Module 5 AdaBoost classifier

In [1]:
```
import pandas as p
import matplotlib.pyplot as plt
from sklearn.preprocessing import LabelEncoder
from sklearn.model_selection import train_test_split
from sklearn.ensemble import AdaBoostClassifier
from sklearn.metrics import confusion_matrix, classification_report, accuracy_score,
```

In [2]:
```
import warnings
warnings.filterwarnings('ignore')
```

In [3]:
```
data = p.read_csv('crop.csv')
```

In [4]:
```
df=data.dropna()
```

In [5]:
```
df.columns
```

Out[5]:
```
Index(['nitrogen', 'phosphorus', 'potassium', 'temperature', 'humidity', 'ph',
       'rainfall', 'label'],
      dtype='object')
```

In [6]:
```
var_mod = ['label']
le = LabelEncoder()
for i in var_mod:
    df[i] = le.fit_transform(df[i]).astype(int)
```

In [7]:
```
inputs = df.drop(labels='label', axis=1)
output = df.loc[:,'label']
```

In [8]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(inputs, output, test_size=0.3, r
print("Number of Training Datasets: ", len(X_train))
print("Number of Testing Datasets: ", len(X_test))
print("Total Number of Datasets: ", len(X_train)+len(X_test))
```

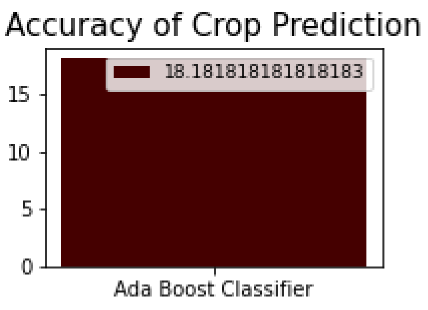
```
Number of Training Datasets:  1540
Number of Testing Datasets:  660
Total Number of Datasets:  2200
```

In [9]:
```
#Model Training
cbc = AdaBoostClassifier()
cbc.fit(X_train,y_train)
predicted_cbc = cbc.predict(X_test)
```

In [10]:
```
#Getting Accuracy
accuracy = accuracy_score(y_test,predicted_cbc) # accuracy: (tp + tn) / (p + n)
print('Accuracy of Ada Boost Classifier is: ',accuracy*100)
```

```
Accuracy of Ada Boost Classifier is:  18.181818181818183
```

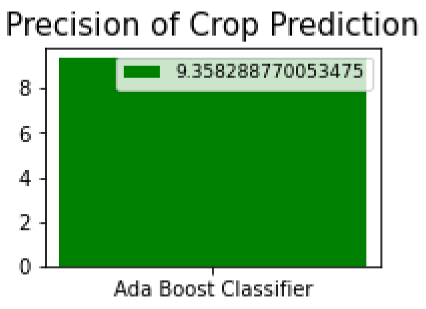
In [11]:
```
DT=accuracy.mean() *100
def graph():
    data=[DT]
    alg="Ada Boost Classifier"
    plt.figure(figsize=(3,2))
    b=plt.bar(alg,data,color=("#450000"))
    plt.title("Accuracy of Crop Prediction",fontsize=15)
    plt.legend(b,data,fontsize=9)
graph()
```



In [12]:
```
#Getting Precision
precision = precision_score(y_test,predicted_cbc,average='weighted') # precision tp
print('Precision of Ada Boost Classifier is: ',precision*100)
```

```
Precision of Ada Boost Classifier is:  9.358288770053475
```

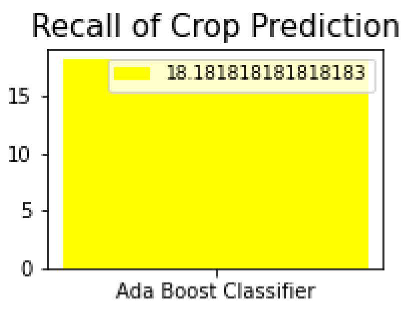
In [13]:
```
DT=precision.mean() *100
def graph():
    data=[DT]
    alg="Ada Boost Classifier"
    plt.figure(figsize=(3,2))
    b=plt.bar(alg,data,color=("green"))
    plt.title("Precision of Crop Prediction",fontsize=15)
    plt.legend(b,data,fontsize=9)
graph()
```



In [14]:
```
#Getting Recall
recall = recall_score(y_test,predicted_cbc,average='weighted') # recall: tp / (tp +
print('Recall of Ada Boost Classifier is: ',recall*100)
```

```
Recall of Ada Boost Classifier is:  18.181818181818183
```

In [15]:
```
DT=recall.mean() *100
def graph():
    data=[DT]
    alg="Ada Boost Classifier"
    plt.figure(figsize=(3,2))
    b=plt.bar(alg,data,color=("yellow"))
    plt.title("Recall of Crop Prediction",fontsize=15)
    plt.legend(b,data,fontsize=9)
graph()
```



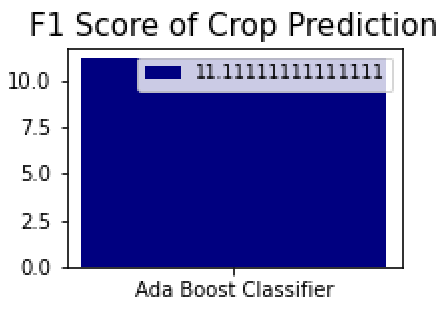
In [16]:

```
#Getting F1 Score
f1 = f1_score(y_test,predicted_cbc,average='weighted') # f1: 2 tp / (2 tp + fp + fn)
print('F1 Score of Ada Boost Classifier is: ',f1*100)
```

```
F1 Score of Ada Boost Classifier is:  11.11111111111111
```

In [17]:

```
DT=f1.mean() *100
def graph():
    data=[DT]
    alg="Ada Boost Classifier"
    plt.figure(figsize=(3,2))
    b=plt.bar(alg,data,color=("#000080"))
    plt.title("F1 Score of Crop Prediction",fontsize=15)
    plt.legend(b,data,fontsize=9)
graph()
```



In [18]:

```
#Classification Report
cr = classification_report(y_test,predicted_cbc)
print('Classification report\n',cr)
```

```
Classification report
               precision    recall  f1-score   support

           0       0.00      0.00      0.00        30
           1       0.06      1.00      0.11        30
           2       0.00      0.00      0.00        30
           3       0.00      0.00      0.00        30
           4       0.00      0.00      0.00        30
           5       0.00      0.00      0.00        30
           6       0.00      0.00      0.00        30
           7       0.50      1.00      0.67        30
           8       0.00      0.00      0.00        30
           9       0.50      1.00      0.67        30
          10       0.00      0.00      0.00        30
          11       0.00      0.00      0.00        30
          12       0.00      0.00      0.00        30
          13       0.00      0.00      0.00        30
          14       0.00      0.00      0.00        30
          15       1.00      1.00      1.00        30
          16       0.00      0.00      0.00        30
          17       0.00      0.00      0.00        30
          18       0.00      0.00      0.00        30
          19       0.00      0.00      0.00        30
          20       0.00      0.00      0.00        30
          21       0.00      0.00      0.00        30

    accuracy                           0.18       660
   macro avg       0.09      0.18      0.11       660
weighted avg       0.09      0.18      0.11       660
```

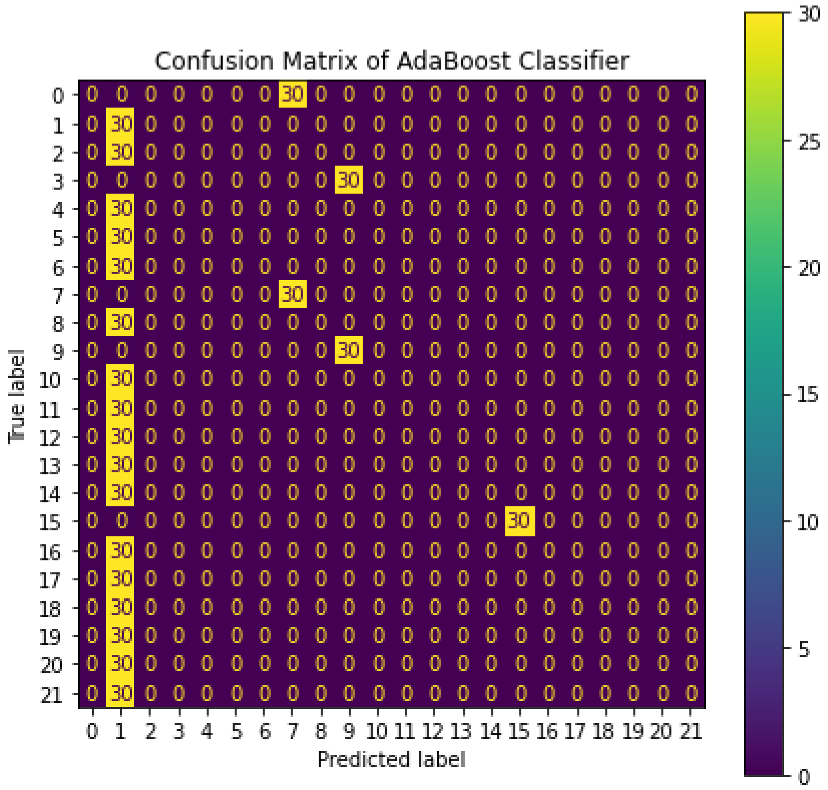
In [19]:

```
#Confusion Matrix
cm = confusion_matrix(y_test,predicted_cbc)
print('Confusion matrix\n',cm)
```

```
Confusion matrix
 [[ 0  0  0  0  0  0  0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0  0 30  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0  0 30  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 30  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0 30  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]]
```

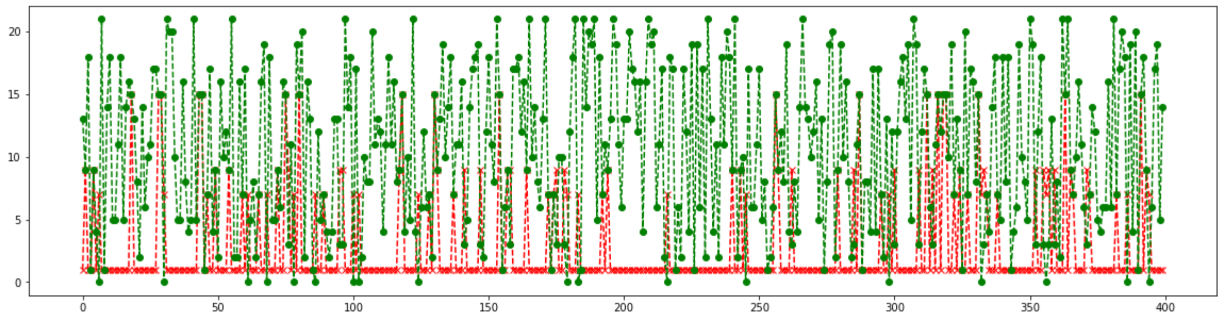
In [20]:

```
fig, ax = plt.subplots(figsize=(7,7))
plot_confusion_matrix(cbc, X_test, y_test, ax=ax)
plt.title('Confusion Matrix of AdaBoost Classifier')
plt.show()
```



In [21]:

```python
DF = p.DataFrame()
DF["y_test"] = y_test
DF["predicted"] = predicted_cbc
DF.reset_index(inplace=True)
plt.figure(figsize=(20, 5))
plt.plot(DF["predicted"][:400], marker='x', linestyle='dashed', color='red')
plt.plot(DF["y_test"][:400],  marker='o', linestyle='dashed', color='green')
plt.show()
```



In [22]:

```python
#Saving Model
import joblib
joblib.dump(cbc,'cbc.pkl')
```

Out[22]:

```
['cbc.pkl']
```