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சனாதிபதி அலுவலகம்
PRESIDENTIAL SECRETARIAT

My No : PS/FSP/08/01/2025
Date : 10 · 12. 2025

Secretary
Ministry of Agriculture, Livestock, Land and Irrigation

Precision Agriculture & Value Chain Management for sustainable profits

A proposal submitted by Mr. Dammika Kobbekaduwa, Director, Sustainable Solutions for Perennial Prosperity, concerning the effectively utilize the crop suitability Database of the Department of Agriculture in Sri Lanka.

02. You are kindly requested to review his proposals and provide your observations and recommendations on the feasibility of implementing them within the purview of your Ministry to Mr. Dammika Kobbekaduwa with a copy to me.

03. Your cooperation in this regard is highly appreciated.

M. A. G. Thushari
Director (Food Security and Policy)
For Secretary to the President
Telephone No: 011 2354354 / Ext: 4618
E-mail: fsp@presidentsoffice.lk

Copy: Mr. Dammika Kobbekaduwa, Director, Sustainable Solutions for Perennial Prosperity

Precision Agriculture & Value Chain Management for sustainable profits

To effectively utilize the Crop Suitability Database of the Department of Agriculture in Sri Lanka and integrate data from your advanced weather monitoring system, follow these steps:

1. Access the Crop Suitability Database:

- **Website:** Visit the Department of Agriculture's Crop Suitability Database at https://csrforgnd.doa.gov.lk/.
- **User Guide:** Refer to the User Guide for detailed instructions on navigating the database.

2. Determine Your Location's Agro-Ecological Region (AER):

- **Identify AER:** Use the database to find your Grama Niladhari Division and corresponding AER.
- **Cropping Calendar:** Consult the cropping calendar provided for each AER to understand optimal planting times and suitable crops.

3. Analyze Soil and Air Quality Data:

- **Data Collection:** Utilize your weather monitoring system to gather data on parameters such as soil pH, moisture, temperature, air humidity, rainfall, and sunlight.
- **Compare with Standards:** Compare your data against the optimal ranges for perennial crops like tea, rubber, coconuts, cinnamon, oil palm, spices, and commercial forestry.

4. Implement Corrective Measures:

- **Soil pH Adjustment:**
  - **Acidic Soils:** Apply lime to raise pH.
  - **Alkaline Soils:** Incorporate sulfur or organic matter to lower pH.
- **Nutrient Management:**
  - **Deficiencies:** Apply appropriate fertilizers based on soil nutrient analysis.
  - **Excesses:** Avoid over-fertilization to prevent nutrient leaching and pollution.
- **Soil Erosion Control:**

- **Cover Crops:** Plant cover crops to reduce erosion and improve soil structure.
- **Mulching:** Apply mulch to protect soil from erosion and retain moisture.

- **Water Management:**
  - **Irrigation:** Implement micro-irrigation systems to enhance water-use efficiency.
  - **Rainwater Harvesting:** Set up systems to collect and utilize rainwater.
- **Air Quality Management:**
  - **Dust Control:** Maintain vegetation cover to reduce dust and improve air quality.
  - **Pollution Monitoring:** Regularly monitor for pollutants that could affect crop health.

5. Monitor and Adjust:

- **Regular Monitoring:** Continuously monitor soil and air parameters to assess the effectiveness of implemented measures.
- **Adjust Practices:** Modify agricultural practices based on ongoing data to maintain optimal conditions for crop growth.

By integrating data from the Crop Suitability Database with real-time environmental data from your monitoring system, you can make informed decisions to optimize conditions for perennial crops, leading to improved yields and sustainable agricultural practices.

1. Atmospheric Conditions

1. **Air Temperature (°C)** – Critical for plant metabolism and growth.
2. **Relative Humidity (%)** – Affects evapotranspiration and disease susceptibility.
3. **Dew Point (°C)** – Indicates condensation risk and fungal disease potential.
4. **Atmospheric Pressure (hPa)** – Helps predict weather changes.
5. **Wind Speed (m/s)** – Impacts transpiration and pollination.
6. **Wind Direction (°)** – Determines airflow patterns and disease spread.

2. Solar Radiation & Light Conditions

7. **Solar Radiation (W/m²)** – Measures available sunlight for photosynthesis.
8. **Photosynthetically Active Radiation (PAR) (µmol/m²/s)** – Key for plant growth.
9. **UV Index** – Helps assess plant stress due to excess radiation.

10. **Sunlight Duration (minutes)** – Tracks daily exposure needed for crop growth.

3. Rainfall & Moisture

11. **Rainfall Intensity (mm/h)** – Indicates risk of flooding and soil erosion.
12. **Cumulative Rainfall (mm)** – Helps in irrigation planning.
13. **Leaf Wetness Duration (minutes)** – Important for fungal disease risk assessment.

