split_dataset

July 5, 2020

1 Conjunto de dados para treinamento, validação e teste

[1]:
```
DATASET = 'b2s'  # b2s ou bfs
TYPE = "multiespectral"
```

1.1 Importação

[2]:
```
from datetime import datetime
from os import listdir
from os.path import isfile, join

import os
import glob
import random

import numpy as np
import pandas as pd

import matplotlib.pyplot as plt
import seaborn as sns
```

1.2 Metadados

[3]:
```
dfs = dict()
for f in os.listdir("data"):
    if os.path.splitext(f)[-1] == '.csv':
        dfs[f] = pd.read_csv(os.path.join("data", f))

frames = []
for k in dfs:
    if DATASET in k and TYPE in k:
        frames.append(dfs[k])
metadata = pd.concat(frames)
metadata.head(3)
```

[3]:
```
                 Instance              Crop                        B1File  \
0  q170505tscrfl_fung_19  crop_tsc_2017_b2s  q170505tscrfl_fung_19_B1.tif
1  q170505tscrfl_fung_31  crop_tsc_2017_b2s  q170505tscrfl_fung_31_B1.tif
2  q170419tscrfl_fung_59  crop_tsc_2017_b2s  q170419tscrfl_fung_59_B1.tif

                         B2File                        B3File  \
0  q170505tscrfl_fung_19_B2.tif  q170505tscrfl_fung_19_B3.tif
1  q170505tscrfl_fung_31_B2.tif  q170505tscrfl_fung_31_B3.tif
2  q170419tscrfl_fung_59_B2.tif  q170419tscrfl_fung_59_B3.tif

                         B4File     Name  REP  BLK  PLOT  ENTRY      Trial  \
0  q170505tscrfl_fung_19_B4.tif  fung_19    1    4    19     17  Fungicide
1  q170505tscrfl_fung_31_B4.tif  fung_31    2    7    31     19  Fungicide
2  q170419tscrfl_fung_59_B4.tif  fung_59    3   12    59     10  Fungicide

   Eval     Yield
0   1.0  6.055209
1   1.0  4.081627
2   1.0  4.612393
```

Adicionando data

[4]:
```
from datetime import datetime

def extract_date(token):
    date = ''
    for s in token:
        if s.isdigit():
            date += s
    return datetime.strptime(date, '%y%m%d')
```

[5]:
```
metadata['Date'] = metadata.apply(lambda x: extract_date(x['Instance'].
 ↪split('_')[0]), axis=1)
metadata['Year'] = metadata.apply(lambda x: x.Date.year, axis=1)
metadata.head(3)
```

[5]:
```
                 Instance              Crop                        B1File  \
0  q170505tscrfl_fung_19  crop_tsc_2017_b2s  q170505tscrfl_fung_19_B1.tif
1  q170505tscrfl_fung_31  crop_tsc_2017_b2s  q170505tscrfl_fung_31_B1.tif
2  q170419tscrfl_fung_59  crop_tsc_2017_b2s  q170419tscrfl_fung_59_B1.tif

                         B2File                        B3File  \
0  q170505tscrfl_fung_19_B2.tif  q170505tscrfl_fung_19_B3.tif
1  q170505tscrfl_fung_31_B2.tif  q170505tscrfl_fung_31_B3.tif
2  q170419tscrfl_fung_59_B2.tif  q170419tscrfl_fung_59_B3.tif

                         B4File     Name  REP  BLK  PLOT  ENTRY      Trial  \
```

```
0  q170505tscrfl_fung_19_B4.tif  fung_19    1    4    19     17  Fungicide
1  q170505tscrfl_fung_31_B4.tif  fung_31    2    7    31     19  Fungicide
2  q170419tscrfl_fung_59_B4.tif  fung_59    3   12    59     10  Fungicide

   Eval     Yield       Date  Year
0   1.0  6.055209 2017-05-05  2017
1   1.0  4.081627 2017-05-05  2017
2   1.0  4.612393 2017-04-19  2017
```

Ordenando por nome,crop,data

[6]:
```
metadata = metadata.sort_values(['Name', 'Crop', 'Date'])
metadata.head(3)
```

[6]:
```
                Instance              Crop                         B1File  \
82   c160407tscrfl_fung_1  crop_tsc_2016_b2s  c160407tscrfl_fung_1_B1.tif
335  c160418tscrfl_fung_1  crop_tsc_2016_b2s  c160418tscrfl_fung_1_B1.tif
565  c160428tscrfl_fung_1  crop_tsc_2016_b2s  c160428tscrfl_fung_1_B1.tif

                          B2File                         B3File  \
82   c160407tscrfl_fung_1_B2.tif  c160407tscrfl_fung_1_B3.tif
335  c160418tscrfl_fung_1_B2.tif  c160418tscrfl_fung_1_B3.tif
565  c160428tscrfl_fung_1_B2.tif  c160428tscrfl_fung_1_B3.tif

                          B4File    Name  REP  BLK  PLOT  ENTRY      Trial  \
82   c160407tscrfl_fung_1_B4.tif  fung_1    1    1     1     22  Fungicide
335  c160418tscrfl_fung_1_B4.tif  fung_1    1    1     1     22  Fungicide
565  c160428tscrfl_fung_1_B4.tif  fung_1    1    1     1     22  Fungicide

     Eval     Yield       Date  Year
82    1.0  5.296382 2016-04-07  2016
335   1.0  5.296382 2016-04-18  2016
565   1.0  5.296382 2016-04-28  2016
```

Definindo a instância

[7]:
```
metadata['Name'] = metadata.apply(lambda x: f'{(x.Name.split("_")[0])}_{int(x.
↪Name.split("_")[1]):03}', axis=1)
```

[8]:
```
metadata['Instance'] = metadata.apply(lambda x: f'{x.Name}_{x.Crop}', axis=1)
```

