

Introduction

Weekly Date

26/8/24 to 31/8/24

Agriculture plays a critical role in sustaining human life and economic development. However, unsustainable fertilizer usage practices have caused significant challenges such as soil degradation, groundwater pollution, and decreased agricultural productivity. Traditional methods often fail to consider dynamic factors like real-time soil health, weather conditions, and crop-specific nutrient requirements.

With the world population expected to reach 9.7 billion by 2050 (UN DESA, 2019), optimizing food production through sustainable methods becomes essential. Technological innovations such as Artificial Intelligence (AI) and Machine Learning (ML) present new opportunities to revolutionize agriculture.

Our project, "Sustainable Fertilizer Usage Optimizer for Higher Yield," aims to design an intelligent system that predicts the most suitable type and quantity of fertilizer for crops.

We are focused primarily on building a fertilizer prediction system that could be integrated into either a mobile application or a web platform — depending on future development decisions.

Problem Statement

Fertilizer mismanagement remains a major challenge in agriculture today. Farmers often apply fertilizers without considering soil nutrients, weather conditions, or crop-specific requirements, leading to:

- Overuse of chemical fertilizers, causing environmental degradation.
- Increased costs for farmers due to unnecessary or inefficient fertilizer usage.
- Reduced soil fertility over time.
- Lack of accessible, intelligent tools that assist farmers in making informed fertilizer choices.

Therefore, there is a strong need to develop a predictive system that accurately suggests the right fertilizer and application strategy based on crop, soil, and environmental data to ensure higher yield and sustainability.

Objectives of the Work

The main objectives of this project are:

1. To develop an AI/ML-based predictive model that can recommend the optimal fertilizer type and quantity based on input parameters such as soil type, soil nutrient levels (NPK), crop type, and weather conditions.
2. To create a user-friendly interface (either mobile app or web app, to be decided) that allows farmers to input their data easily and receive actionable fertilizer recommendations.
3. To promote sustainable agricultural practices by reducing the overuse of chemical fertilizers and minimizing environmental impacts.
4. To assist farmers in increasing their crop yield while simultaneously lowering their input costs.
5. To support decision-making through data analytics, making agriculture more precise, efficient, and eco-friendly.
6. To align with Sustainable Development Goals (SDGs) such as SDG 2 (Zero Hunger) and SDG 13 (Climate Action) by advancing sustainable food production methods.