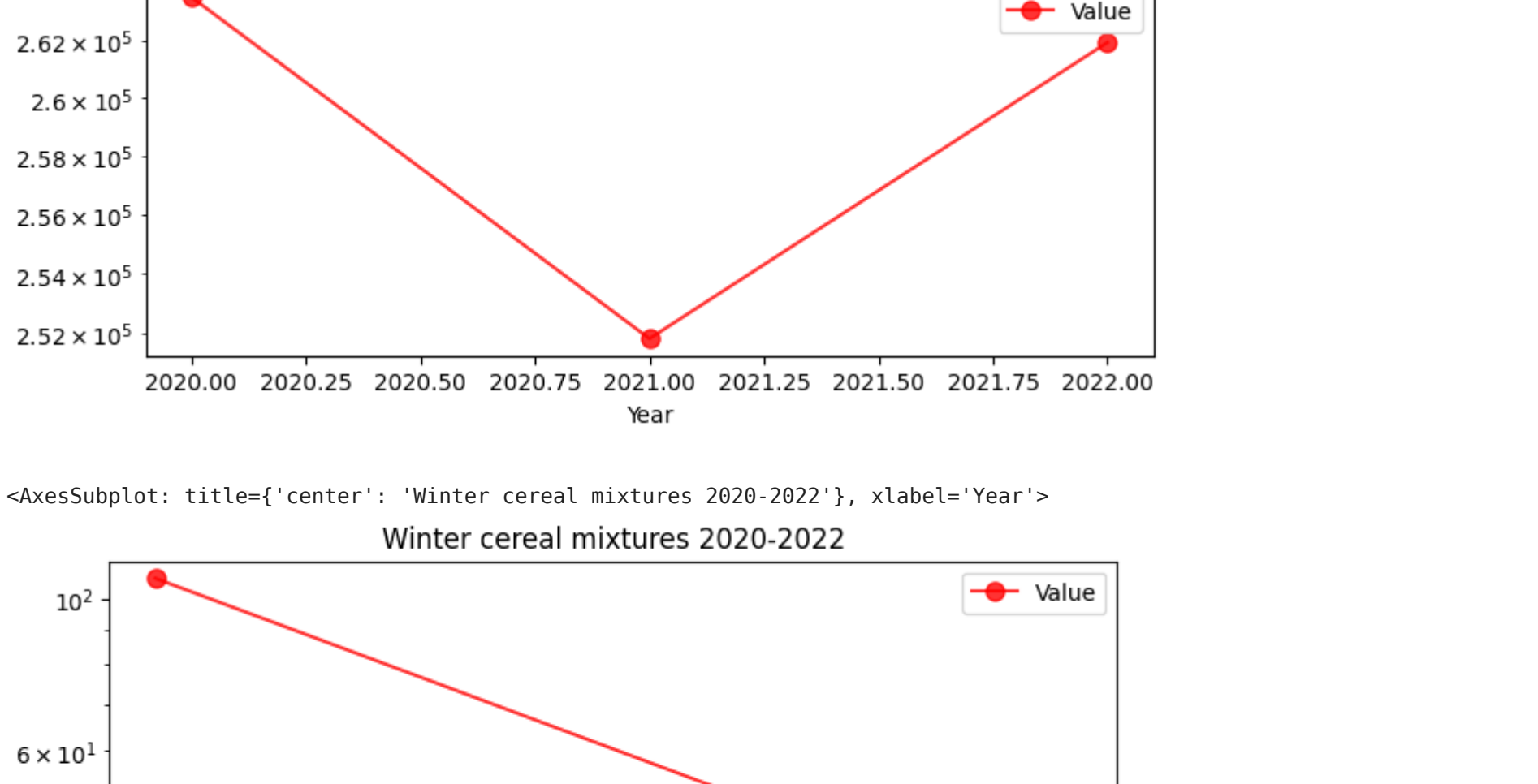


## Subsetting data

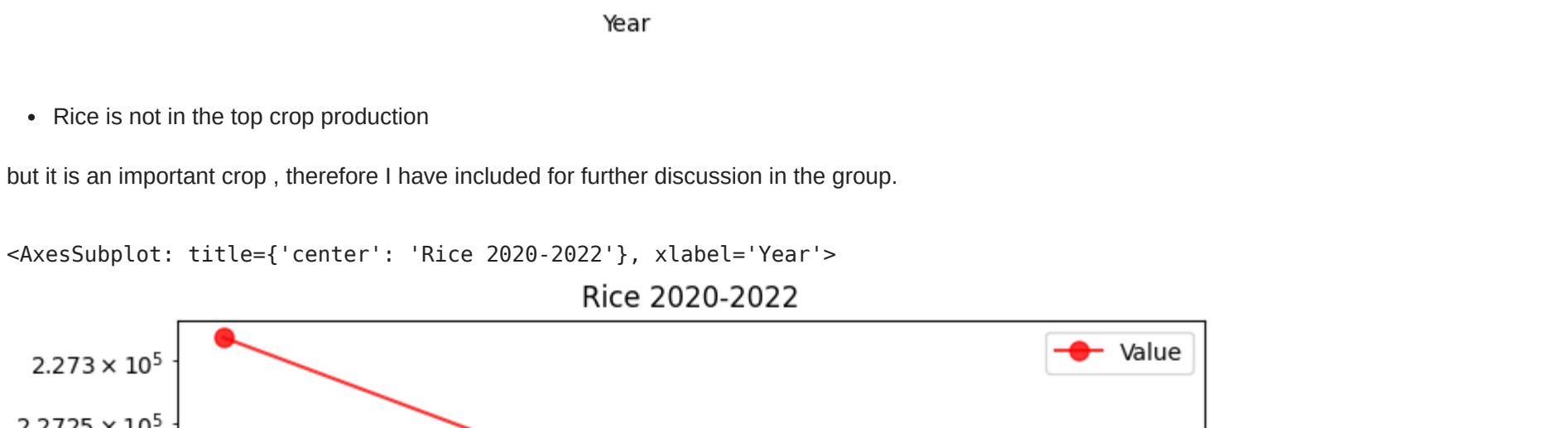
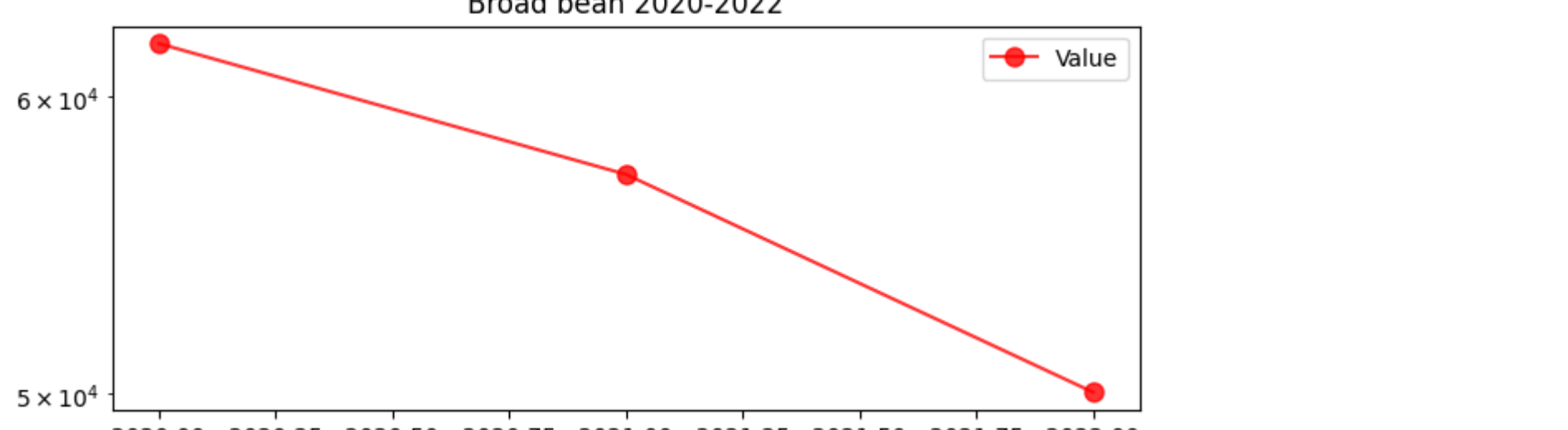
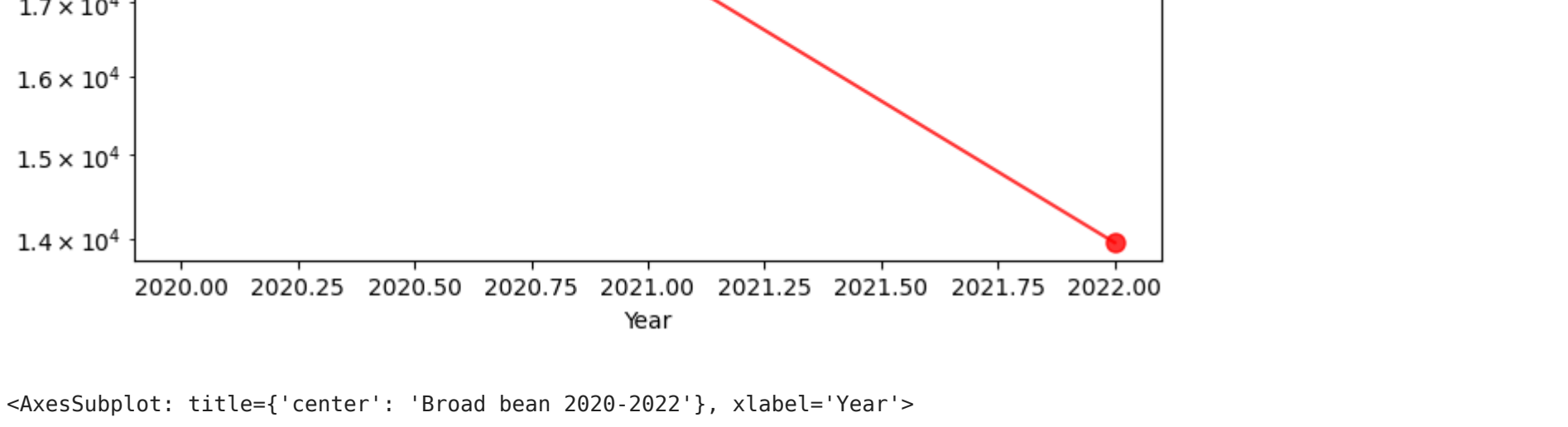