4. Soil Conditions

14. **Soil Temperature (°C) at different depths (10cm, 30cm, 50cm)** – Critical for root activity.
15. **Soil Moisture Content (%) at different depths** – Guides irrigation management.
16. **Soil pH** – Essential for nutrient availability and crop health.
17. **Soil Electrical Conductivity (EC) (dS/m)** – Measures salinity stress on plants.
18. **Soil Oxygen Level (%)** – Important for root respiration and microbial activity.
19. **Soil Carbon Dioxide (CO_2) Level (ppm)** – Indicates root and microbial respiration.

5. Air Quality & Gas Composition

20. **CO_2 Concentration (ppm)** – Key for photosynthesis.
21. **O_2 Concentration (ppm)** – Affects plant respiration and soil aeration.
22. **NO_2 (Nitrogen Dioxide) (ppm)** – Indicator of air pollution affecting plant health.
23. **SO_2 (Sulfur Dioxide) (ppm)** – Affects plant respiration and chlorophyll degradation.
24. **O_3 (Ozone) (ppm)** – Can cause oxidative stress in plants.

6. Evapotranspiration & Climate Stress Indicators

25. **Evapotranspiration Rate (mm/h)** – Crucial for water balance and irrigation.
26. **Vapor Pressure Deficit (VPD) (kPa)** – Indicates plant stress due to water loss.
27. **Heat Index (°C)** – Combines temperature and humidity for stress evaluation.
28. **Chill Hours (hours below 10°C)** – Important for crops requiring cold dormancy.

7. Disease & Pest Monitoring

29. **Pest Risk Index** – AI-based indicator using temperature, humidity, and wind data.

30. **Fungal Disease Risk Index** – Uses humidity, leaf wetness, and temperature data.

How This Data Helps Optimize Crop Conditions

- **Precision Irrigation:** Soil moisture & evapotranspiration data guide water application.
- **Fertilizer Management:** Soil pH, EC, and oxygen levels optimize nutrient uptake.
- **Pest & Disease Prevention:** Leaf wetness, VPD, and fungal risk index aid in preventive treatments.
- **Yield Maximization:** Solar radiation, CO_2, and PAR data help maximize photosynthesis.

Next Steps

- Automate real-time analysis & corrective measures (fertigation, irrigation, shade control).
- Use AI-driven predictive models for climate stress adaptation.
- Implement remote monitoring via IoT dashboards for decision-making.

To optimize your perennial crop cultivation in Sri Lanka, consider the following US-based weather monitoring systems renowned for their precision and reliability:

RainWise AgroMET Weather Station
Designed specifically for agricultural applications, this station provides real-time data on temperature, humidity, rainfall, wind speed, and solar radiation. Its durable construction ensures longevity in diverse climates.

Rainwise

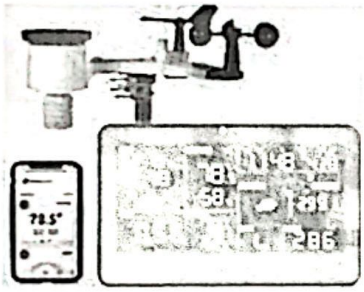
Arable Mark 2 Crop Intelligence System
This advanced system offers comprehensive monitoring, including weather, plant, soil,

and irrigation insights. It aids in data-driven decision-making to enhance crop yield and quality.

Arable

Ambient Weather WS-2902C WiFi Smart Weather Station
A highly rated personal weather station that streams real-time weather data, including temperature, humidity, wind, and solar radiation. It's user-friendly and suitable for agricultural monitoring.

Ambient Weather



Key Considerations for Selection:

- **Data Parameters:** Ensure the system monitors essential parameters such as soil moisture, temperature, humidity, rainfall, and solar radiation.
- **Integration Capability:** Opt for systems that can integrate with existing farm management software for seamless data analysis.
- **Durability:** Select equipment designed to withstand Sri Lanka's climatic conditions.
- **Support and Maintenance:** Consider the availability of customer support and ease of maintenance, especially when sourcing equipment internationally.

Implementation Steps:

1. **Assess Your Needs:** Determine the specific data requirements for your crops to select the most suitable system.
2. **Installation:** Follow manufacturer guidelines for proper installation to ensure accurate data collection.
3. **Data Analysis:** Utilize the collected data to make informed decisions on irrigation, fertilization, and other cultural practices.
4. **Regular Maintenance:** Perform routine checks and maintenance to ensure the system's longevity and accuracy.

By investing in a reliable weather monitoring system, you can enhance your farm's productivity and sustainability through precise environmental data management.

Optimizing Perennial Crop Management with Automated Weather Monitoring for Junior Planters in Sri Lanka

Introduction

Efficient agricultural management relies on precise environmental data collection. For Sri Lanka's Junior Planters managing Tea, Rubber, Coconuts, Cinnamon, Oil Palm, Spices, and Commercial Forestry, investing in an **Automated Weather Monitoring Unit (AWMU)** is crucial. These units record real-time weather and soil conditions every five minutes, ensuring optimal decision-making. Coupled with the **National Resource Management Centre (NRMC) website (**https://csrforgnd.doa.gov.lk/, planters can integrate scientific data with advanced monitoring systems to maximize yield and sustainability.

1. Why Invest in an Automated Weather Monitoring Unit?

1.1 Real-Time Precision in Decision-Making

Agriculture is highly dependent on climatic variables. Traditional weather observation methods often fail to capture rapid environmental changes. An **AWMU collects data every five minutes**, ensuring up-to-date information for:

- **Irrigation planning** – Adjusting watering schedules based on soil moisture and rainfall trends.
- **Pest & disease management** – Monitoring humidity and leaf wetness to predict fungal risks.
- **Fertilization schedules** – Using soil pH and electrical conductivity data to optimize nutrient applications.
- **Weather-based harvesting** – Avoiding losses by tracking rain and wind conditions.

1.2 Key Parameters Monitored by an AWMU

A robust **AWMU tracks over 30 critical environmental parameters** essential for plantation crop management:

A. Atmospheric Conditions

- Air temperature, relative humidity, dew point, wind speed & direction, atmospheric pressure.

B. Solar Radiation & Light Conditions

- Solar radiation, Photosynthetically Active Radiation (PAR), UV index, sunlight duration.

C. Rainfall & Moisture

- Rainfall intensity, cumulative rainfall, leaf wetness duration.

D. Soil Conditions

- Soil temperature (multiple depths), soil moisture content, pH, electrical conductivity (EC), oxygen levels, CO_2 levels.

E. Air Quality & Gas Composition

- CO_2, O_2, NO_2, SO_2, O_3 – crucial for assessing pollution and plant respiration.

F. Evapotranspiration & Climate Stress Indicators

- Evapotranspiration rate, vapor pressure deficit (VPD), heat index, chill hours.

G. Pest & Disease Monitoring

- AI-generated Pest Risk Index and Fungal Disease Risk Index.

2. Utilizing the NRMC Website for Crop Suitability & Land Use Analysis

The **National Resource Management Centre (NRMC) of Sri Lanka** provides a crucial online tool for planters. By accessing **https://csrforgnd.doa.gov.lk/**, planters can:

- **Analyze crop suitability maps** based on soil, climate, and altitude.
- **Assess land use classifications** for sustainable plantation expansion.
- **Integrate data from AWMU with NRMC insights** to make region-specific cultivation decisions.
- **Optimize agroforestry and conservation planning** based on real-time environmental conditions.

How to Use NRMC with an AWMU?

1. **Step 1:** Collect real-time soil and climate data using the weather unit.
2. **Step 2:** Compare recorded data with NRMC's recommended crop suitability indicators.
3. **Step 3:** Adjust irrigation, fertilizer application, and planting schedules accordingly.
4. **Step 4:** Monitor long-term climate trends to anticipate challenges and take preventive action.

3. Choosing the Right AWMU for Sri Lankan Plantations

Several U.S.-manufactured **weather monitoring systems** are ideal for plantations in Sri Lanka:

- **RainWise AgroMET Weather Station** – Designed for large-scale agriculture.

- **Arable Mark 2 Crop Intelligence System** – Provides data on soil, climate, and irrigation.
- **Ambient Weather WS-2902C** – Budget-friendly, suitable for small and mid-size estates.

Selection Factors:

- Coverage of required parameters.
- Integration with farm management software.
- Durability and maintenance support.
- Cost-effectiveness and long-term reliability.

4. Benefits of Integrating AWMU Data into Plantation Management

4.1 Climate-Resilient Crop Production

AWMU data helps predict extreme weather events (droughts, heavy rainfall) and enables preventive measures to mitigate yield losses.

4.2 Improved Resource Efficiency

- Reduces water wastage by **up to 40%** through smart irrigation.
- Optimizes fertilizer use, minimizing costs and environmental impact.

4.3 Increased Productivity & Profitability

- Enhances yield by maintaining optimal growing conditions.
- Reduces disease-related crop losses with proactive monitoring.

4.4 Data-Driven Plantation Management

- Helps planters compare real-time field data with historical trends.
- Facilitates scientific decision-making rather than intuition-based farming.

Conclusion

Incorporating **Automated Weather Monitoring Units** with **NRMC online tools** marks a turning point in plantation agriculture. Junior Planters in Sri Lanka can harness cutting-edge technology to optimize irrigation, pest control, and climate adaptation. Investing in **real-time weather data collection** ensures long-term **sustainability, increased yields, and improved plantation profitability**. By embracing **smart agriculture**, Sri Lankan planters can stay competitive in a rapidly evolving global market.

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9th January 2025