In [ ]: `Aim: To implement k-means Clustering`

In [ ]:
```python
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from matplotlib.colors import ListedColormap
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import confusion_matrix,accuracy_score
from sklearn.cluster import KMeans,AgglomerativeClustering
from scipy.cluster.hierarchy import fcluster, linkage, dendrogram
```

In [5]:
```python
dataset = pd.read_csv('iris.csv')
```

In [7]:
```python
x = dataset.iloc[:, [0,1,2,3]].values
```
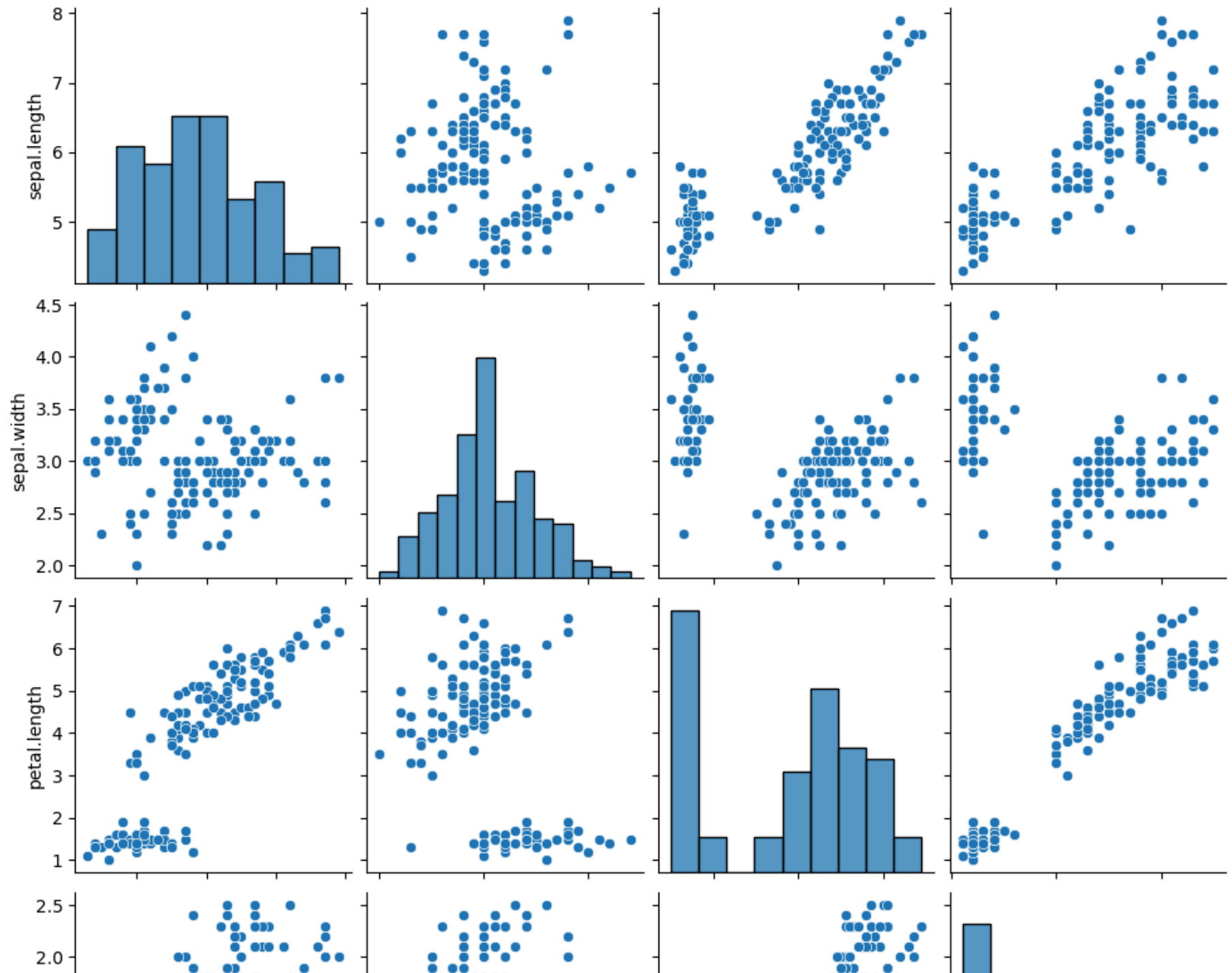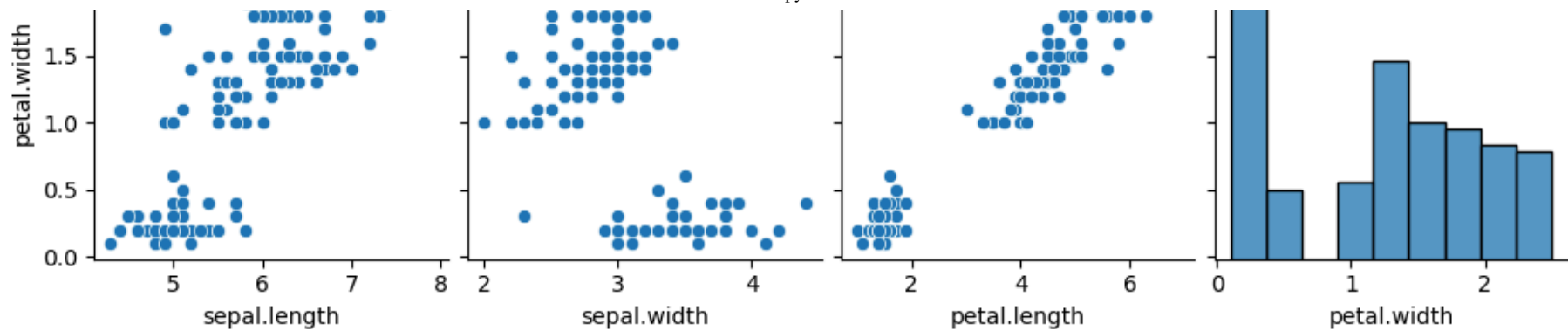
In [11]: `sns.pairplot(dataset)`

```
/Users/rahul/anaconda3/lib/python3.11/site-packages/seaborn/axisgrid.py:118: UserWarning: The figure layout