[9]:
```
metadata.head()
```

[9]:
```
                       Instance              Crop  \
82   fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
335  fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
565  fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
10   fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
```

```
385  fung_001_crop_tsc_2017_b2s  crop_tsc_2017_b2s

                          B1File                          B2File  \
82   c160407tscrfl_fung_1_B1.tif  c160407tscrfl_fung_1_B2.tif
335  c160418tscrfl_fung_1_B1.tif  c160418tscrfl_fung_1_B2.tif
565  c160428tscrfl_fung_1_B1.tif  c160428tscrfl_fung_1_B2.tif
10   c160511tscrfl_fung_1_B1.tif  c160511tscrfl_fung_1_B2.tif
385  q170419tscrfl_fung_1_B1.tif  q170419tscrfl_fung_1_B2.tif

                          B3File                          B4File      Name  REP  \
82   c160407tscrfl_fung_1_B3.tif  c160407tscrfl_fung_1_B4.tif  fung_001    1
335  c160418tscrfl_fung_1_B3.tif  c160418tscrfl_fung_1_B4.tif  fung_001    1
565  c160428tscrfl_fung_1_B3.tif  c160428tscrfl_fung_1_B4.tif  fung_001    1
10   c160511tscrfl_fung_1_B3.tif  c160511tscrfl_fung_1_B4.tif  fung_001    1
385  q170419tscrfl_fung_1_B3.tif  q170419tscrfl_fung_1_B4.tif  fung_001    1

     BLK  PLOT  ENTRY      Trial  Eval     Yield       Date  Year
82     1     1     22  Fungicide   1.0  5.296382 2016-04-07  2016
335    1     1     22  Fungicide   1.0  5.296382 2016-04-18  2016
565    1     1     22  Fungicide   1.0  5.296382 2016-04-28  2016
10     1     1     22  Fungicide   1.0  5.296382 2016-05-11  2016
385    1     1     23  Fungicide   1.0  5.643749 2017-04-19  2017
```

[10]:
```
for key in ['B1File', 'B2File', 'B3File', 'B4File']:
    metadata[key] = metadata.apply(lambda x: os.path.join('data', 'RAW',␣
 ↪x['Crop'], x[key]), axis=1)
metadata.head(3)
```

[10]:
```
                       Instance              Crop  \
82   fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
335  fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
565  fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s

                                             B1File  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…

                                             B2File  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…

                                             B3File  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…
```

```
                                                    B4File      Name  REP  BLK  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…  fung_001    1    1
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…  fung_001    1    1
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…  fung_001    1    1

     PLOT  ENTRY      Trial  Eval     Yield       Date  Year
82      1     22  Fungicide   1.0  5.296382 2016-04-07  2016
335     1     22  Fungicide   1.0  5.296382 2016-04-18  2016
565     1     22  Fungicide   1.0  5.296382 2016-04-28  2016
```

Definindo *Days after sowing*

[11]:
```
sowing_2016 = datetime.strptime('2016-01-19', '%Y-%m-%d')
sowing_2017 = datetime.strptime('2017-01-24', '%Y-%m-%d')

def get_das(date):
    if date.year == 2016:
        return (date - sowing_2016).days
    elif date.year == 2017:
        return (date - sowing_2017).days
```

[12]:
```
metadata['DAS'] = metadata.apply(lambda x: get_das(x.Date), axis=1)
metadata.head(3)
```

[12]:
```
                       Instance               Crop  \
82   fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
335  fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
565  fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s

                                                    B1File  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…

                                                    B2File  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…

                                                    B3File  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…

                                                    B4File      Name  REP  BLK  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…  fung_001    1    1
```

```
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…  fung_001    1    1
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…  fung_001    1    1
```

	PLOT	ENTRY	Trial	Eval	Yield	Date	Year	DAS
82	1	22	Fungicide	1.0	5.296382	2016-04-07	2016	79
335	1	22	Fungicide	1.0	5.296382	2016-04-18	2016	90
565	1	22	Fungicide	1.0	5.296382	2016-04-28	2016	100

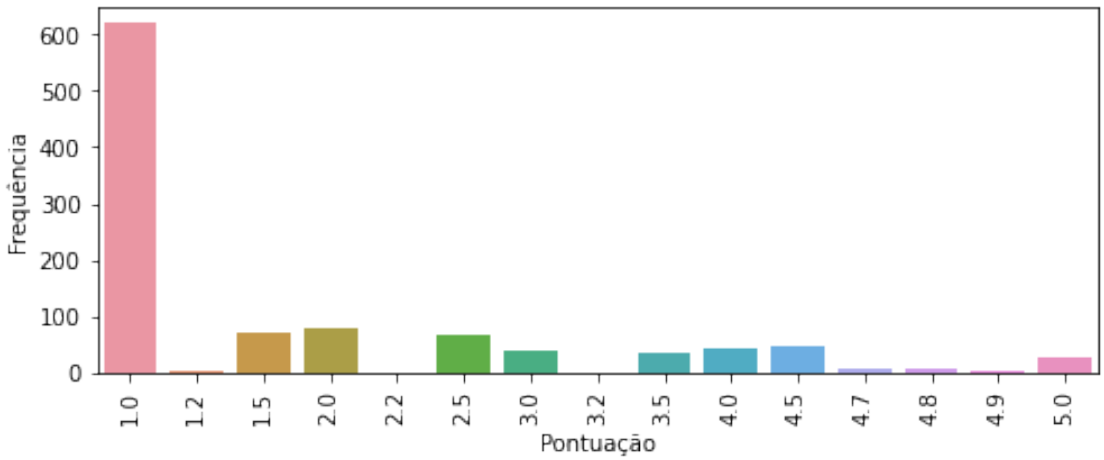
1.2.1 Análise dos dados

[13]:
```
def plot_freq_das(df):
    plt.figure(figsize=(8,3))
    evals = df['DAS'].value_counts()
    sns.barplot(evals.index, evals.values)
    plt.xticks(rotation='vertical')
    plt.xlabel('Pontuação')
    plt.ylabel('Dias')
    plt.title("Days after sowing")
    plt.show()
```

Frequência de TSC (Eval)

[14]:
```
def plot_freq_tsc(df):
    plt.figure(figsize=(8,3))
    evals = df['Eval'].value_counts()
    sns.barplot(evals.index, evals.values)
    plt.xticks(rotation='vertical')
    plt.xlabel('Pontuação')
    plt.ylabel('Frequência')
    plt.show()
```

[15]:
```
plot_freq_tsc(metadata)
```



1.3 Train test split

1.3.1 Rodada 1

Na rodada 1 serão usados dados sem fungicida.

O split entre os sets de treinamento, teste e validação serão feitos com base no ano de cada instância.

O split entre os sets de treinamento e validação é aleatório.

[16]:
```
trial1 = metadata[metadata.Trial != 'Fungicide']
trial1_train_val = trial1[trial1.Year == 2016]
trial1_test = trial1[trial1.Year == 2017]
print("Tamanho dos dados de treinamento e validação: ", len(trial1_train_val))
print("Tamanho dos dados de teste: ", len(trial1_test))
```

```
Tamanho dos dados de treinamento e validação:  300
Tamanho dos dados de teste:  225
```

[17]:
```
trial1_train_val.head(3)
```

[17]:

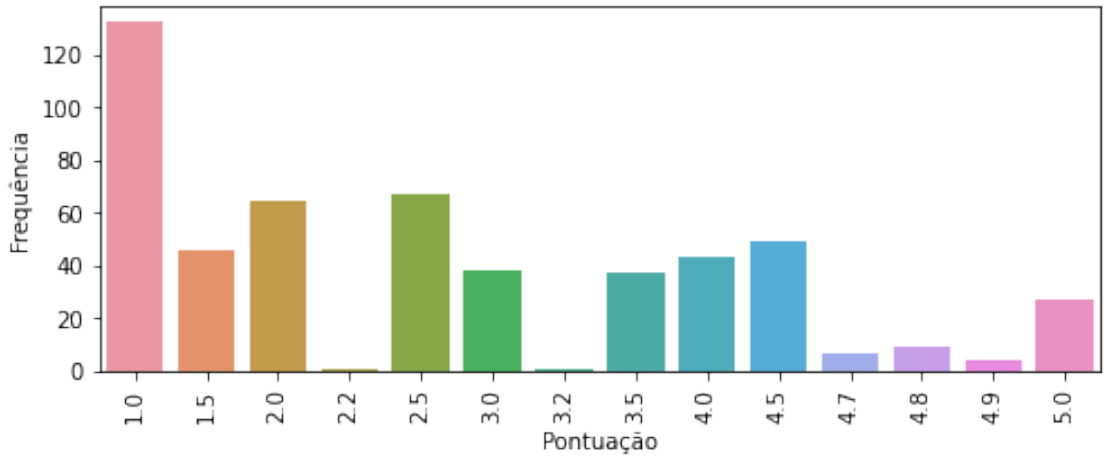
	Instance	Crop	B1File	B2File	B3File	B4File	Name	REP	BLK
59	nfung_001_crop_tsc_2016_b2s	crop_tsc_2016_b2s	data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…	nfung_001	1	1
267	nfung_001_crop_tsc_2016_b2s	crop_tsc_2016_b2s	data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…	nfung_001	1	1
180	nfung_001_crop_tsc_2016_b2s	crop_tsc_2016_b2s	data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…	nfung_001	1	1

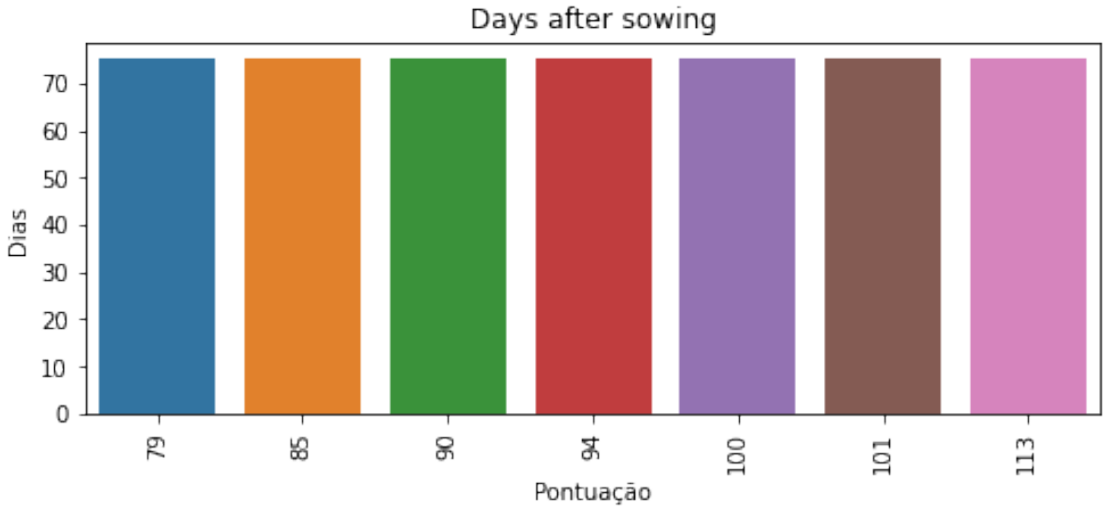
```
     PLOT  ENTRY         Trial  Eval     Yield       Date  Year  DAS
59      1     24  No fungicide   2.5  2.705875 2016-04-07  2016   79
267     1     24  No fungicide   3.5  2.705875 2016-04-18  2016   90
180     1     24  No fungicide   4.0  2.705875 2016-04-28  2016  100
```

[18]:
```
trial1_test.head(3)
```

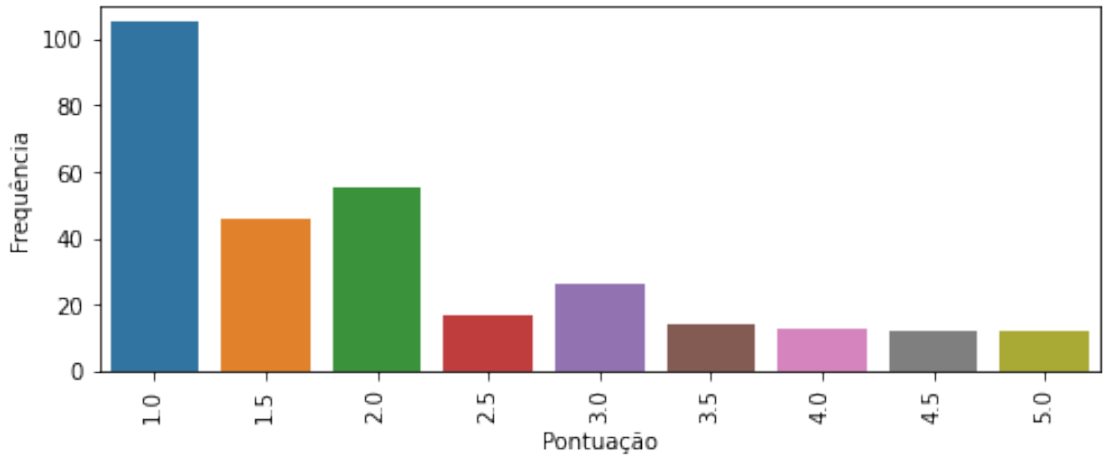
[18]:
```
                        Instance              Crop  \
115  nfung_001_crop_tsc_2017_b2s  crop_tsc_2017_b2s
196  nfung_001_crop_tsc_2017_b2s  crop_tsc_2017_b2s
291  nfung_001_crop_tsc_2017_b2s  crop_tsc_2017_b2s

                                                B1File  \
115  data/RAW/crop_tsc_2017_b2s/q170419tscrfl_nfung…
196  data/RAW/crop_tsc_2017_b2s/q170428tscrfl_nfung…
291  data/RAW/crop_tsc_2017_b2s/q170505tscrfl_nfung…

                                                B2File  \
115  data/RAW/crop_tsc_2017_b2s/q170419tscrfl_nfung…
196  data/RAW/crop_tsc_2017_b2s/q170428tscrfl_nfung…
291  data/RAW/crop_tsc_2017_b2s/q170505tscrfl_nfung…

                                                B3File  \
115  data/RAW/crop_tsc_2017_b2s/q170419tscrfl_nfung…
196  data/RAW/crop_tsc_2017_b2s/q170428tscrfl_nfung…
291  data/RAW/crop_tsc_2017_b2s/q170505tscrfl_nfung…

                                                B4File       Name  REP  BLK  \
115  data/RAW/crop_tsc_2017_b2s/q170419tscrfl_nfung…  nfung_001    1    1
196  data/RAW/crop_tsc_2017_b2s/q170428tscrfl_nfung…  nfung_001    1    1
291  data/RAW/crop_tsc_2017_b2s/q170505tscrfl_nfung…  nfung_001    1    1

     PLOT  ENTRY         Trial  Eval     Yield       Date  Year  DAS
115     1     25  No fungicide   4.5  2.806167 2017-04-19  2017   85
196     1     25  No fungicide   5.0  2.806167 2017-04-28  2017   94
291     1     25  No fungicide   5.0  2.806167 2017-05-05  2017  101
```

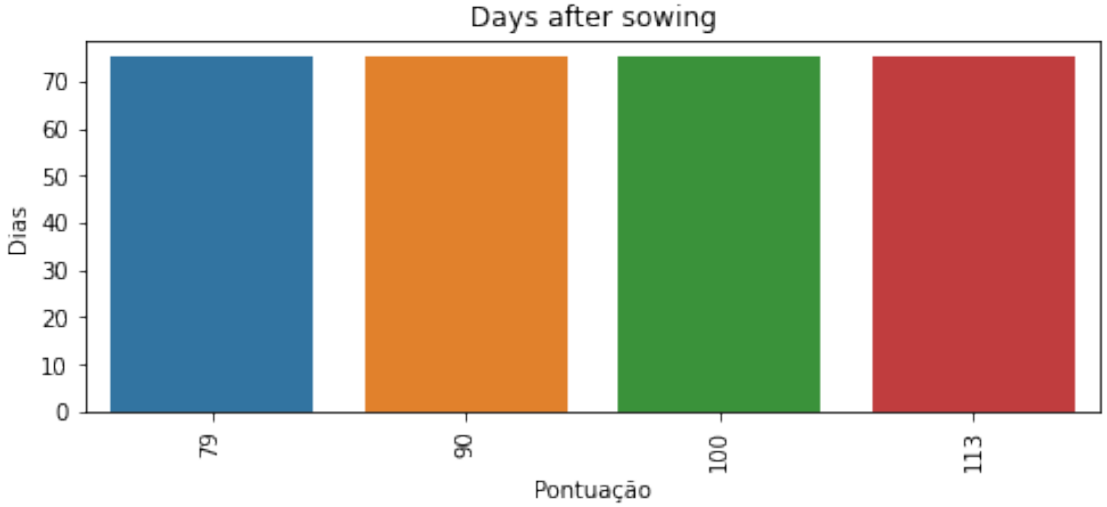
[19]:
```
plot_freq_tsc(trial1)
plot_freq_das(trial1)
```



