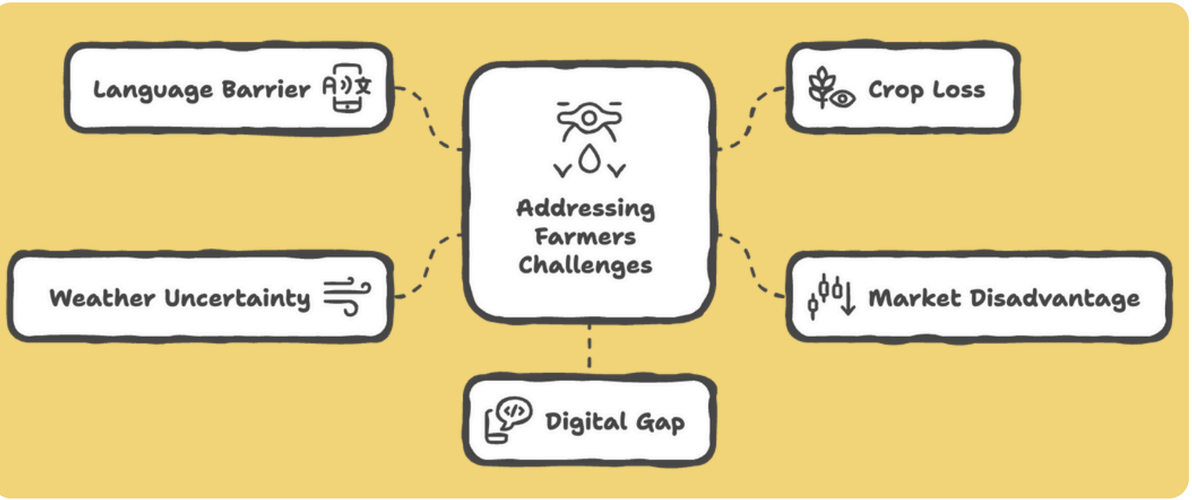
TITLE PAGE

- **Problem Statement ID** – 25074
- **Problem Statement Title -** AI Powered Personal Farming Assistant for Kerala Farmers
- **Theme -** Agriculture, FoodTech & Rural Development
- **PS Category-** Software
- **Team ID -** SIH2025127
- **Team Name -** CATALYST

CATALYST

IDEA TITLE
Ammachi AI

SMART INDIA HACKATHON 2025



Innovation & Uniqueness

Bilingual Design
Ammachi AI supports Malayalam from the start, unlike other apps.

Dual Detection
Combines Plant.id API with TensorFlow.js for reliable disease detection.

Conversational UX
Uses a chat interface for intuitive advice, replacing complex dashboards.

One-Stop Hub
Integrates disease detection, weather, and market data in one app.

Detailed Explanation of our Proposed Solution

Farmers interact through a chat interface in Malayalam or English, providing a bilingual conversational assistant. Dialogflow powers natural conversations, while react-i18next ensures smooth language switching. This lowers the language barrier and makes the system farmer-friendly.

Weather forecasts (OpenWeatherMap) warn about rain, heat, or spraying conditions. Market prices (AGMARKNET API) are shown in a farmer-friendly way: clear trends instead of raw numbers.

Farmers upload a photo of a diseased crop. The image is analyzed via the Plant.id API or a TensorFlow.js fallback model for offline use to give Crop Disease Diagnosis. Ammachi AI then explains the disease in simple terms and suggests practical treatment steps

In Personalized dashboard farmers can see crop health history, local weather forecasts, and market price trends. Data stored in MongoDB Atlas for secure access anytime.

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TECHNICAL APPROACH

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30% crop loss, price fluctuation, language barrier. Build bilingual AI to empower farmers.

Market access

Language barriers

Crop diseases

Problem Analysis

Frontend

React PWA with bilingual support (Malayalam + English). Lightweight and offline-ready interface for rural farmers.

React PWA
i18next | Offline

Backend

Node.js APIs ensure real-time request handling and authentication. Scalable REST services connecting front-end with AI + database.

Node.js APIs
REST | Auth

Database

Farmer profiles, disease knowledge base, and chat history stored securely. MongoDB Atlas ensures cloud scalability and reliability.

MongoDB Atlas
Cloud | Secure

AI Integration Layer

Dialogflow + Google Translate for bilingual intent detection. AI orchestrates disease diagnosis, weather, and price retrieval seamlessly.

Weather API

OpenWeatherMap fetches hyperlocal 7-day forecasts. Data converted into farmer-friendly, jargon-free updates.

OpenWeatherMap

Market API

Agmarknet provides mandi prices across 3,500+ markets. Values localized and simplified for quick decision-making.

AGMARKNET

Disease Detection

Plant.id

Plant.id API enables 94% accurate disease detection. Fallback TensorFlow.js model supports offline identification

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PWA Deployment

Machine Learning

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FEASIBILITY AND VIABILITY

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FEASIBILITY

API Integration

Free tiers available (Dialogflow, Plant.id, OpenWeatherMap, AgriMarket).

Cross-platform development

React Native for Android & iOS farmers.

Scalable Cloud Infrastructure

MongoDB Atlas, TensorFlow models with fallback.

Open-source frameworks

cost-effective and adaptable.

Radar chart

with axes: Technical, Operational, Financial, Market, Resource.

CHALLENGES

Stats to display	72% Rural Connectivity, 85% Translation Accuracy, 30% Cost Increase, 94% Image Detection
Image recognition	Needs training for diverse crop diseases
API costs	Usage spikes increase expenses
Offline functionality	Poor connectivity in rural Kerala
Language accuracy	Malayalam NLP is still limited

STRATEGIES

Fallback mechanisms	translation & offline models for basic features.
API optimization	caching and minimal external calls.
Community training	farmers provide feedback to improve disease detection.
Low-cost hardware support	works on budget smartphones.
Phased rollout	launch core features first, expand gradually.
Farmer feedback loop	continuous improvement and trust-building.
Scalable growth	expand to more crops and states over time.

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IMPACT AND BENEFITS

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Adoption Metrics

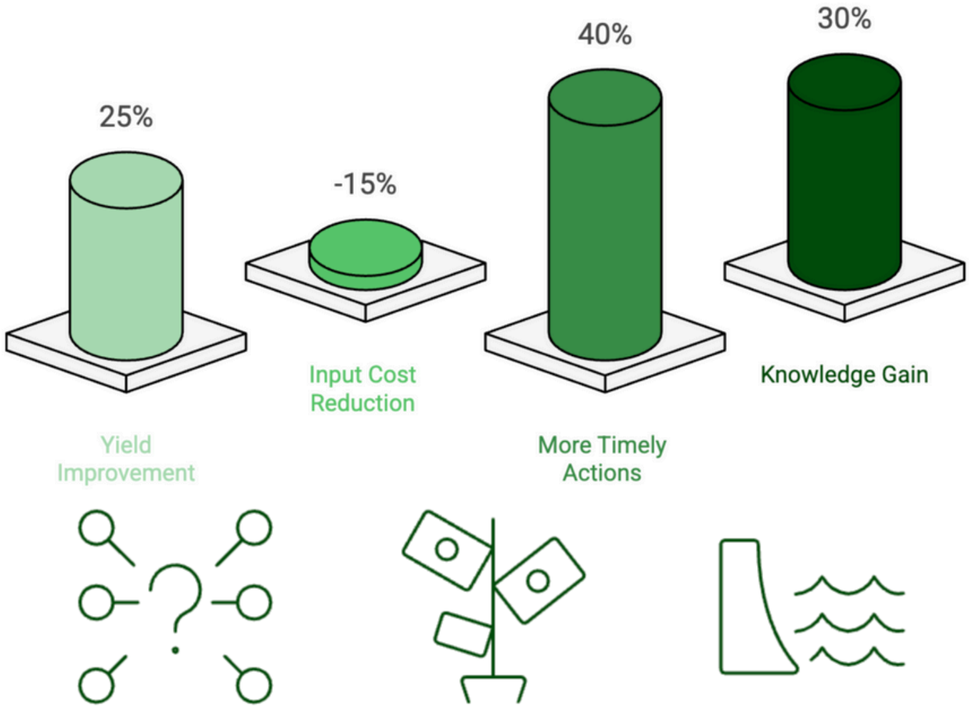
- Strong farmer onboarding shows high trust and acceptance of AI in rural communities.
- Sustained retention indicates habit formation and ongoing relevance of the platform.

System Performance

- Fast and reliable responses build confidence in digital advisory systems.
- High uptime ensures continuity of support, critical in time-sensitive farming situations.
- Positive user satisfaction demonstrates technology acceptance in low-resource settings.

Impact Metrics

- Yield improvement (+25%) highlights AI's potential to strengthen food security.
- Input cost reduction (~15%) reflects better resource efficiency.
- Timely actions (+40%) show a shift toward proactive, data-driven decisions.
- Knowledge gain (+30%) indicates capacity building as farmers become more informed and resilient.



Social Benefits

Breaks language barrier, improves digital literacy, fosters knowledge-sharing.

Economic Benefits

Better decision-making, increased farm income, reduced input costs.

Environmental Benefits

Reduced crop loss, sustainable water usage, decreased chemical usage.

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RESEARCH AND REFERENCES

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Use Cases

- Crop Disease Management
- Upload plant leaf images for instant disease detection
- Get treatment advice in local language

- Weather-Aware Farming
- Hyperlocal forecasts for rainfall, temperature, humidity
- Optimize sowing, irrigation, and harvesting

- Market Price Guidance
- Real-time mandi price updates
- Sell at the right time and location to maximize income

- Fertilizer & Pesticide Recommendations
- AI suggests correct dosage based on crop stage
- Reduces chemical overuse and saves costs

- Farmer Community Support
- Local language chatbot for Q&A
- Knowledge sharing between farmers to improve practices

References

Bilingual Digital Tools in Agriculture
"Local language apps increase adoption by ~70%"
(Intl. Journal of Agricultural Extension, 2022)
https://scispace.com/journals/international-journal-of-agricultural-extension-p8yadqyo/2022

AI-Powered Crop Disease Detection
"ML models achieve 92–95% accuracy"
(Elsevier – Computers & Electronics in Agriculture, 2023)
https://www.sciencedirect.com/journal/computers-and-electronics-in-agriculture/vol/211/suppl/C

Farmer Engagement
"Multilingual AI chatbots boost digital adoption by 67%"
(Indian Journal of Agricultural Sciences, 2023)
https://www.researchgate.net/

Automation and social impacts: winners and losers
(FAO Agricultural Economics Report, 2022)
https://www.fao.org/agrifood-economics/publications/detail/en/c/1613441/

Weather Forecasting in Precision Farming
"Hyperlocal forecasts reduce crop loss by 20–25%"
(Journal of Climate and Agriculture, 2021)
https://www.sciencedirect.com/science/article/abs/