has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```

Out[11]: `<seaborn.axisgrid.PairGrid at 0x16e278310>`

In [12]:
```python
Elbow = []
for i in range(1, 11):
    kmeans = KMeans(n_clusters = i, init = "k-means++", max_iter = 300, random_state = 20)
    kmeans.fit(x)
    Elbow.append(kmeans.inertia_)
```

```
/Users/rahul/anaconda3/lib/python3.11/site-packages/sklearn/cluster/_kmeans.py:1412: FutureWarning: The def
ault value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppre
ss the warning
  super()._check_params_vs_input(X, default_n_init=10)
/Users/rahul/anaconda3/lib/python3.11/site-packages/sklearn/cluster/_kmeans.py:1412: FutureWarning: The def
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/Users/rahul/anaconda3/lib/python3.11/site-packages/sklearn/cluster/_kmeans.py:1412: FutureWarning: The def
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ss the warning
  super()._check_params_vs_input(X, default_n_init=10)
```

```
In [16]: plt.plot(range(1, 11), Elbow, marker = "o")
         plt.title("The Elbow method")
         plt.xlabel("no. of clusters")
         plt.ylabel("Elbow")
         plt.show()
```
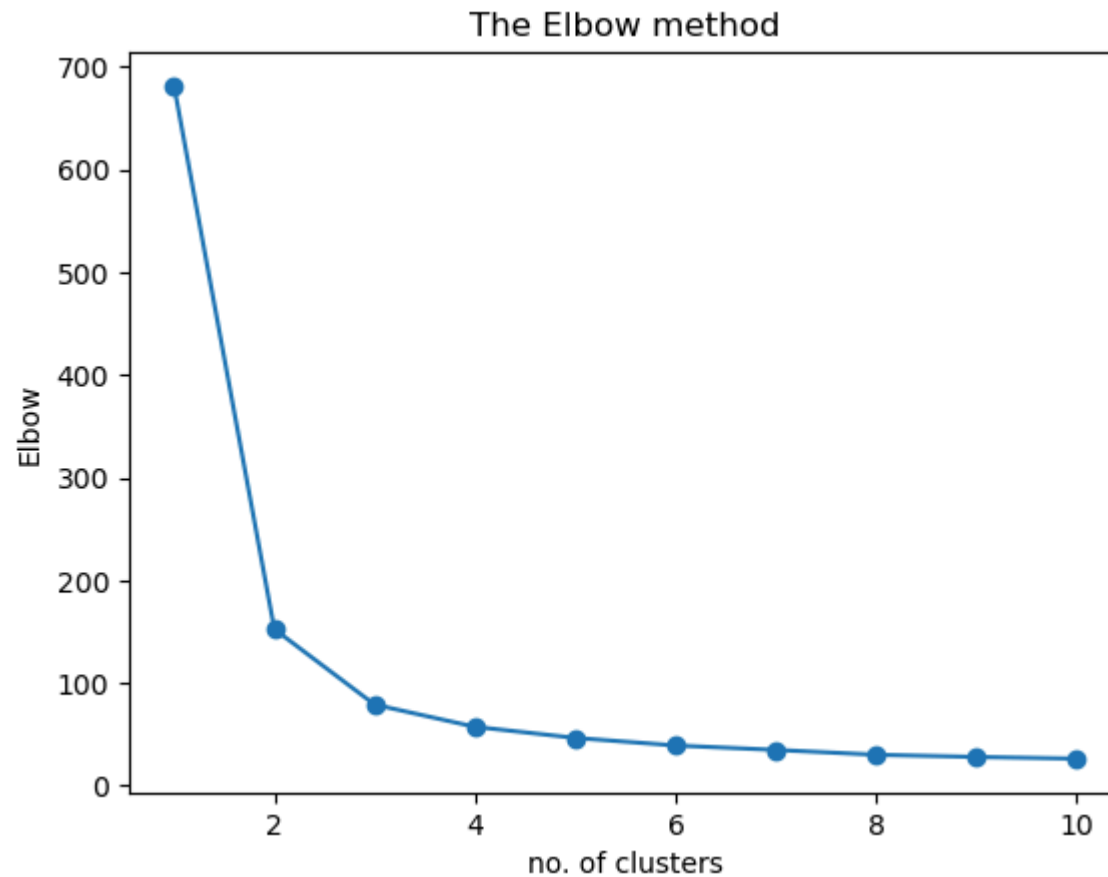


```
In [19]: kmeans = KMeans(n_clusters = 3, init ="k-means++", max_iter = 300, n_init = 10, random_state = 0)
         y_kmeans = kmeans.fit_predict(x)
```

In [21]:
```python
plt.scatter(x[y_kmeans == 0, 0], x[y_kmeans == 0, 1], s = 100, c = 'red', label = "iris-setosa")
plt.scatter(x[y_kmeans == 1, 0], x[y_kmeans == 1, 1], s = 100, c = 'blue', label = "iris-versicolor")
plt.scatter(x[y_kmeans == 2, 0], x[y_kmeans == 2, 1], s = 100, c = 'green', label = "iris-verginica")
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 1], s = 100, c = "yellow", label = "Mea
plt.legend()
```
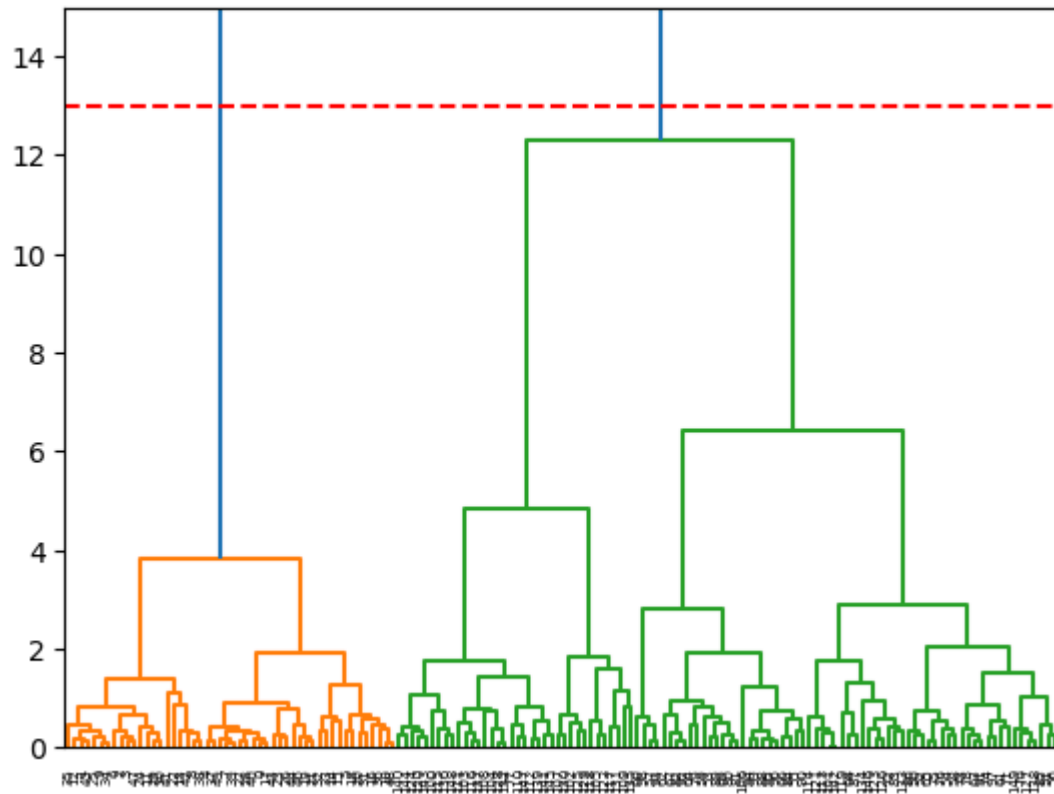
Out[21]: <matplotlib.legend.Legend at 0x16ebfcf90>
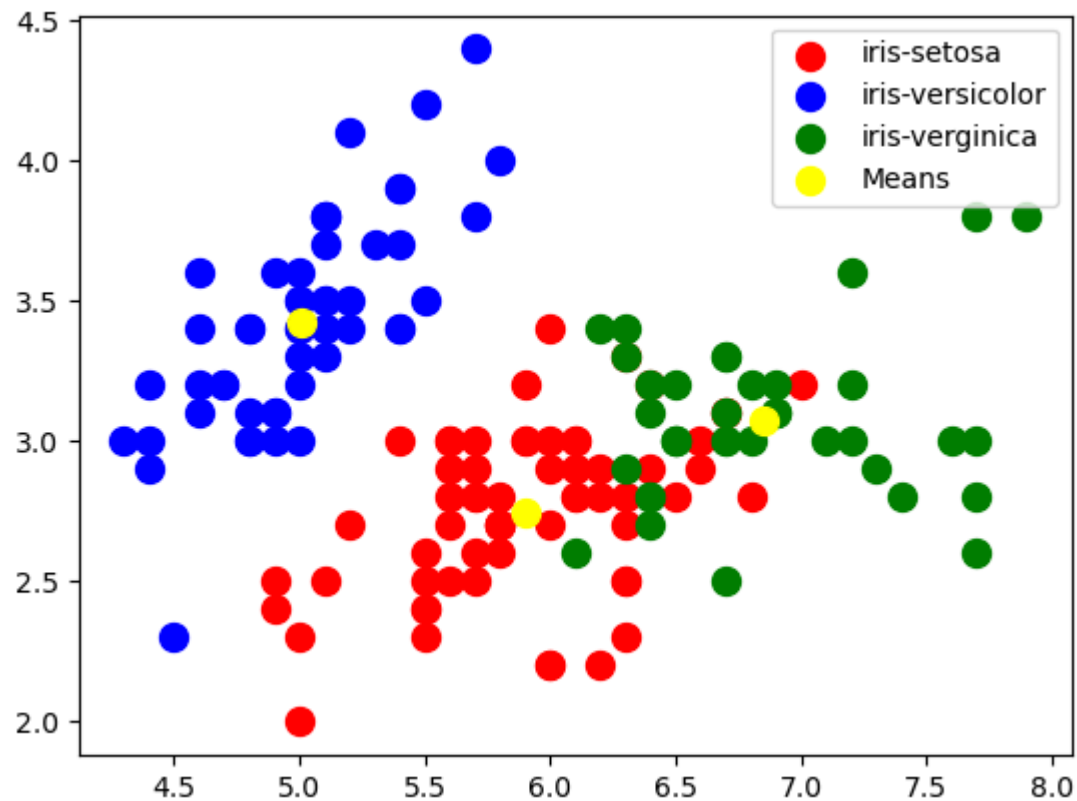
In [22]:
```python
distance_matrix = linkage(x, method = "ward", metric = "euclidean")
```

In [24]: `dn = dendrogram(distance_matrix)`