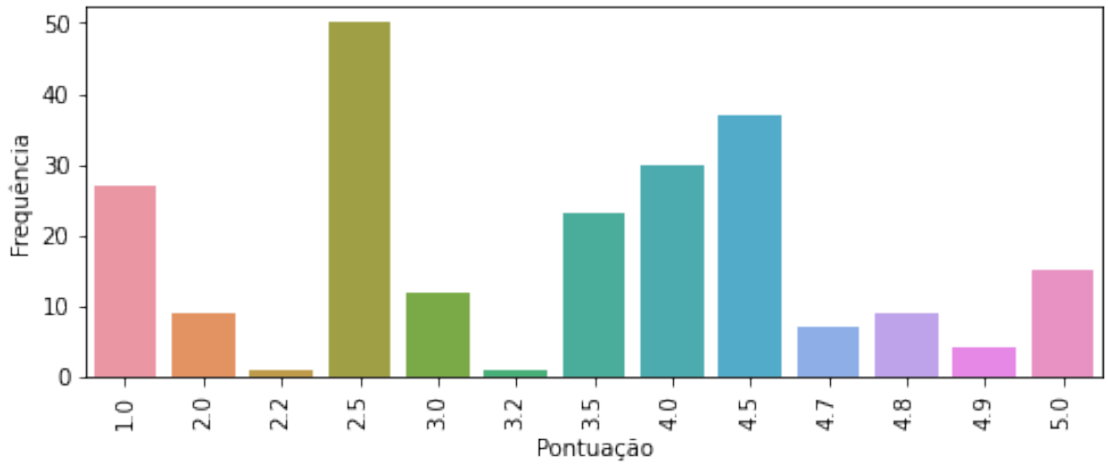


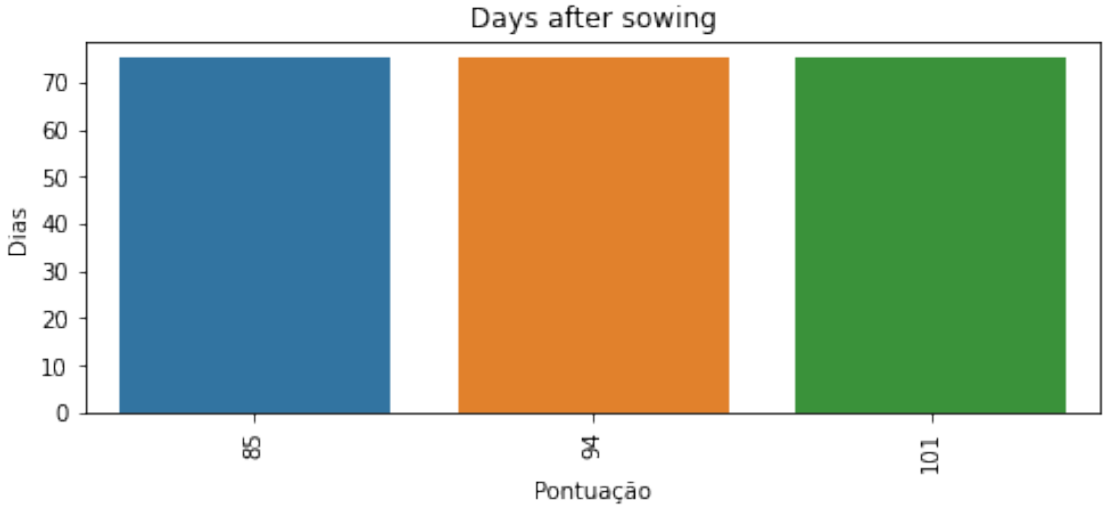
[20]:
```
plot_freq_tsc(trial1_train_val)
plot_freq_das(trial1_train_val)
```





[21]:
```
plot_freq_tsc(trial1_test)
plot_freq_das(trial1_test)
```





[ ]:

1.3.2 Rodada 2

Na rodada 2 também serão usados dados sem fungicida.

O split entre os sets de treinamento, teste e validação serão feitos na repetição do experimento.

O split entre os sets de teste e validação é aleatório.

[22]:
```
trial2 = metadata[metadata.Trial != 'Fungicide']
trial2_train = trial1[trial2.REP < 3]
trial2_val_test = trial1[trial2.REP == 3]
print("Tamanho dos dados de treinamento: ", len(trial2_train))
```

```
print("Tamanho dos dados de validação e teste: ", len(trial2_val_test))
```

```
Tamanho dos dados de treinamento:  350
Tamanho dos dados de validação e teste:  175
```

[23]:
```
trial2_train.head(3)
```

[23]:

	Instance	Crop	B1File	B2File	B3File	B4File	Name	REP	BLK	PLOT	ENTRY	Trial	Eval	Yield	Date	Year	DAS
59	nfung_001_crop_tsc_2016_b2s	crop_tsc_2016_b2s	data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…	nfung_001	1	1	1	24	No fungicide	2.5	2.705875	2016-04-07	2016	79
267	nfung_001_crop_tsc_2016_b2s	crop_tsc_2016_b2s	data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…	nfung_001	1	1	1	24	No fungicide	3.5	2.705875	2016-04-18	2016	90
180	nfung_001_crop_tsc_2016_b2s	crop_tsc_2016_b2s	data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…	data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…	nfung_001	1	1	1	24	No fungicide	4.0	2.705875	2016-04-28	2016	100

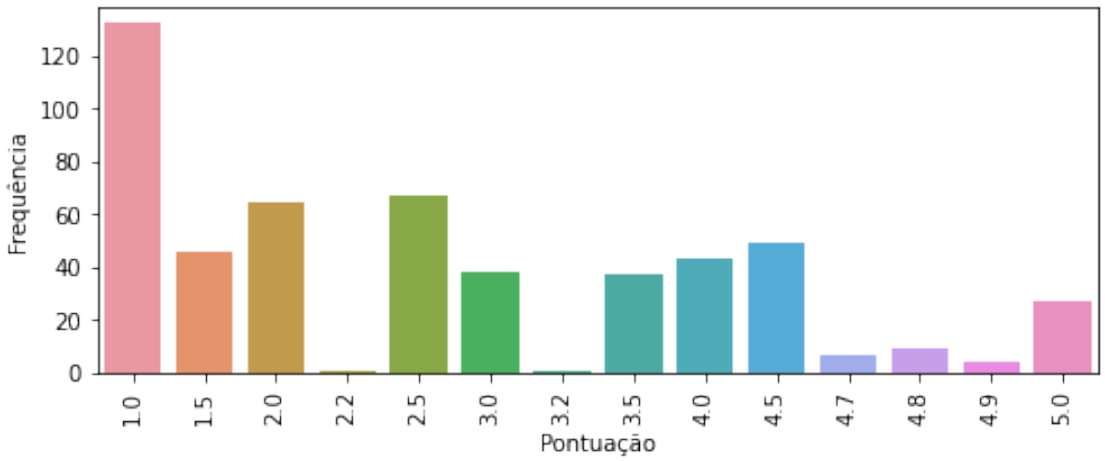
[24]:
```
trial2_val_test.head(3)
```

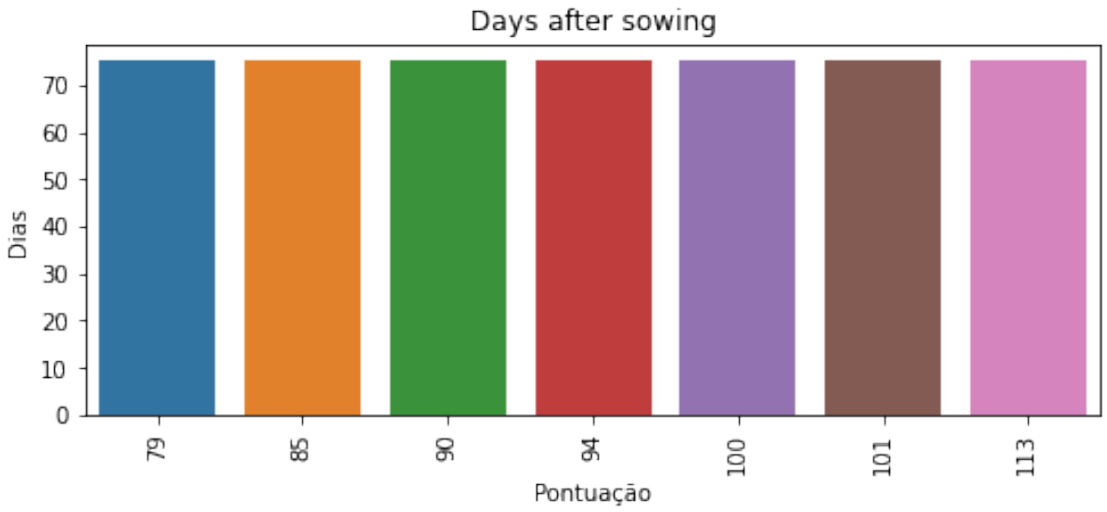
[24]:

	Instance	Crop	B1File
157	nfung_051_crop_tsc_2016_b2s	crop_tsc_2016_b2s	data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…
450	nfung_051_crop_tsc_2016_b2s	crop_tsc_2016_b2s	data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…
494	nfung_051_crop_tsc_2016_b2s	crop_tsc_2016_b2s	

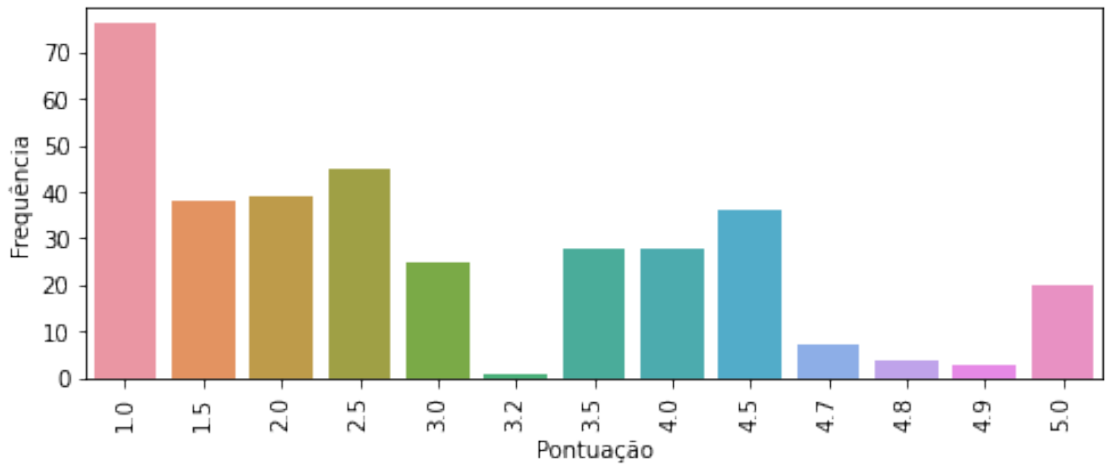
```
494  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…

                                                  B2File  \
157  data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…
450  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…
494  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…

                                                  B3File  \
157  data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…
450  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…
494  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…

                                                  B4File       Name  REP  BLK  \
157  data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…  nfung_051    3   11
450  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…  nfung_051    3   11
494  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…  nfung_051    3   11

     PLOT  ENTRY         Trial  Eval     Yield       Date  Year  DAS
157    51     11  No fungicide   1.5  0.685118 2016-04-07  2016   79
450    51     11  No fungicide   1.5  0.685118 2016-04-18  2016   90
494    51     11  No fungicide   2.0  0.685118 2016-04-28  2016  100
```

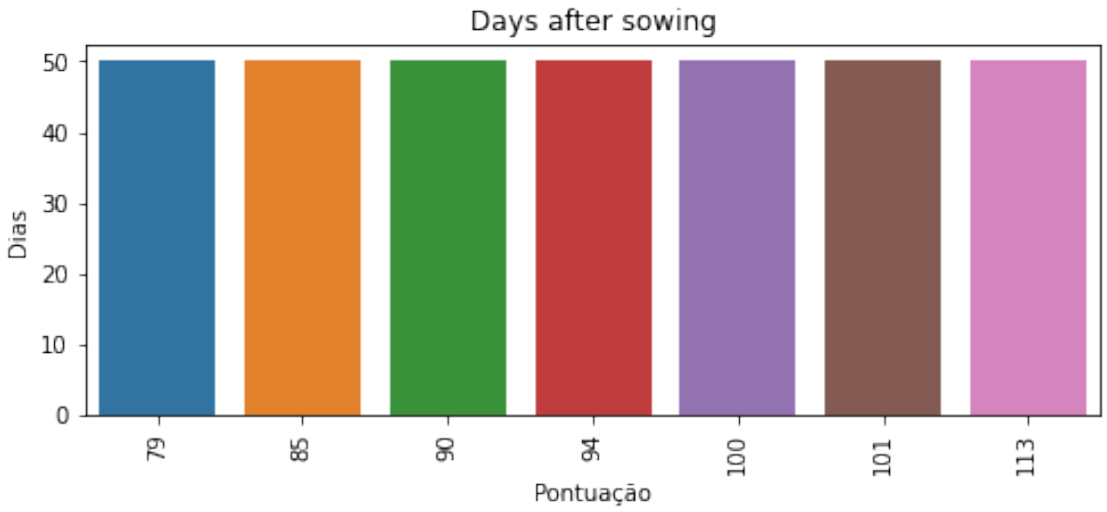
[25]:
```
plot_freq_tsc(trial2)
plot_freq_das(trial2)
```