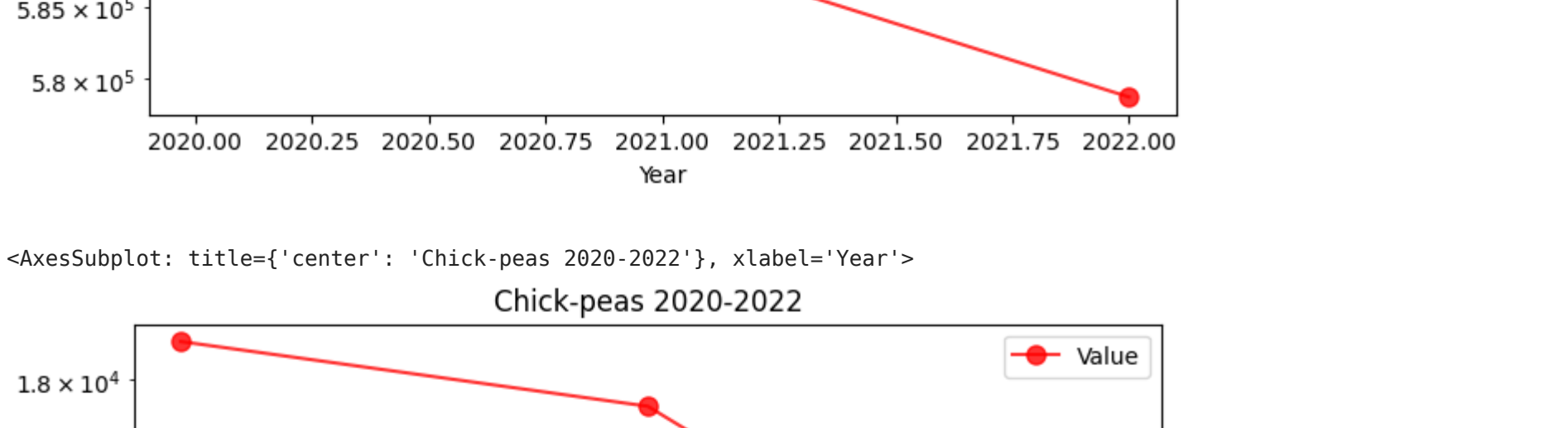
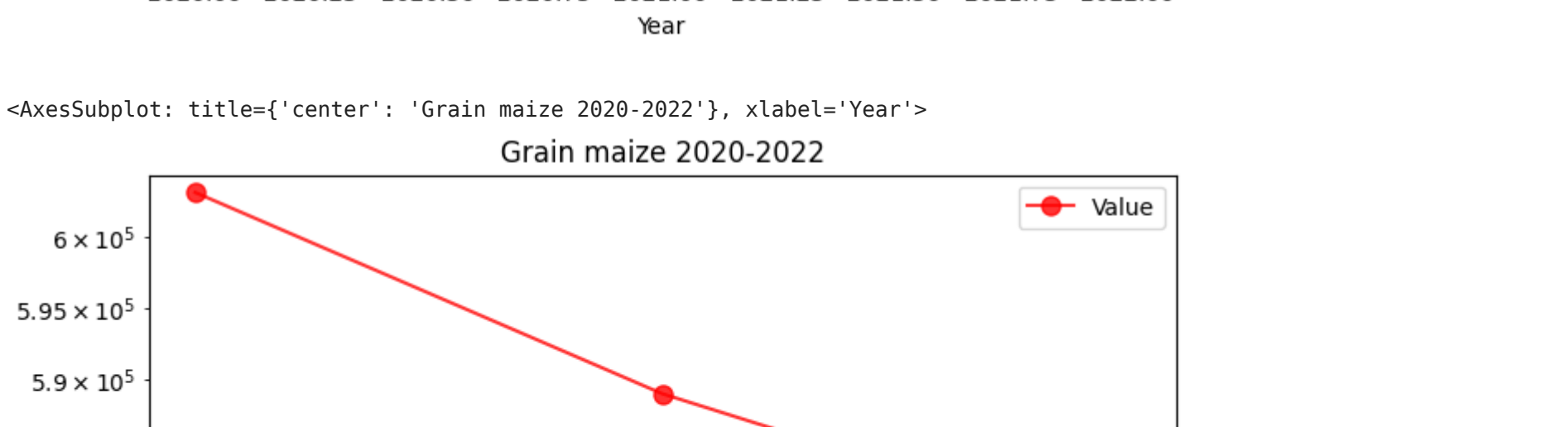
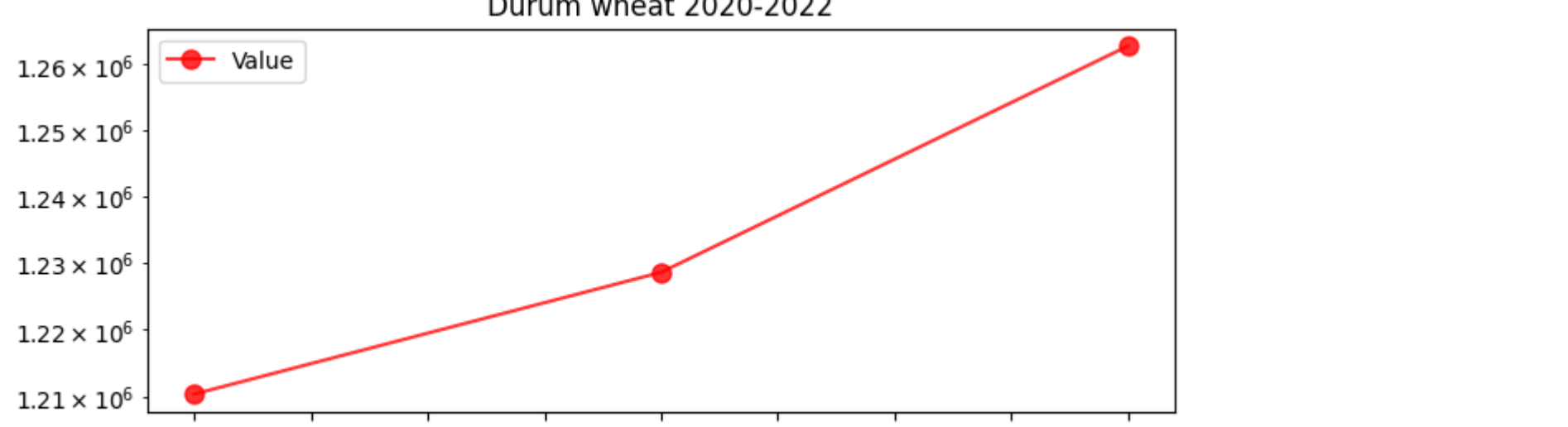
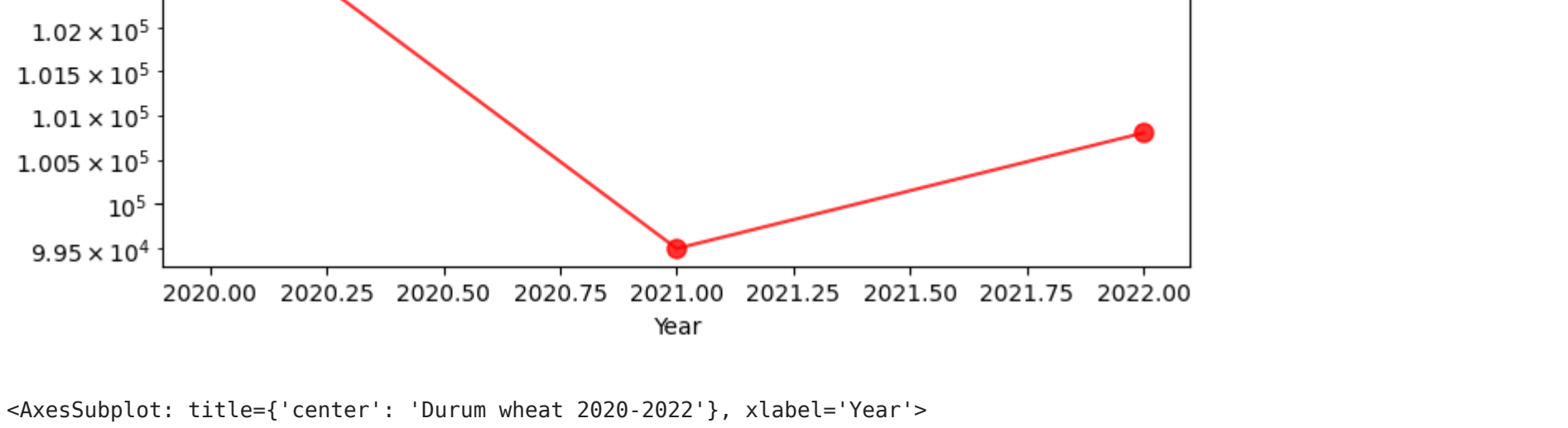
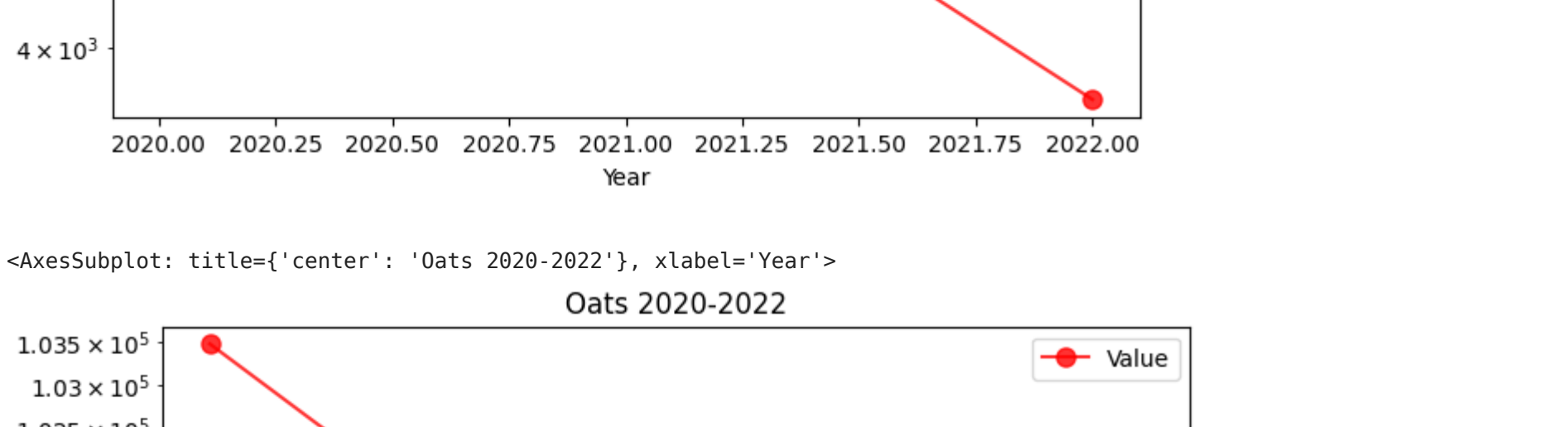
