



TECHNOLOGY FEATURE Agriculture & AI / Technology Report / Research Communication

# Digital Farming: AI Technologies Shaping Pakistan's Agricultural Future

*Pakistan grows enough food to feed 230 million people but loses almost a third of it before it reaches anyone's plate and a bunch of underfunded startups with AI tools are trying to fix that.*

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## Introduction

Some where in Okara a wheat farmer got message on his mobile that his fields need water. Down in Rahim yar Khan, drones spray the cotton fields, a job nobody wants to do in by hands in heat. In Sawabi someone takes picture of damaged maize leaf and gets pest ID without going anywhere.

## Why Should We Care?

Why does this matters? Because Agriculture is the backbone of Pakistan's economy and it's not just a minor sector. About 22–23% of GDP comes from agriculture sector. Pakistan's 37–40% of the entire labour force works in farming. And this sector is in serious trouble. According to World Bank figures 2022 super-floods alone destroyed crops of \$3.7 billion worth. Underground water is declining every year. According to FAO Pakistan's post harvest losses are somewhere between 30-40%.

***"According to both IMF and UNDP numbers, Pakistan may run dry, absolute water scarcity by 2025. Not decades from now. Practically tomorrow."***

### A Quick Look at Pakistan's Agricultural Crisis

| Indicator                        | Figure         | Source                        |
|----------------------------------|----------------|-------------------------------|
| Agriculture's share of GDP       | 22–23%         | Pakistan Bureau of Statistics |
| Agriculture labour force         | 37–40%         | Pakistan Bureau of Statistics |
| Crop losses from 2022 floods     | ~\$3.7 billion | World Bank                    |
| Crop losses after harvest        | 30–40%         | FAO Pakistan                  |
| Expected water scarcity timeline | 2025           | IMF / UNDP                    |
| Internet penetration (overall)   | ~36%           | PTA                           |

AI wont's solve this all but it's becoming a tool that can operate at big scale within Pakistan's fragmented, messy agriculture.

## Technology Overview

So what AI technologies are being employed in Pakistan's farms not in theory but deployed on real soil?

### Satellite and Drone-Based Crop Monitoring

Satellite and drone-based crop monitoring is the most visible application. SUPARCO is working with provincial agriculture departments in Punjab and Sindh to provide satellite imagery for tracking health of crops during Rabi

and Kharif seasons. In private sector, startups like Ricult and TerraMonitor are using a different approach, they process satellite data and convert it into simple, advisories delivered via SMS to farmers. No smart phones and English literacy is required.

### AI Pest and Disease Detection

AI-powered pest detection was first time actively used during Pakistan's Fall Armyworm crisis in 2019–2020. In KP and Punjab the pest damaged maize crop at large scale. CIMMYT aided mobile apps using image recognition allowed farmers to take photos of damaged leaves and get identifications instantly, apparently with 85-90% accuracy.



Figure 1: Drone spraying pesticides on a wheat field in Rahim Yar Khan, Punjab Pakistan. Credit: Author.

### Precision Irrigation and IoT Soil Sensors

Water scarcity is really critical issue. Both the IMF and UNDP have warned that Pakistan could cross into absolute water scarcity by 2025, their words, not mine. So it makes sense that IoT soil sensors hooked up with AI irrigation scheduling are now tested in places like Tando Allahyar in Sindh and a few districts in Balochistan. In Sindh 25–30% water savings per acre have been reported.

### Supply Chain and Market Linkage Platforms

On the supply chain end, BaKhabar Kissan keeps sending market price alerts and weather SMS to millions of farmers it is basic but effective. Tazah Technologies uses AI in cold chain logistics to match decomposition produce with buyer demand before spoilage of products.

## Results and Real Numbers

### Who Actually Benefits?

The Landlords with more than 200 acres of land. But Pakistan's average farm size is often less than 5 acres, which is in the form of small plots. But a sharecropper in Tharparkar having 3 acres of land and no access to technology isn't using these tools anymore.

### Where Does Policy Stand?

The agriculture technology is a priority area in the Digital Pakistan initiative. Recently Government introduced internship program for agriculture graduates. A draft National AI policy exists, but the policies without execution



don't accomplish much. It is also difficult to build something that works on old mobiles, and also works for people who understand only local and different languages like Sindhi and Pashto.

## What Comes Next

### Stubborn Roadblocks

Every one already knows these problem and they are not easy to fix yet.

| Challenge             | Description                                                                                                           |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------|
| Internet access issue | Roughly 36% of Pakistanis are online, but step into rural areas and that figure falls off more (PTA data)             |
| Language barrier      | Try finding an AI farming application in Sindhi or Pashto, you won't have much luck. Saraiki and Balochi? Even worse. |
| Digital literacy      | Old farmers don't trust new technology                                                                                |
| Land fragmentation    | Farms fragmentation makes it difficult to apply                                                                       |
| Trust deficit         | Farmers need multi season proof before adopting change                                                                |

### Reasons For Cautious Optimism

USAID, JICA and FAO are now funding in digital agricultural initiatives at scale. European and Gulf buyers are demanding tractability of there exports. When tools are employed in local farming practices like Multan and Larkana, adoption follows and numbers improve.

### Final Word

Pakistan's traditional agriculture is reaching its limits, tube well have gone deeper and weather are breaking patterns. Apps and drones will not fix this all, but the proper, designed and measured use of technology can show measurable improving results. And as an Agricultural country we cannot neglect it.

### About the Author

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