Title: **Agri Guard: Gemini-Powered Precision Farming & IPM**

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1. **Problem Statement :** Modern agriculture suffers from a "visibility gap." Farmers often fail to detect nutrient deficiencies or pest outbreaks until significant yield loss has occurred. This leads to resource inefficiency (over-application of chemicals) and relies heavily on manual scouting, which is labour-intensive and error-prone. Smallholder farmers specifically lack immediate access to expert entomologists.

2. **Solution:** Agri Guard is an "AI Agronomist" that bridges the gap between complex data and the farmer using Google Gemini's multimodal capabilities.

- **Instant Diagnostic Engine:** Uses computer vision to identify pests (e.g., Fall Armyworm) and disease stages from simple leaf photos.
- **IPM Strategist:** Unlike simple classifiers, Agri Guard generates a long-term Integrated Pest Management (IPM) plan, suggesting both organic biological controls and precise chemical dosages.
- **Conversational Interface:** A hands-free voice interface allows farmers to ask questions like "What is this white fuzz?" while working in the field.

3. Model Card (Technical Details)

Model Name: Agri Guard Vision-Reasoning Engine v1.0

Base Architecture: Google Gemini 2.5 Flash (Multimodal)

Logic Pipeline: The model utilizes a Chain-of-Thought (CoT) reasoning process. It first parses visual anomalies (lesions, insect morphology), correlates them with regional pathogen databases (e.g., West Bengal potato blight), and checks weather conditions before outputting a tiered response.

Safety: The system is strictly prompted to prioritize organic solutions. Chemical recommendations always include safety warnings (e.g., "Wear gloves," "Avoid water sources")

4. Field Pilot Plan

- **Location:** Barrackpore/Nadia District, West Bengal (Vegetable Belt).
- **Deployment:** We will distribute the APK to 50 "Lead Farmers" who will act as sentinels, uploading images of specific plants twice a week.
- **Health Mapping:** Aggregated data will generate a regional "Heat Map." If >10% of farmers report Early Blight, an SMS alert is sent to the entire cooperative.
- **Feedback:** Weekly sessions to refine the voice interface for local Bengali dialects.

5. Working prototype: