India’s Agriculture Sector

“Productivity challenges”

Farm holdings
Nearly 90% of the population is engaged in agricultural production. As farms are divided among family members, average farm size today is half what it was 40 years ago.

Irrigation
Water use efficiency is very low. Unsustainable practices such as flooding or canals and pumping ground water resources are depleting the country’s aquifers.

Indian monsoon
The country is faced with the prospect of declining rainfall during the monsoon. India’s prime growing season for rain-fed agriculture.

Subsidy
Government subsidy for farmers for fertiliser, electricity and irrigation increased more than eightfold between 1990-91 and 2006-07. Areas receiving the highest subsidies regularly underperform those with lower subsidy.

Cold Storage and Food Processing
30% of harvest and post-harvest economic losses come from the fruit and vegetable sector, although that sector comprised only 13.6% of total production.

Crop pattern, Fertiliser and Soil nutrients
The Government of India’s top research institute reports that nearly 60% of agricultural land is at risk because of fertiliser misuse, poor cropping patterns and soil nutrient deficiencies.
Abiotic stress
- heat
- cold
- drought
- salt
- flooding

Biotic stress
- pathogen attack
- insect attack
- herbivore attack

Primary metabolites
- plant development

Phytohormones
- plant defence
SOLUTION
The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.
What you can do with IoT in agriculture

- Smart Irrigation
- Livestock monitoring
- Weather monitoring and forecasting
- Sensor based precision agriculture
- Remote crop monitoring
- Remote monitoring quality of soil
- Smart warehousing, logistics, and distribution
- Remote asset monitoring
- Greenhouse monitoring and automation system
Smart Irrigation

✓ It’s estimated that as much as 50 percent of irrigation water is wasted due to evaporation or runoff. This happens because most irrigation systems still rely upon simple timers.

✓ “Smart” irrigation systems can now monitor soil conditions in real time with low power, wireless sensor networks.

✓ The wireless sensor networks report the data to a central network gateway, and the network gateway sends the data to your computer.

✓ If you are using Internet cloud applications your gateway can send the data there as well.

✓ Your software, whether it’s on your local computer or part of a cloud service in the Internet, can then combine your data with third party inputs like weather reports from national weather services.

✓ That lets your system make intelligent decisions about where and when to release water, and in what quantities. If no rain was predicted the system could decide to release water immediately.

✓ But if rain was in the forecast the system could wait, measure the results, and recalculate.
REMOTE SENSING
Drones
Data whose scale, diversity, and complexity require new architecture, techniques, algorithms, and analytics to manage it and extract value and hidden knowledge from it.
Autonomous Early Warning System

EFFECT OF USAGE

- The use of autonomous early warning system for detecting pest resurgence is an essential task to reduce the probabilities of massive Oriental fruit fly outbrakes.
- By preventing pest outbreaks, farmers would be able to reduce their dependence on chemical pesticides. Chemical pesticide abuse often brings harmful consequences to human health and natural environments.
- The proposed early warning system can be easily adopted in different fruit farms without extra efforts from farmers and government officials since it is built based on machine learning techniques, and the warning messages are delivered to their mobile phones as text messages.
Mobile Phones
Mankind's biggest challenge is food production.

up to 25% of the annual yield is lost due to plant diseases and pest in India

*FAO Stats
Distinguishing of Plant disease can be a big problem for farmers

Rice Blast and Brown Spot (Bengal Famine) can cause up to 50% crop losses
Plantix provides a solution for small farmers. Automatic plant diseases recognition with smartphones.

Plantix's users send us images of plant damages. These images feed our unique database. Based on the images we train neural networks to identify plant damages. Our system provides instant diagnostic tools and treatment plans.
Challenges - dataset preparation

Plantix App → Field Staff → Web App
Sorting - Identification - Validation → Diverse Dataset

Quality
Environment
Stages
plantix
grow smart.

MEERKAT

GATHERI
X

ALBATROS
Plantix – easy to use with instant benefit

Take a picture → Get a result → Get advice → Community
Select Crops
To receive personalized content related to your crops.

Weather
Kakuguda
24.9°
8.7 m/s
92%

Create Crop Guide
Get daily information on how to improve your yield

Focus Crop
Select your crop
Tomato
Rice
Cotton
Farming practice
Sowing date
Notification frequency
Bacterial Blight of Cotton

*Xanthomonas citri* subsp. *malvacearum*

**Hosts:** Cotton

**Symptoms:**

- Angular to circular leaf spots with red to brown border, often restricted by veins.
- Black cankers on stem and branches.
- Rotting of infected stems with round water-sealed or sunken and dark lesions.

**Preventive Measures:**

- Plant high-quality, disease-free seeds or seeds treated with an appropriate agent.
- Use blight-resistant varieties if available.
- Spray fields and identify infected plants and remove them.
- Keep the canopy open as much as possible to reduce humidity and promote drying of the foliage, which is beneficial in limiting the progress of this disease.
- Do not cultivate or move equipment through fields when foliage is wet.
- Infested fields should be harvested as soon as possible.
- Stalks should be shredded at the first opportunity.

**Bacterial Blight of Cotton**

Be controlled with a blight resistant variety the following year or rotated to a different crop.

**Biological Control**

Application of talc-based powder formulations containing the bacteria *Pseudomonas fluorescens* and *Bacillus subtilis* are efficient against *X. malvacearum*. Extracts of *Acalypha indica* have also been used to control the disease. Other plants that prevent rust growing also avoid infection with bacterial blight.

**Chemical Control**

Always consider an integrated approach with preventive measures and chemical treatments if necessary. Seed treatment with authorized pesticides or foliar spray with copper or a combination of copper and formaldehyde can be used and changed as needed to control the disease.
MEERKAT

Meerkat - data set management
Classification · Image input control · Data set preparation

Unstaged
Interesting
Identified
Validated
Training
Select your Plantix language

- English
- Deutsch
- Español
- Français
- Português
- Русский
- العربية
- تونسي
- नेपाली
- मराठी
- हिंदी
- తెలుగు
Plantix’s fast-growing database is the biggest of its kind

- User sourced and validated
- Highly diverse data stream
- Automatic detection of more than 200 diseases
- Detection accuracy of over 90% for the main 110 diseases
- 15-20k images per day
94% on Fellow farmers
10% on Agriculture retailers
4% on TV/Radio
3% on Agriculture-Extension officers
If no Farmers
No Food
No Future