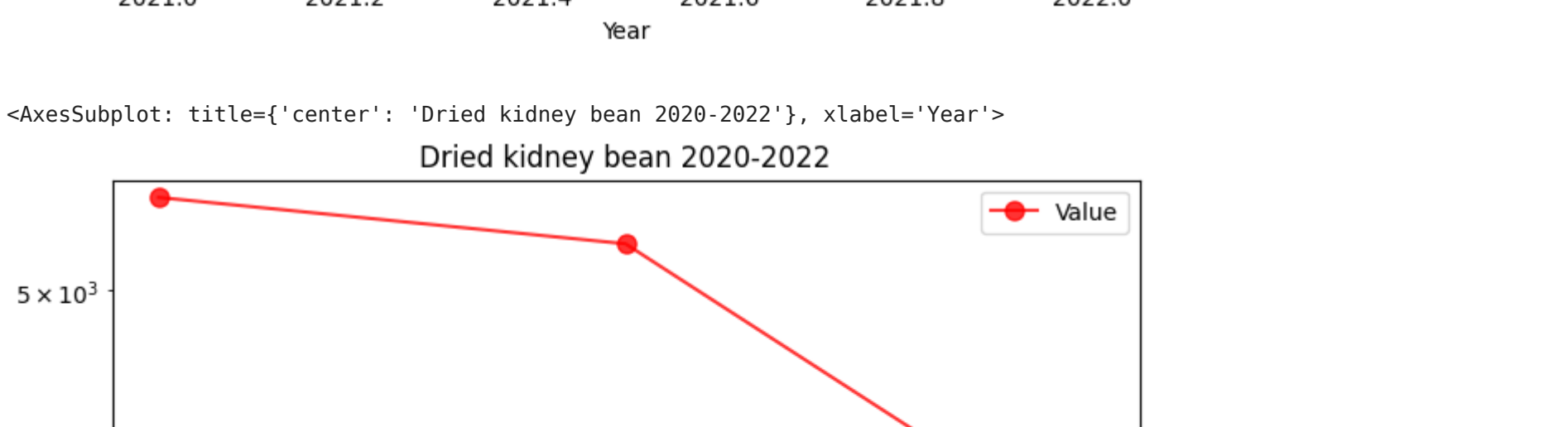
City	Data_type	Type_crop	Year	Value
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3	Vercelli	total area - hectares	common wheat	2020 1285
