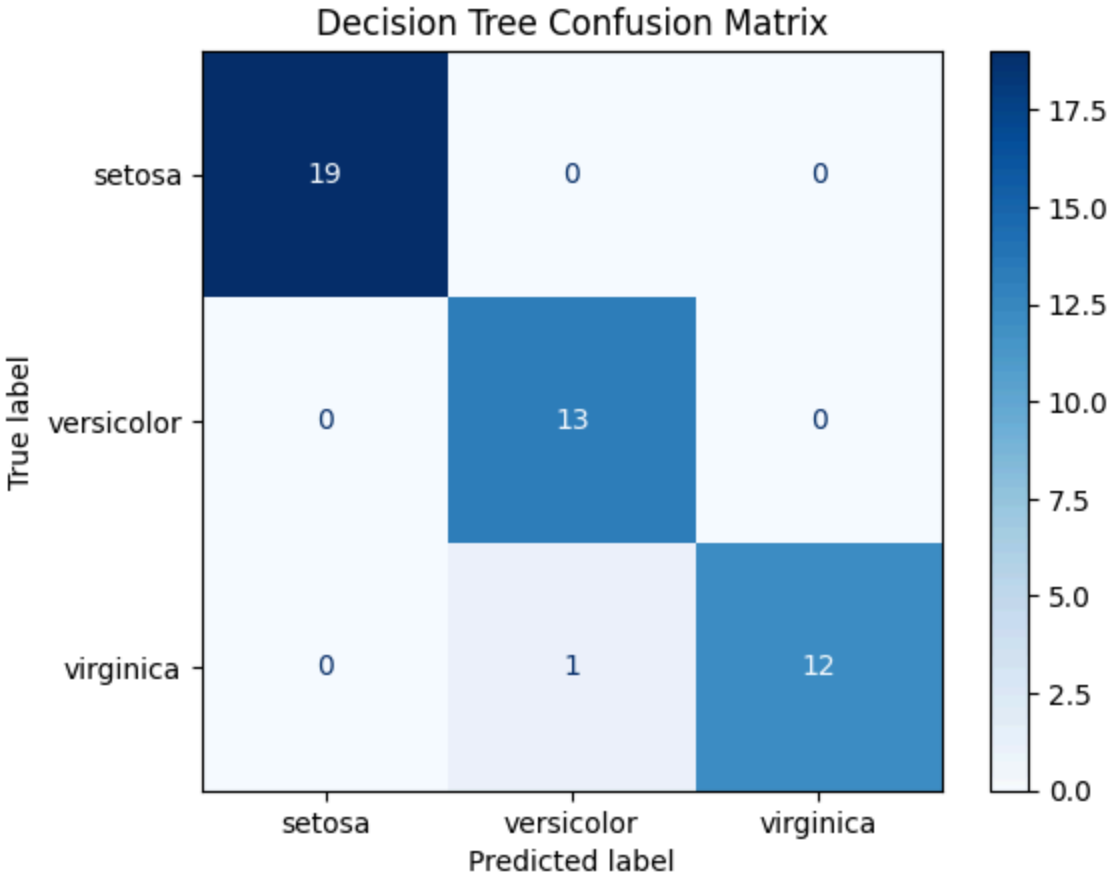
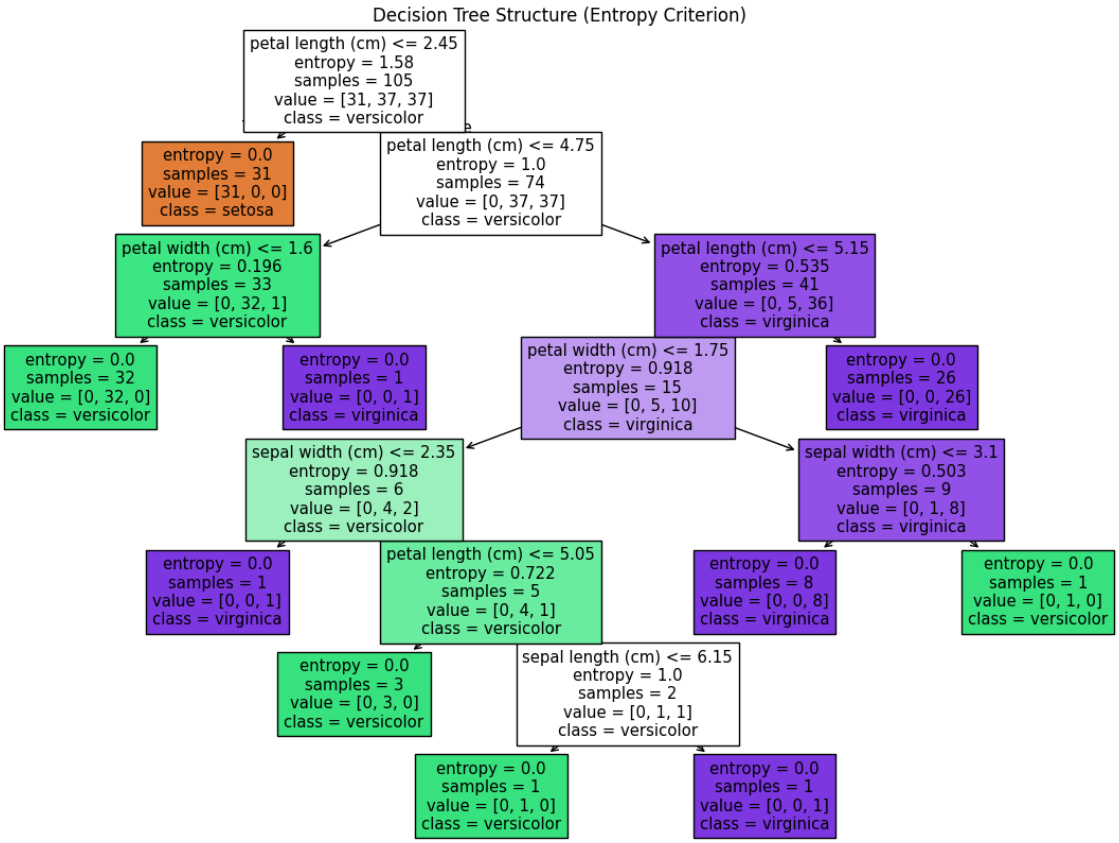
Decision Tree classifier

In [4]:
```
# Import necessary libraries
from sklearn.datasets import load_iris
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier, plot_tree
from sklearn.metrics import accuracy_score, confusion_matrix, ConfusionMatrixD
import matplotlib.pyplot as plt
import seaborn as sns

# Load dataset
iris = load_iris()
X = iris.data
y = iris.target

# Split data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.3, random_state=42
)

# Create Decision Tree model
dt = DecisionTreeClassifier(criterion='entropy', random_state=42)

# Train the model
dt.fit(X_train, y_train)

# Make predictions
y_pred = dt.predict(X_test)

# Evaluate the model
print("Accuracy:", accuracy_score(y_test, y_pred))

# Confusion Matrix
cm = confusion_matrix(y_test, y_pred)
disp = ConfusionMatrixDisplay(confusion_matrix=cm, display_labels=iris.target_
disp.plot(cmap='Blues')
plt.title("Decision Tree Confusion Matrix")
plt.show()
```

```
Accuracy: 0.9777777777777777
```



In [5]:
```
# --- Visualize the Decision Tree ---
plt.figure(figsize=(15, 10))
plot_tree(dt, filled=True, feature_names=iris.feature_names, class_names=iris.
plt.title("Decision Tree Structure (Entropy Criterion)")
plt.show()
```


Decision Tree Structure (Entropy Criterion)
petal length (cm) <= 2.45
entropy = 1.58
samples = 105
value = [31, 37, 37]
class = versicolor
entropy = 0.0
samples = 31
value = [31, 0, 0]
class = setosa
petal length (cm) <= 4.75
entropy = 1.0
samples = 74
value = [0, 37, 37]
class = versicolor
petal width (cm) <= 1.6
entropy = 0.196
samples = 33
value = [0, 32, 1]
class = versicolor
petal length (cm) <= 5.15
entropy = 0.535
samples = 41
value = [0, 5, 36]
class = virginica
entropy = 0.0
samples = 32
value = [0, 32, 0]
class = versicolor
entropy = 0.0
samples = 1
value = [0, 0, 1]
class = virginica
petal width (cm) <= 1.75
entropy = 0.918
samples = 15
value = [0, 5, 10]
class = virginica
entropy = 0.0
samples = 26
value = [0, 0, 26]
class = virginica
sepal width (cm) <= 2.35
entropy = 0.918
samples = 6
value = [0, 4, 2]
class = versicolor
sepal width (cm) <= 3.1
entropy = 0.503
samples = 9
value = [0, 1, 8]
class = virginica
entropy = 0.0
samples = 1
value = [0, 0, 1]
class = virginica
petal length (cm) <= 5.05
entropy = 0.722
samples = 5
value = [0, 4, 1]
class = versicolor
entropy = 0.0
samples = 8
value = [0, 0, 8]
class = virginica
entropy = 0.0
samples = 1
value = [0, 1, 0]
class = versicolor
entropy = 0.0
samples = 3
value = [0, 3, 0]
class = versicolor
sepal length (cm) <= 6.15
entropy = 1.0
samples = 2
value = [0, 1, 1]
class = versicolor
entropy = 0.0
samples = 1
value = [0, 1, 0]
class = versicolor
entropy = 0.0
samples = 1
value = [0, 0, 1]
class = virginica