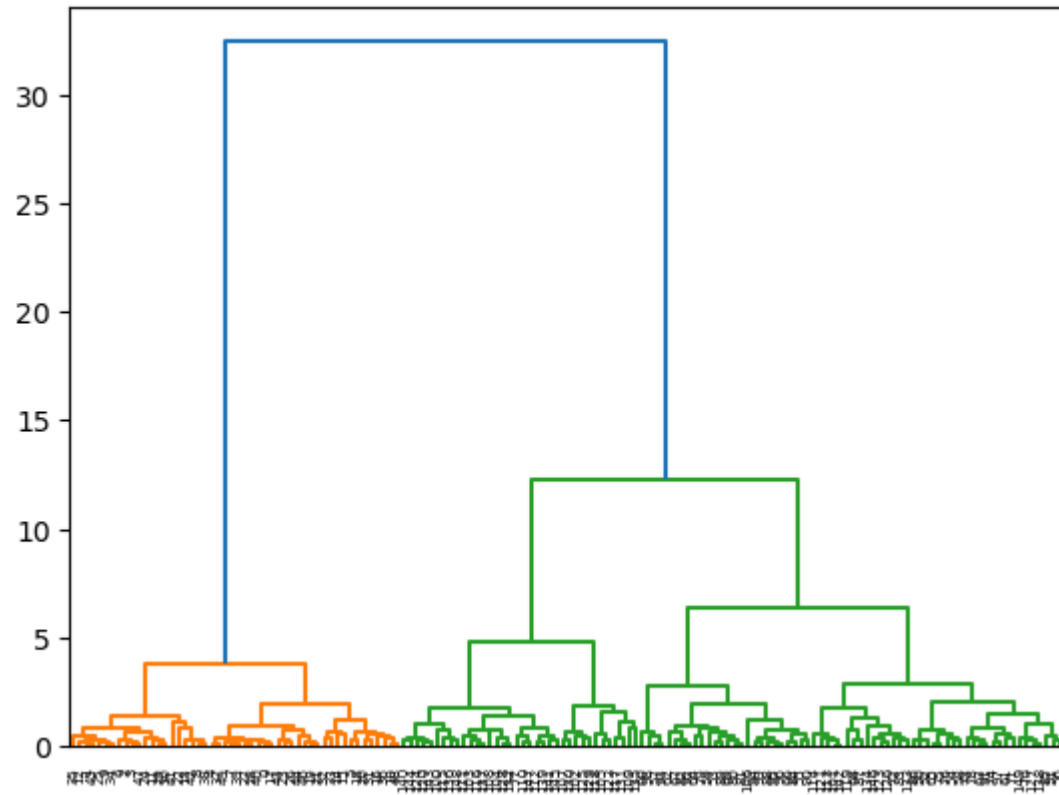
In [28]:
```python
dn = dendrogram(distance_matrix)
plt.axhline(y = 13, color = "r", linestyle = "--")
plt.ylim(0,15)
plt.show()
```

In [35]:
```python
cluster = AgglomerativeClustering(n_clusters = 2, affinity = "euclidean", linkage = "ward")
cluster.fit_predict(x)
plt.title("Agglomerative Clustering - 2 Clusters")
plt.scatter(x[:, 2],x[:, 3], c= cluster.labels_, label = cluster.labels_)
plt.xlabel("Petal Length")
plt.ylabel("Petal Width")
```

/Users/rahul/anaconda3/lib/python3.11/site-packages/sklearn/cluster/_agglomerative.py:1005: FutureWarning:
Attribute `affinity` was deprecated in version 1.2 and will be removed in 1.4. Use `metric` instead
  warnings.warn(

Out[35]: Text(0, 0.5, 'Petal Width')
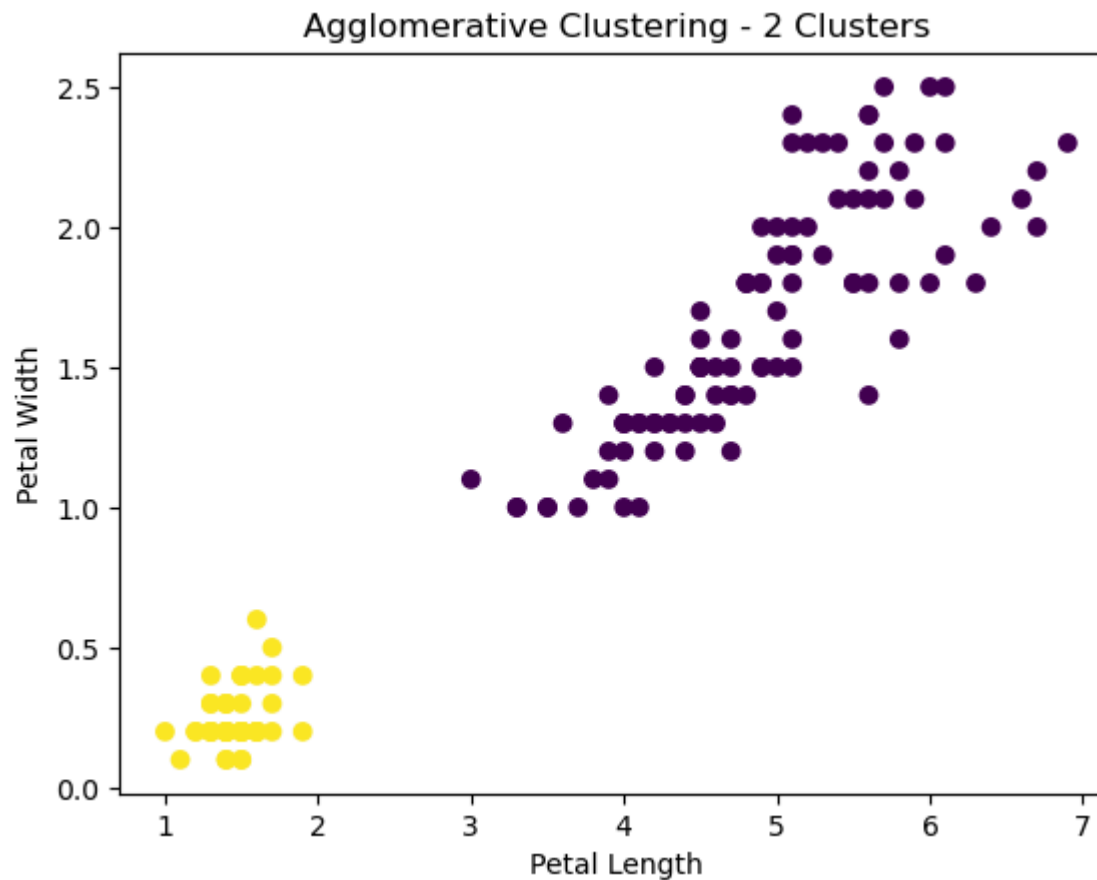
In [34]:
```python
cluster = AgglomerativeClustering(n_clusters = 3, affinity = "euclidean", linkage = "ward")
cluster.fit_predict(x)
plt.title("Agglomerative Clustering – 2 Clusters")
plt.scatter(x[:, 2],x[:, 3], c= cluster.labels_, label = cluster.labels_)
plt.xlabel("Petal Length")
plt.ylabel("Petal Width")
```

/Users/rahul/anaconda3/lib/python3.11/site–packages/sklearn/cluster/_agglomerative.py:1005: FutureWarning:
Attribute `affinity` was deprecated in version 1.2 and will be removed in 1.4. Use `metric` instead
  warnings.warn(

Out[34]: Text(0, 0.5, 'Petal Width')