4	Vercelli	total area - hectares	common wheat	2021 1491

## Stats

	Year	Value
count	2198	2198
mean	2020	3997
std	0	12345
min	2020	0
25%	2020	47
50%	2021	455
75%	2022	2855
max	2022	240000

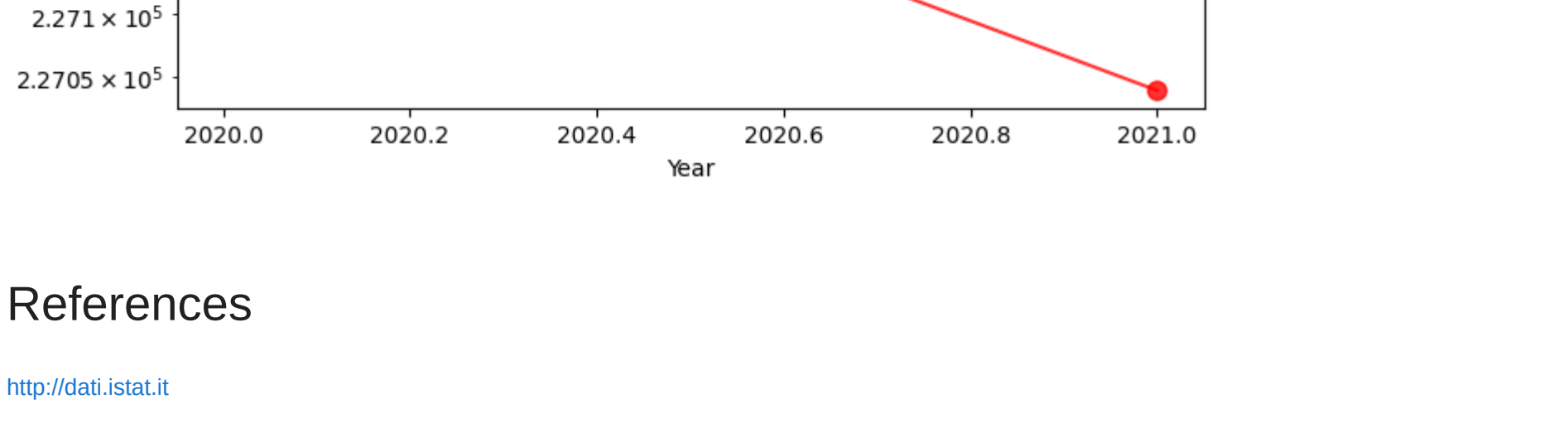


## Vizualization of ten type cereal produced in Italy in the period of 2020-2022



- Rice is not in the top crop production

but it is an important crop, therefore I have included for further discussion in the group.



## References

<http://dati.istat.it>

<https://maps.princeton.edu/catalog/stanford-mn871sp9778>

[https://www.crsagov.it/documents/684570/ITACONTA+2020\\_ENG+DEF+web+%281%29.pdf/95c6b30a-1e18-8e94-d4ac-ce884aef76e8?t=1619527317576](https://www.crsagov.it/documents/684570/ITACONTA+2020_ENG+DEF+web+%281%29.pdf/95c6b30a-1e18-8e94-d4ac-ce884aef76e8?t=1619527317576)