In [3]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [4]:
```
df=pd.read_csv('Fertilizer Prediction.csv')
```

In [5]:
```
df
```

Out[5]:

	Temparature	Humidity	Moisture	Soil Type	Crop Type	Nitrogen	Potassium	Phosphorous
0	26	52	38	Sandy	Maize	37	0	0
1	29	52	45	Loamy	Sugarcane	12	0	36
2	34	65	62	Black	Cotton	7	9	30
3	32	62	34	Red	Tobacco	22	0	20
4	28	54	46	Clayey	Paddy	35	0	0
...	...	...	...	...	...	...	...	...
94	25	50	32	Clayey	Pulses	24	0	19
95	30	60	27	Red	Tobacco	4	17	17
96	38	72	51	Loamy	Wheat	39	0	0
97	36	60	43	Sandy	Millets	15	0	41
98	29	58	57	Black	Sugarcane	12	0	10

99 rows × 9 columns

In [6]:
```
df.dtypes
```

Out[6]:
```
Temparature         int64
Humidity            int64
Moisture            int64
Soil Type          object
Crop Type          object
Nitrogen            int64
Potassium           int64
Phosphorous         int64
Fertilizer Name    object
dtype: object
```

In [7]:
```
df.columns
```

Out[7]:
```
Index(['Temparature', 'Humidity ', 'Moisture', 'Soil Type', 'Crop
Type',
       'Nitrogen', 'Potassium', 'Phosphorous', 'Fertilizer Name'],
      dtype='object')
```

In [8]:
```
df.isnull().value_counts()
```

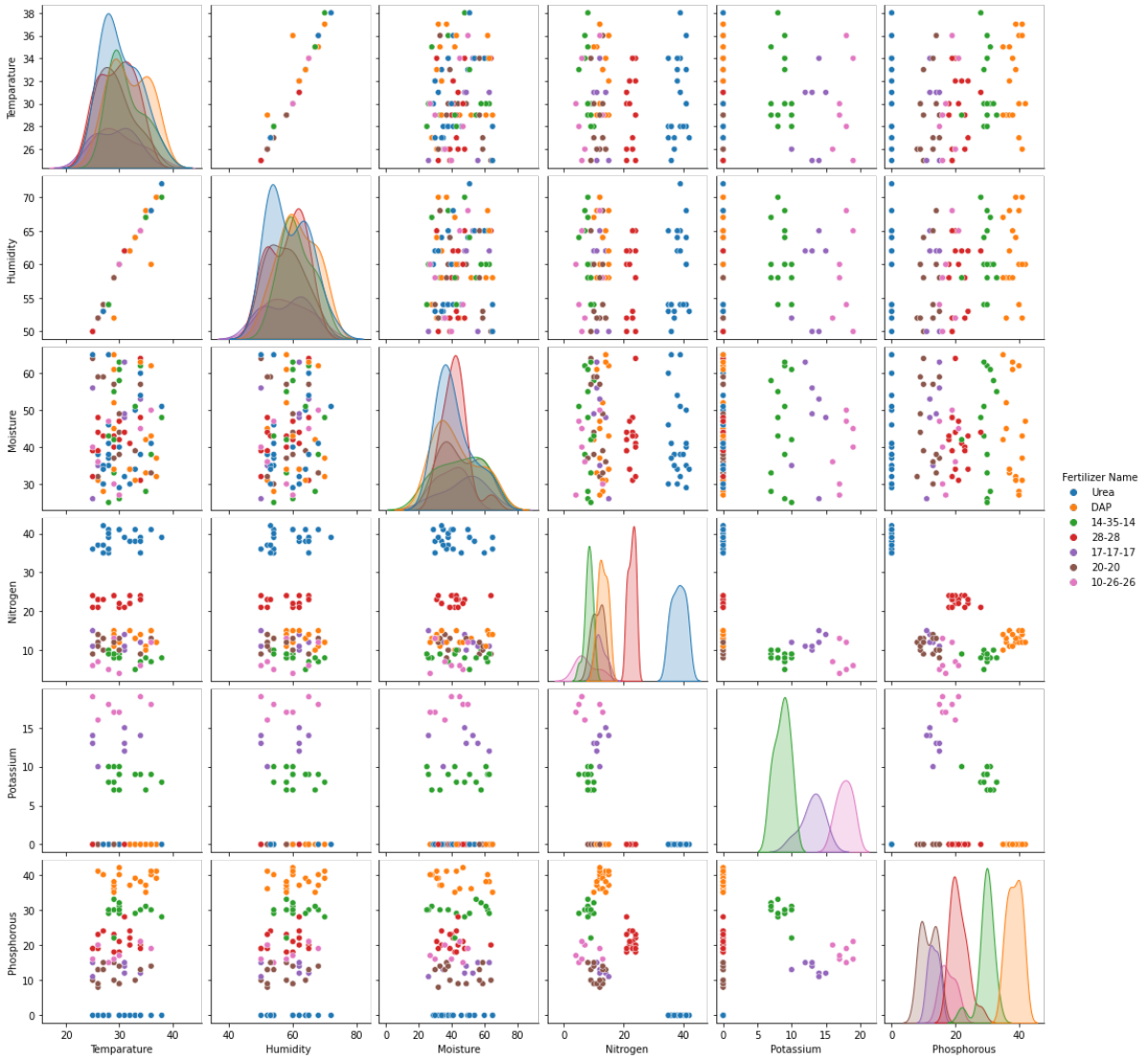
Out[8]:
```
Temparature  Humidity   Moisture  Soil Type  Crop Type  Nitrogen
Potassium  Phosphorous  Fertilizer Name
False        False      False     False      False      False
False      False        False             99
dtype: int64
```

In [9]:
```
df['Fertilizer Name'].unique()
```

Out[9]:
```
array(['Urea', 'DAP', '14-35-14', '28-28', '17-17-17', '20-20',
       '10-26-26'], dtype=object)
```

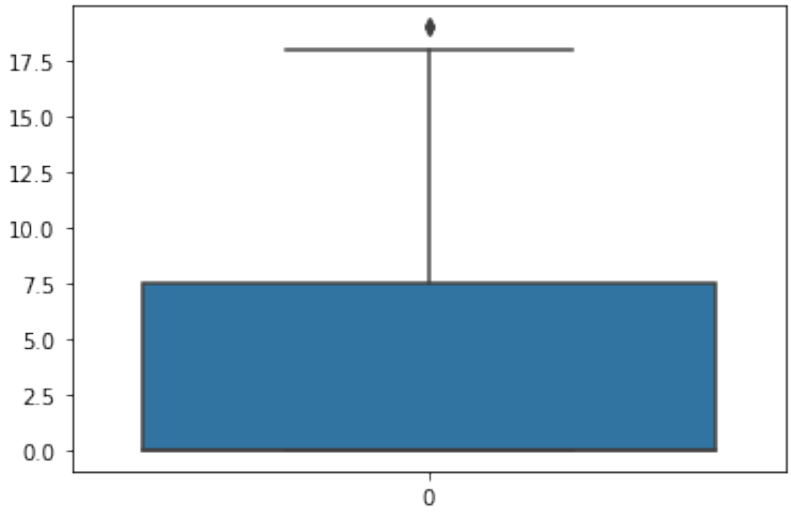
In [10]:
```
sns.pairplot(df,hue='Fertilizer Name')
```

Out[10]: <seaborn.axisgrid.PairGrid at 0x155b403a0>



In [11]:
```
sns.boxplot(data=df['Potassium'])
```

Out[11]: <AxesSubplot:>



In [12]:
```
from sklearn.preprocessing import LabelEncoder
```

In [13]:
```
def Encoder(df):
          col=df['Fertilizer Name']
          le = LabelEncoder()
          for feature in col:
              try:
                  df['Fertilizer Name'] = le.fit_transform(df['Fert
              except:
                  print('Error encoding '+feature)
          return df
```

In [14]:
```
Encoder(df)
df['Fertilizer Name'].unique()
```

Out[14]: array([6, 5, 1, 4, 2, 3, 0])

In [15]:
```
df['Fertilizer Name']=df['Fertilizer Name']
df['Fertilizer Name']
df1=df[['Temparature', 'Humidity ', 'Moisture','Nitrogen', 'Potassi
```

In [16]:
```
from sklearn.preprocessing import StandardScaler
sc=StandardScaler()
sc.fit(df1.drop('Fertilizer Name',axis=1))
scaled=sc.transform(df1.drop('Fertilizer Name',axis=1))
df1=df1.drop(['Fertilizer Name'],axis=1)
```

In [17]:
```
from sklearn.model_selection import train_test_split
```

In [20]:
```
x_train, x_test, y_train, y_test = train_test_split(scaled,df['Fert
```

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

Out[21]: (79, 6)

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

Out[22]: (20, 6)

In [23]:
```
y_train
```

Out[23]:
```
49    1
70    4
68    0
15    2
39    5
     ..
60    6
71    6
14    5
92    6
51    3
Name: Fertilizer Name, Length: 79, dtype: int64
```

In [24]:
```
y_test
```

Out[24]:
```
62    4
40    3
95    0
18    6
97    5
84    4
64    6
42    4
10    5
0     6
31    5
76    4
47    4
26    1
44    5
4     6
22    5
12    6
88    0
73    6
Name: Fertilizer Name, dtype: int64
```

In [25]:
```
from sklearn.linear_model import LogisticRegression
```

In [26]:
```
lr=LogisticRegression()
```

In [27]:
```
lr.fit(x_train,y_train)
```

Out[27]:
```
LogisticRegression()
```

In [28]:
```
y_test
```

Out[28]:
```
62    4
40    3
95    0
18    6
97    5
84    4
64    6
42    4
10    5
0     6
31    5
76    4
47    4
26    1
44    5
4     6
22    5
12    6
88    0
73    6
Name: Fertilizer Name, dtype: int64
```

In [29]:
```
pred=lr.predict(x_test)
```

In [30]:
```
from sklearn.metrics import classification_report
```

In [31]:
```
print(classification_report(y_test,pred))
```

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00         2
           1       1.00      1.00      1.00         1
           3       1.00      1.00      1.00         1
           4       1.00      1.00      1.00         5
           5       1.00      1.00      1.00         5
           6       1.00      1.00      1.00         6

    accuracy                           1.00        20
   macro avg       1.00      1.00      1.00        20
weighted avg       1.00      1.00      1.00        20
```

KNN

In [32]:
```
from sklearn.neighbors import KNeighborsClassifier
```

In [33]:
```
knn=KNeighborsClassifier(n_neighbors=1)
```

In [34]:
```
knn.fit(x_train,y_train)
```

Out[34]:
```
KNeighborsClassifier(n_neighbors=1)
```

In [35]:
```
predk=knn.predict(x_test)
```

In [36]:
```
predk
```

Out[36]:
```
array([4, 3, 0, 6, 5, 4, 6, 4, 5, 6, 5, 4, 4, 1, 5, 6, 5, 3, 0, 6]
)
```

In [37]:
```
from sklearn.metrics import classification_report
```

In [38]:
```
print(classification_report(y_test,predk))
```

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00         2
           1       1.00      1.00      1.00         1
           3       0.50      1.00      0.67         1
           4       1.00      1.00      1.00         5
           5       1.00      1.00      1.00         5
           6       1.00      0.83      0.91         6

    accuracy                           0.95        20
   macro avg       0.92      0.97      0.93        20
weighted avg       0.97      0.95      0.96        20
```

In [39]:
```
knn2=KNeighborsClassifier(n_neighbors=2)
knn.fit(x_train,y_train)
predk=knn.predict(x_test)
```

In [40]:
```
print(classification_report(y_test,predk))
```

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00         2
           1       1.00      1.00      1.00         1
           3       0.50      1.00      0.67         1
           4       1.00      1.00      1.00         5
           5       1.00      1.00      1.00         5
           6       1.00      0.83      0.91         6

    accuracy                           0.95        20
   macro avg       0.92      0.97      0.93        20
weighted avg       0.97      0.95      0.96        20
```

In [ ]:
```

```