```python
In [1]: 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.metrics import confusion_matrix,accuracy_score
        from sklearn.cluster import AgglomerativeClustering
        from scipy.cluster.hierarchy import fcluster, linkage, dendrogram
```
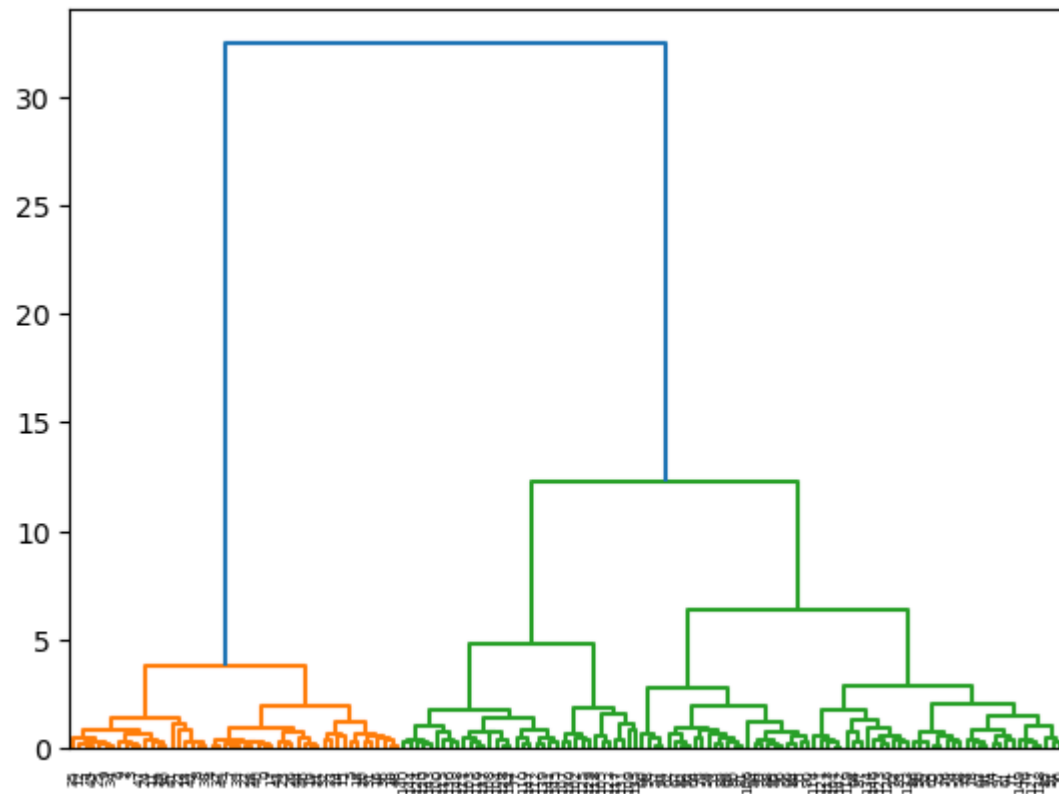
```python
In [2]: dataset = pd.read_csv('/Users/rahul/Documents/6-sem/ML-LAB/ML LAB DATASETS/iris.csv')
```
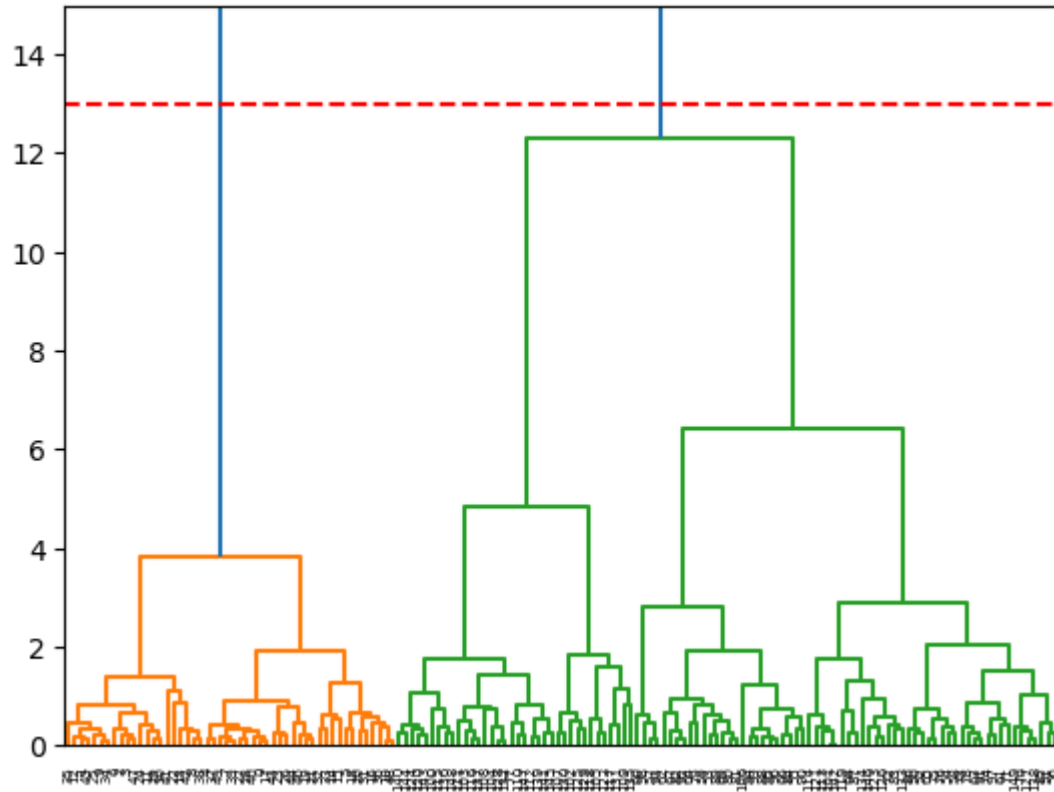
```python
In [3]: x = dataset.iloc[:, [0,1,2,3]].values
```

```python
In [4]: distance_matrix = linkage(x, method = "ward", metric = "euclidean")
```

In [5]:
```
dn = dendrogram(distance_matrix)
```

In [6]:
```python
dn = dendrogram(distance_matrix)
plt.axhline(y = 13, color = "r", linestyle = "--")
plt.ylim(0,15)
plt.show()
```

In [7]:
```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[7]: Text(0, 0.5, 'Petal Width')
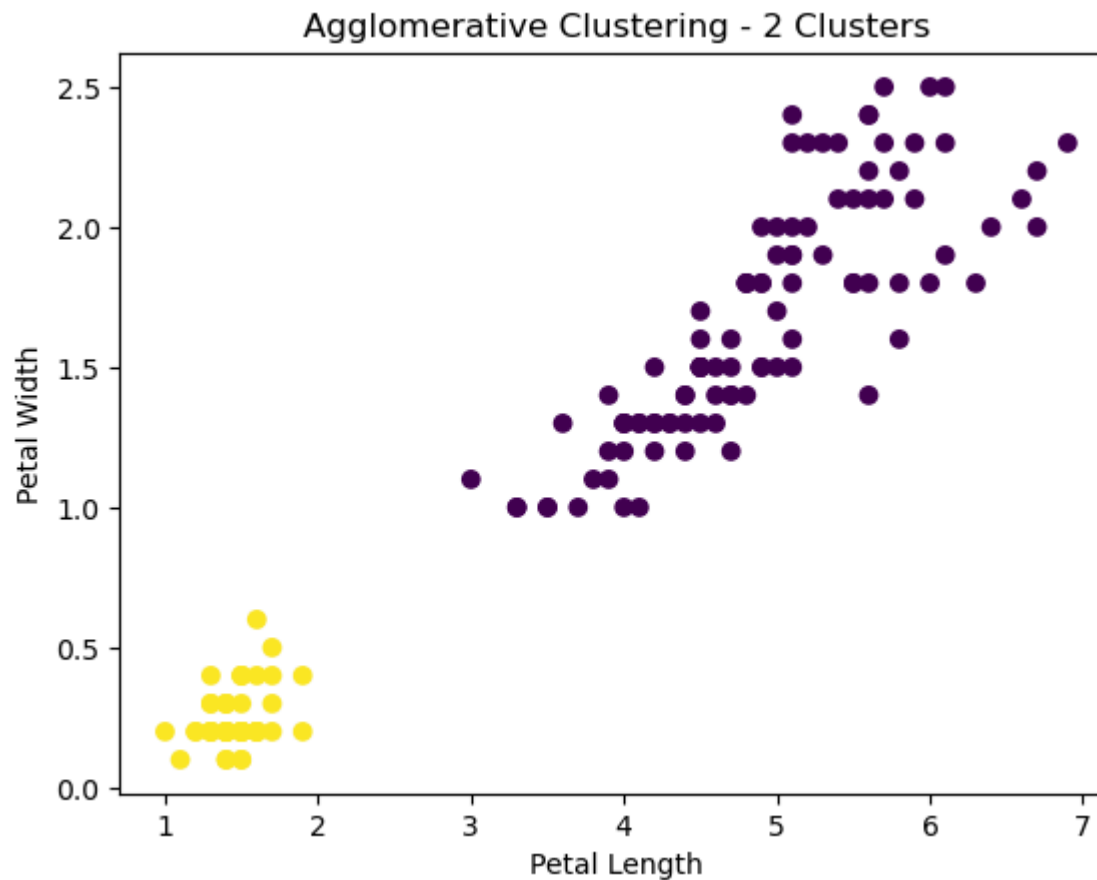
In [8]:
```python
cluster = AgglomerativeClustering(n_clusters = 3, affinity = "euclidean", linkage = "ward")
cluster.fit_predict(x)
plt.title("Agglomerative Clustering – 2 Clusters")
plt.scatter(x[:, 2],x[:, 3], c= cluster.labels_, label = cluster.labels_)
plt.xlabel("Petal Length")
plt.ylabel("Petal 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[8]: Text(0, 0.5, 'Petal Width')