

Eco-sense Acidic Rain Detector

Problem statement

Acid rain negatively impacts agriculture by altering soil pH and harming crops. Farmers often struggle to detect and manage its effects, leading to reduced yield and soil degradation. There is a need for a smart solution to monitor rainwater acidity and ensure safe irrigation. Our project utilizes Arduino technology to detect acidic rain, analyze pH levels, and filter water if needed, providing farmers with real-time alerts and a reliable method to protect their crops and maintain soil health.

Description of the invention

Our project is an Arduino-based system designed to detect and manage the impact of acidic rain on agriculture. When rain is detected, a container automatically collects the water and measures its pH level. If the water is acidic, the system triggers a filtration process before use. If the pH is normal, the water is directly used for irrigation. This smart solution provides real-time alerts to farmers, helping them protect crops, maintain soil health, and ensure sustainable agricultural practices.

Advantage & Novelty

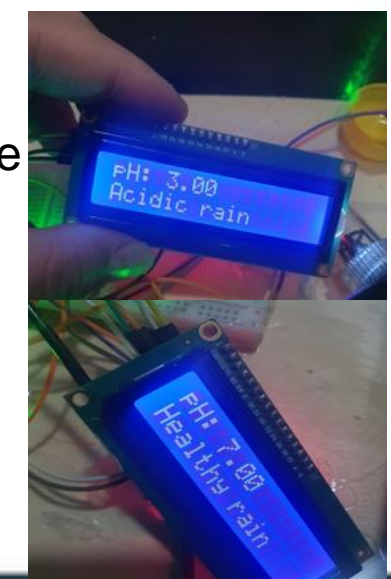
- **Real-Time Acid Rain Detection** – Automatically measures rainwater pH and alerts farmers instantly.
- **Smart Filtration System** – Filters acidic water before irrigation, ensuring crop safety.
- **Automated & Efficient** – Reduces manual testing and improves agricultural sustainability.
- **Eco-Friendly Solution** – Protects soil health and minimizes the harmful effects of acid rain on agriculture.
- **Novel Approach** – Combines rain detection, pH measurement, and water filtration in one integrated system.

Future Work

- **Advanced Filtration Techniques** – Improve filtration efficiency using eco-friendly neutralizing agents.
- **Automated Irrigation Control** – Link the system with smart irrigation to optimize water usage.
- **Expanded Sensor Integration** – Add temperature, humidity, and soil moisture sensors for comprehensive monitoring.
- **Solar-Powered System** – Enhance sustainability by using renewable energy for operation.

Experiment Procedure

- 1. System Setup** – Assemble Arduino, sensors, and filtration unit.
- 2. Rainwater Detection** – Automatically collects rainwater.
- 3. pH Measurement** – Checks acidity levels in real-time.
- 4. Filtration Process** – Neutralizes acidic water if needed.
- 5. Irrigation Control** – Uses safe water for crops.
- 6. Alert System** – Notifies farmers of acidic rain.
- 7. Testing & Validation** – Ensures accuracy and effectiveness.



Data and Results

- **pH Monitoring Accuracy** – The system successfully detects rainwater acidity with real-time pH measurement.
- **Filtration Efficiency** – Acidic water is filtered to a safe pH level before irrigation.
- **Automated Response** – The container opens and tests rainwater without manual intervention.
- **Farmer Alerts** – Instant notifications ensure timely action to protect crops.
- **Improved Crop Health** – Reduction in soil acidity leads to healthier plants and higher yields.



References

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- **World Health Organization (WHO). (2021).** *Effects of Acid Rain on Soil and Water Quality.* Retrieved from www.who.int