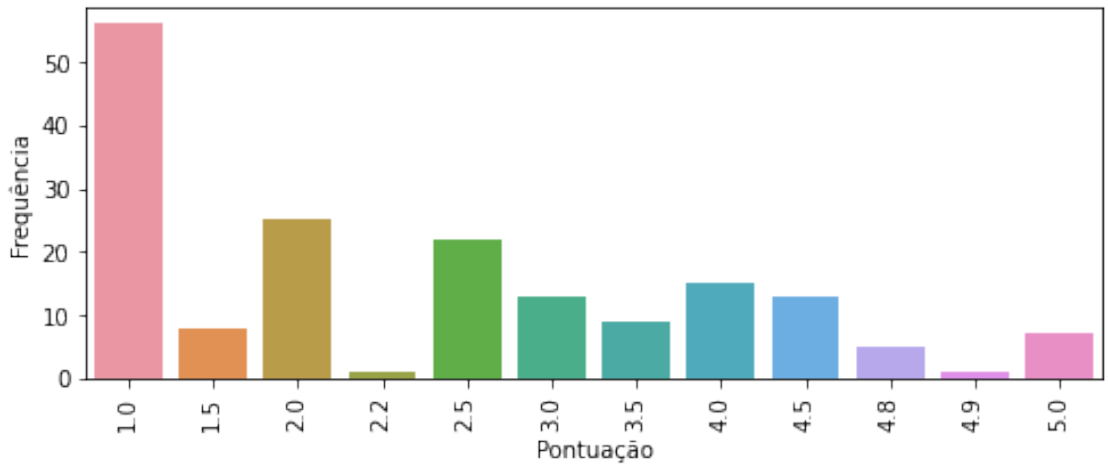


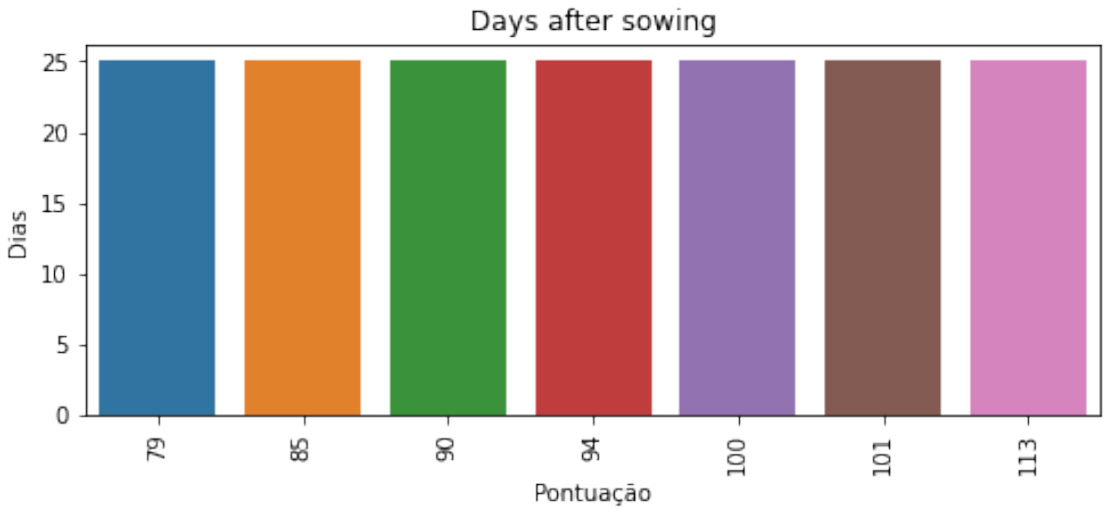
[26]:
```
plot_freq_tsc(trial2_train)
plot_freq_das(trial2_train)
```





[27]:
```
plot_freq_tsc(trial2_val_test)
plot_freq_das(trial2_val_test)
```





1.3.3 Rodada 3

Na rodada 3 serão usados dados com fungicida (teste) e sem fungicida (treinamento e validação).

O split entre os sets de treinamento, teste e validação serão feitos de forma aleatória.

[28]:
```
trial3_val_train = metadata[metadata.Trial != 'Fungicide']
trial3_test = metadata[metadata.Trial == 'Fungicide']
print("Tamanho dos dados de validação e treinamento: ", len(trial3_val_train))
print("Tamanho dos dados de teste: ", len(trial3_test))
```

```
Tamanho dos dados de validação e treinamento:  525
Tamanho dos dados de teste:  525
```

[29]:
```
trial3_val_train.head(3)
```

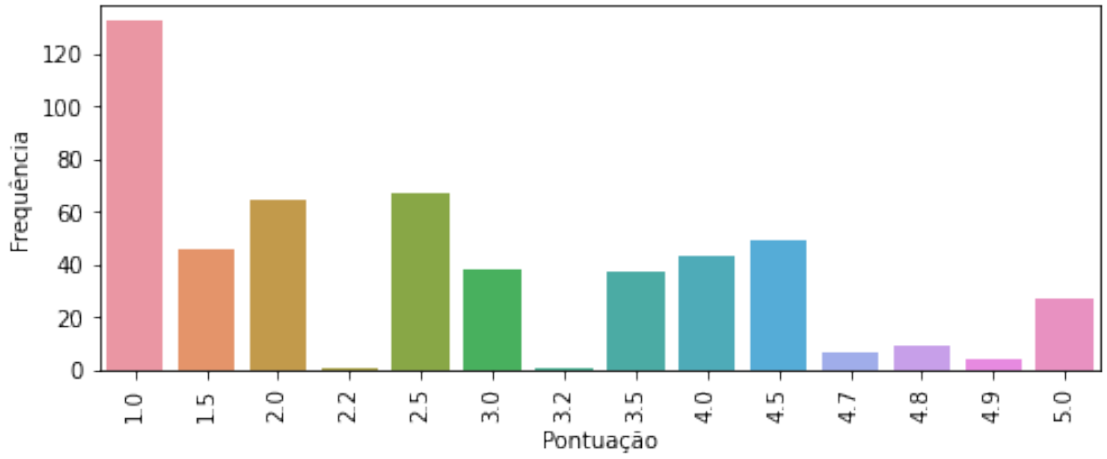
[29]:
```
                        Instance              Crop  \
59   nfung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
267  nfung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
180  nfung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s

                                              B1File  \
59   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…
267  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…
180  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…

                                              B2File  \
59   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…
267  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…
180  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…
```

