



### **AI for Agriculture at the BeOrchid Africa Developers Hackathon 2026**

**Website:** <https://taiwrash.github.io/w2p>

#### **Executive Summary**

W2P is an AI-powered agricultural intelligence platform built to remove uncertainty from planting decisions. Growing up on a farm, planting season always felt like a gamble. Before planting, we worried whether the seeds would germinate, whether rainfall had truly stabilized, and whether temperature and soil moisture conditions were right. Planting requires real financial commitment in clearing land, plowing, purchasing seeds, and labor. If germination fails, that money is lost. Even when crops germinate, farmers remain uncertain whether seasonal weather conditions will sustain growth through flowering and seed production.

**W2P transforms climate data into practical, localized planting guidance so farmers can make informed decisions about when to plant and what to plant.**

#### **Problem Statement**

Across Africa, smallholder farmers depend heavily on seasonal rainfall and climate stability. Traditional planting calendars are increasingly unreliable due to shifting climate patterns. Farmers often make planting decisions based on experience and intuition rather than predictive data.

This results in:

- Failed germination due to unstable rainfall onset
- Reduced yield because of mid-season drought or temperature spikes
- Financial loss from wasted seeds, labor, and land preparation
- Increased food insecurity

The core problem is not lack of effort or knowledge. The problem is the lack of accessible, localized climate intelligence that translates environmental data into actionable decisions for farmers.

#### **Proposed Solution**

W2P analyzes historical rainfall trends, seasonal forecasts, temperature patterns, and soil inputs to predict optimal planting windows and crop suitability for specific regions.

The system uses:

- Time-series forecasting models, LSTM to predict rainfall onset stability and seasonal consistency
- Supervised machine learning models, Random Forest to evaluate crop suitability
- Risk scoring algorithms to estimate germination probability and end-of-season yield risk

**Farmers or cooperatives input their location and basic farm parameters. W2P outputs:**

1. Recommended planting window
2. Most suitable crop among selected regional options
3. Germination probability score
4. Yield risk estimate

**This helps farmers reduce financial risk before committing resources.**

## Technical Architecture

### Backend

- FastAPI (Python) for API development
- PostgreSQL for structured storage of climate and crop data
- Docker for containerized deployment
- Cloud-ready infrastructure for scalability
- Machine Learning Layer
- Time-series forecasting for rainfall and seasonality prediction
- Feature engineering including rainfall averages, temperature variability, and seasonal indices
- Classification models for crop suitability ranking
- Risk modeling for yield probability estimation

### Frontend

- React-based interface
- Mobile-first and low-bandwidth optimized
- Dashboard displaying planting recommendations and risk visualization
- Scalability and Impact

W2P is designed as a scalable cloud-based platform capable of serving:

- Individual smallholder farmers
- Agricultural cooperatives
- Government advisory bodies
- Agricultural insurance providers

Future expansion includes:

- SMS advisory integration for rural access
- Satellite vegetation index integration
- Multi-region and multi-crop support
- API access for third-party agricultural platforms

