**3 Best Models Selected Are:**

| **Rank** | **Model** | **Reason** |
| --- | --- | --- |
| 1 | **XGBoost Classifier** | Best Macro-F1 among advanced models (0.8406). Great balance of precision and recall. |
| 2 | **Decision Tree Classifier** | Very high baseline Macro-F1 (0.8996), simple and interpretable. |
| 3 | **Random Forest Classifier** | Good Macro-F1 (0.8264), strong ensemble backup, very stable model. |

**Final Models for Comparison**

| **Model** | **Strategy** |
| --- | --- |
| XGBoost | Fine-tune via Cross-Validation and RandomizedSearchCV |
| Decision Tree | Basic, no heavy tuning needed (optional light tuning if you want) |
| Random Forest | Basic model or slight tuning if you want |

**Action Plan for All 3 Models:**

| **Step** | **XGBoost** | **Decision Tree** | **Random Forest** |
| --- | --- | --- | --- |
| 1 | Do 5-Fold Cross-Validation | Do 5-Fold CV | Do 5-Fold CV |
| 2 | Tune Hyperparameters | (Optional: light tuning) | (Optional: light tuning) |
| 3 | Compare Macro-F1, Precision, Recall | Compare | Compare |

**Here’s how we can proceed:**

**1. Cross-Validation and Tuning Setup for All 3 Models**

I’ll prepare:

* Cross-Validation (Stratified 5-Fold) scripts for each model
* Light RandomizedSearchCV tuning grids for each (especially for XGBoost and Random Forest)
* Decision Tree tuning can be very light (it's already strong)

**Confirmed Models for final tuning and comparison:**

| **Model** | **Tune** |  |
| --- | --- | --- |
| XGBoost | Full tuning (important) |  |
| Random Forest | Light tuning |  |
| Decision Tree | Very light tuning |  |