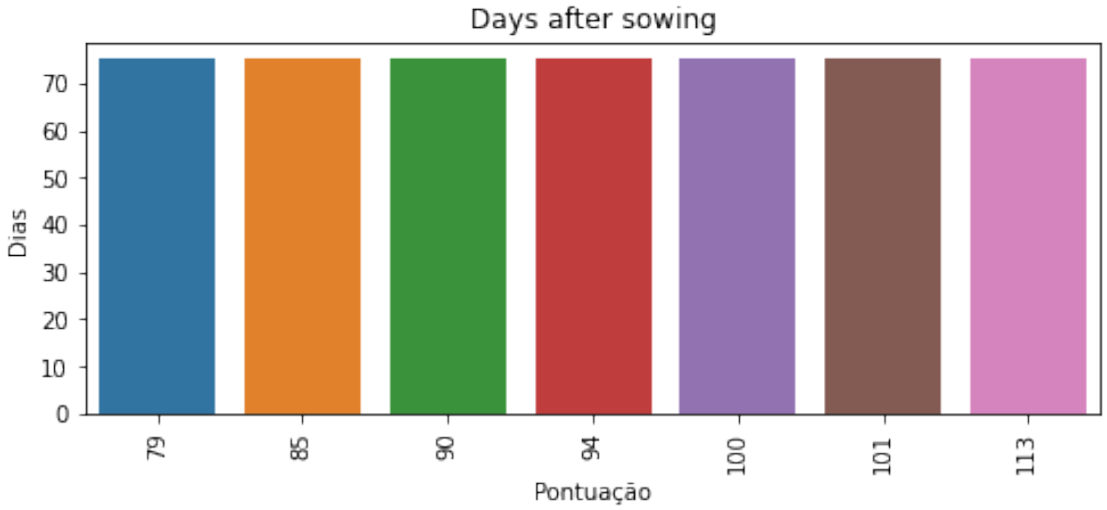
```
                                                 B3File  \
59   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…
267  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…
180  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…

                                                 B4File       Name  REP  BLK  \
59   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_nfung…  nfung_001    1    1
267  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_nfung…  nfung_001    1    1
180  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_nfung…  nfung_001    1    1

     PLOT  ENTRY         Trial  Eval     Yield       Date  Year  DAS
59      1     24  No fungicide   2.5  2.705875 2016-04-07  2016   79
267     1     24  No fungicide   3.5  2.705875 2016-04-18  2016   90
180     1     24  No fungicide   4.0  2.705875 2016-04-28  2016  100
```

[30]:
```
trial3_test.head(3)
```

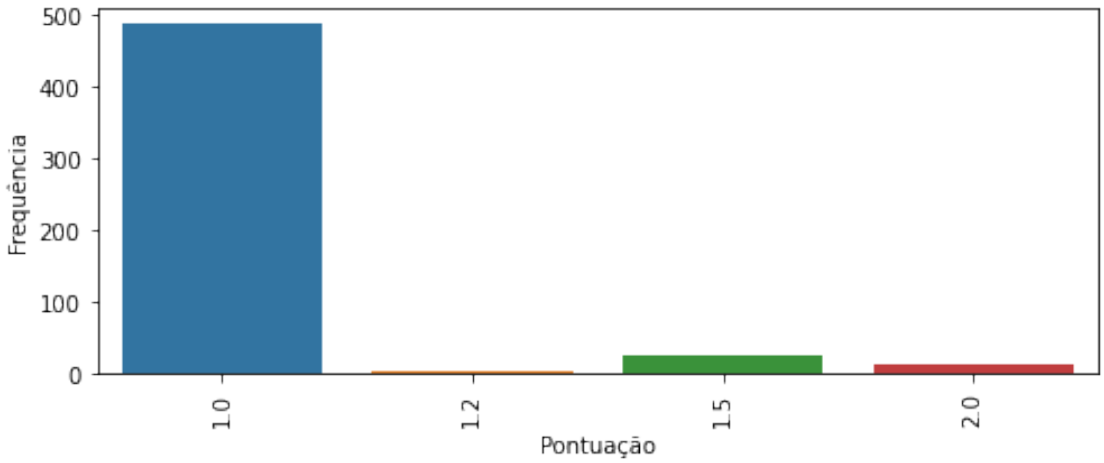
[30]:
```
                       Instance               Crop  \
82   fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
335  fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s
565  fung_001_crop_tsc_2016_b2s  crop_tsc_2016_b2s

                                                 B1File  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…

                                                 B2File  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…

                                                 B3File  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…

                                                 B4File      Name  REP  BLK  \
82   data/RAW/crop_tsc_2016_b2s/c160407tscrfl_fung_…  fung_001    1    1
335  data/RAW/crop_tsc_2016_b2s/c160418tscrfl_fung_…  fung_001    1    1
565  data/RAW/crop_tsc_2016_b2s/c160428tscrfl_fung_…  fung_001    1    1

     PLOT  ENTRY      Trial  Eval     Yield       Date  Year  DAS
82      1     22  Fungicide   1.0  5.296382 2016-04-07  2016   79
335     1     22  Fungicide   1.0  5.296382 2016-04-18  2016   90
565     1     22  Fungicide   1.0  5.296382 2016-04-28  2016  100
```

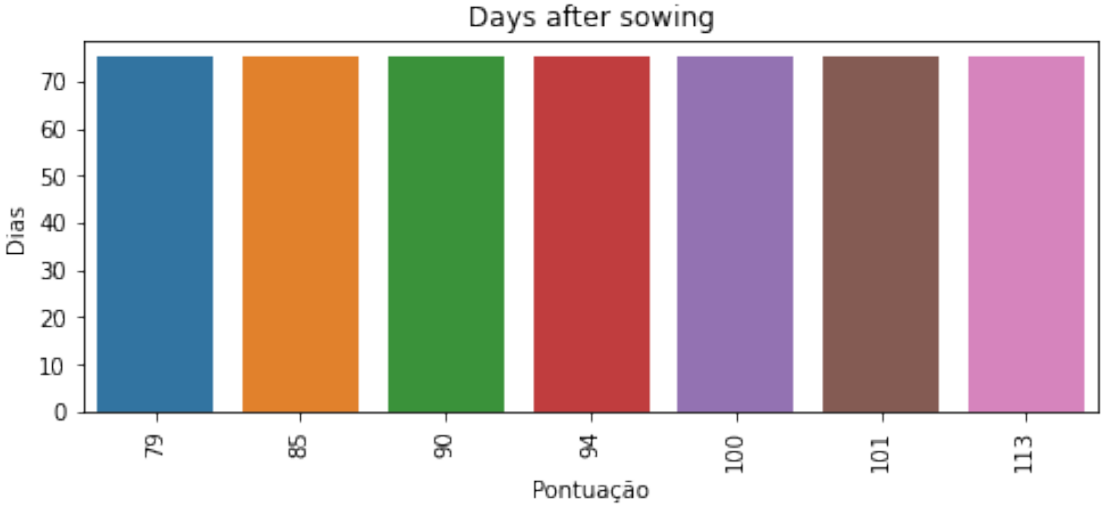
[31]:
```
plot_freq_tsc(trial3_val_train)
plot_freq_das(trial3_val_train)
```





[32]:
```
plot_freq_tsc(trial3_test)
plot_freq_das(trial3_test)
```


500
400
300
200
100
0
Frequência
1.0
1.2
1.5
2.0
Pontuação


Days after sowing
70
60
50
40
30
20
10
0
Dias
79
85
90
94
100
101
113
Pontuação

[ ]: