



Session 2:

Geospatial Intelligence For Regenerative Agriculture &
Smart Farm-to-market Systems

Reduce Post-Harvest Losses using RS

Dr. Harsh Shah

Founder and CEO, AgroCast Analytics Pvt Ltd

CTO, Jalkruti Water Solutions Pvt Ltd



Post-harvest loss in India is a critical issue, with an estimated **74 million tonnes of food lost annually, valued at over **₹92,000 crore**.**

~10% of foodgrains and up to 35% of fruits and vegetables are wasted due to inadequate cold storage, poor logistics, and inefficient supply chains.

FROM SEED TO SALE: Frontier Tech Across the Farmer Lifecycle

Pre-season planning and finance

- Predictive analytics for crop term planning
- Digital data backed credit and crop insurance
- Climate resilient high yield inputs (e.g. Minichromosome technology)

Smart sowing, input mgmt. and irrigation

- Mechanized precision transplanters
- Drones for direct seeding
- IoT-based precision fertigation systems
- Hydroponics and vertical farming
- Digital water management systems

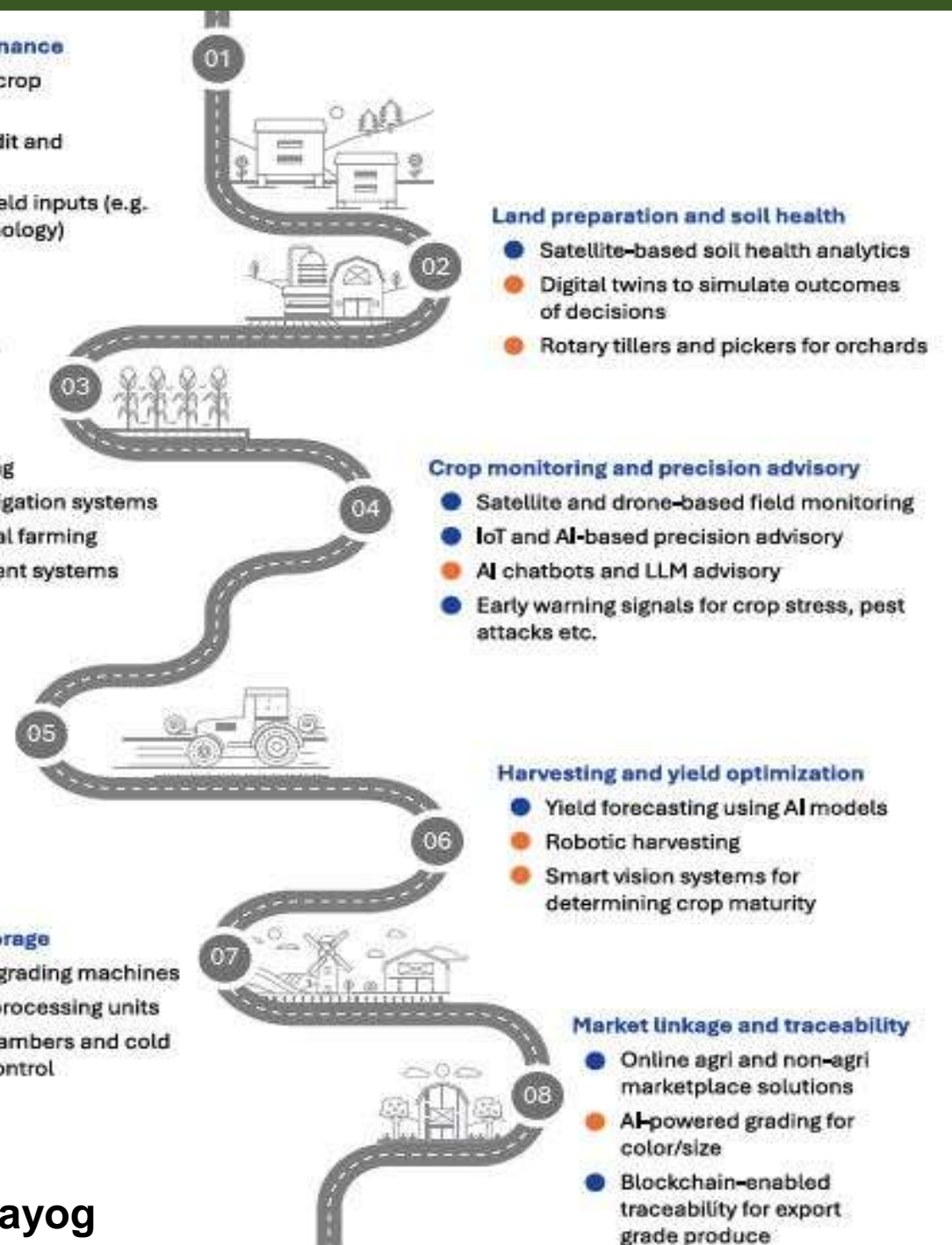
Pest and crop health management

- Smart sensors for pest detection
- Biological controls

Post harvest mgmt. and storage

- Automated sorting and grading machines
- On-farm and farmgate processing units
- IoT-enabled ripening chambers and cold storage with ethylene control

Source: NITI Aayog



FACTORS AFFECTING TO POST-HARVEST LOSSES



01

Lack of information of surrounding crop, harvest date and yield

02

Less understanding on weather forecast

03

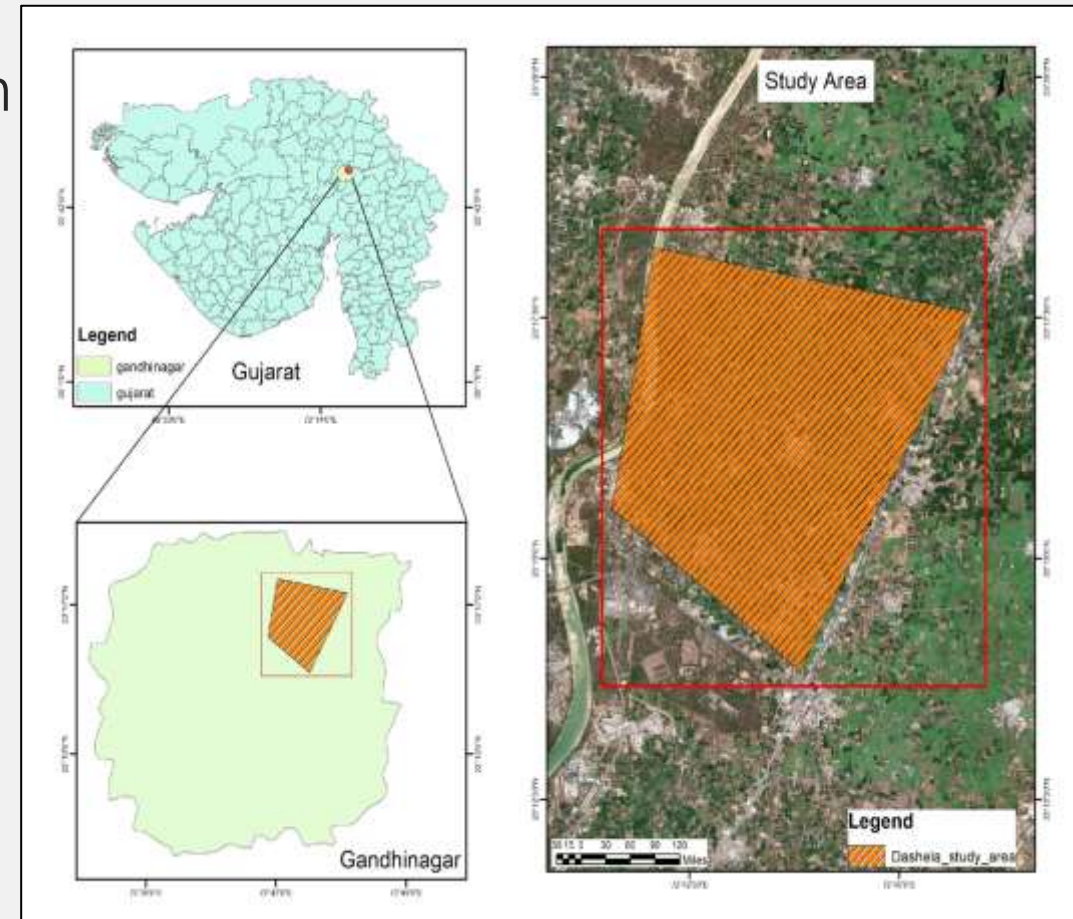
Unawareness of demand, rate and other market places

STUDY AREA

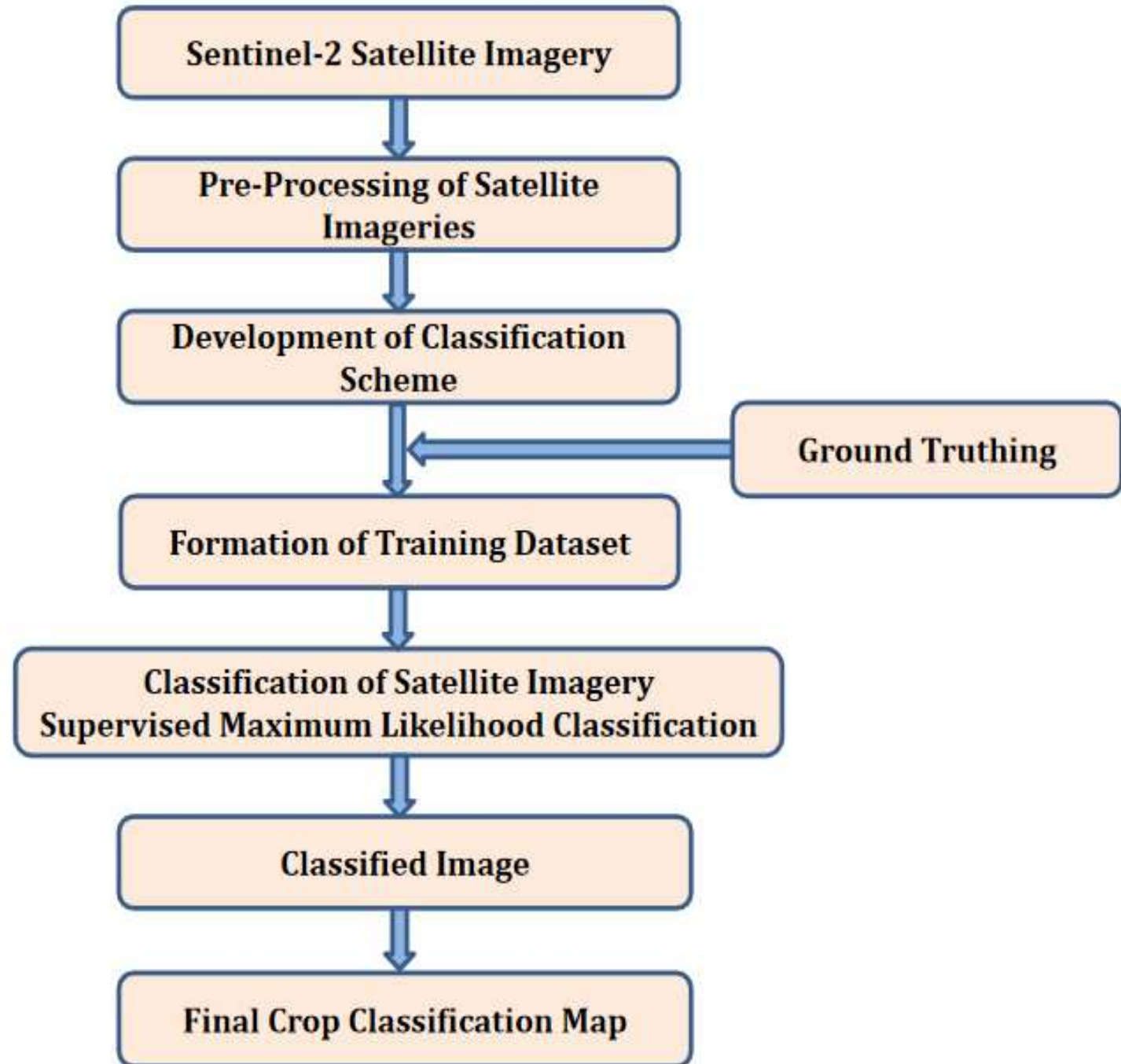
- The present study focuses on the Dashela region of Gandhinagar Taluka.
- ~ 3,500 hectares.

DATASET

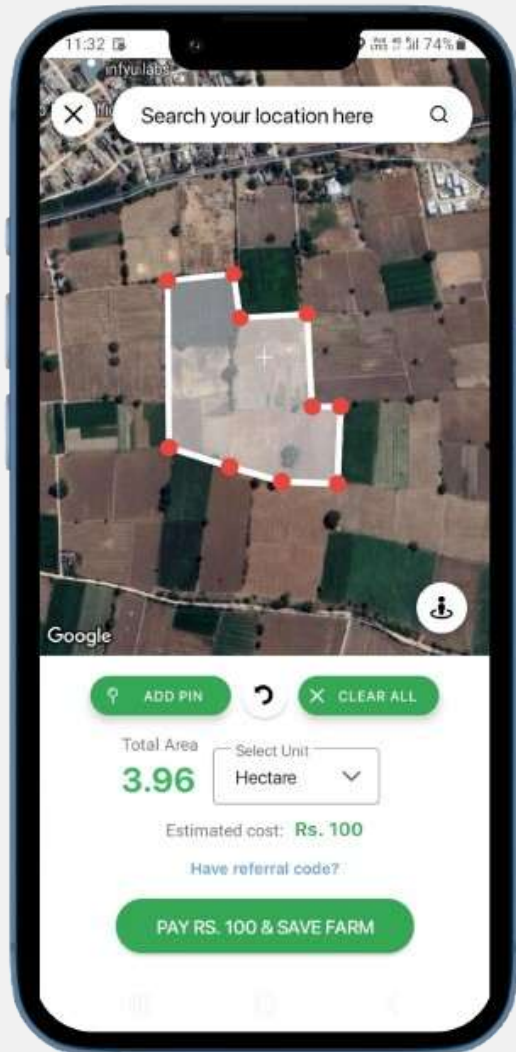
- ✓ **Satellite:** Sentinel-2.
- ✓ **Duration:** November 1, 2024 – March 5, 2025.
- ✓ **Vegetation Indices:** NDVI, NDMI, and EVI.



METHODOLOGY



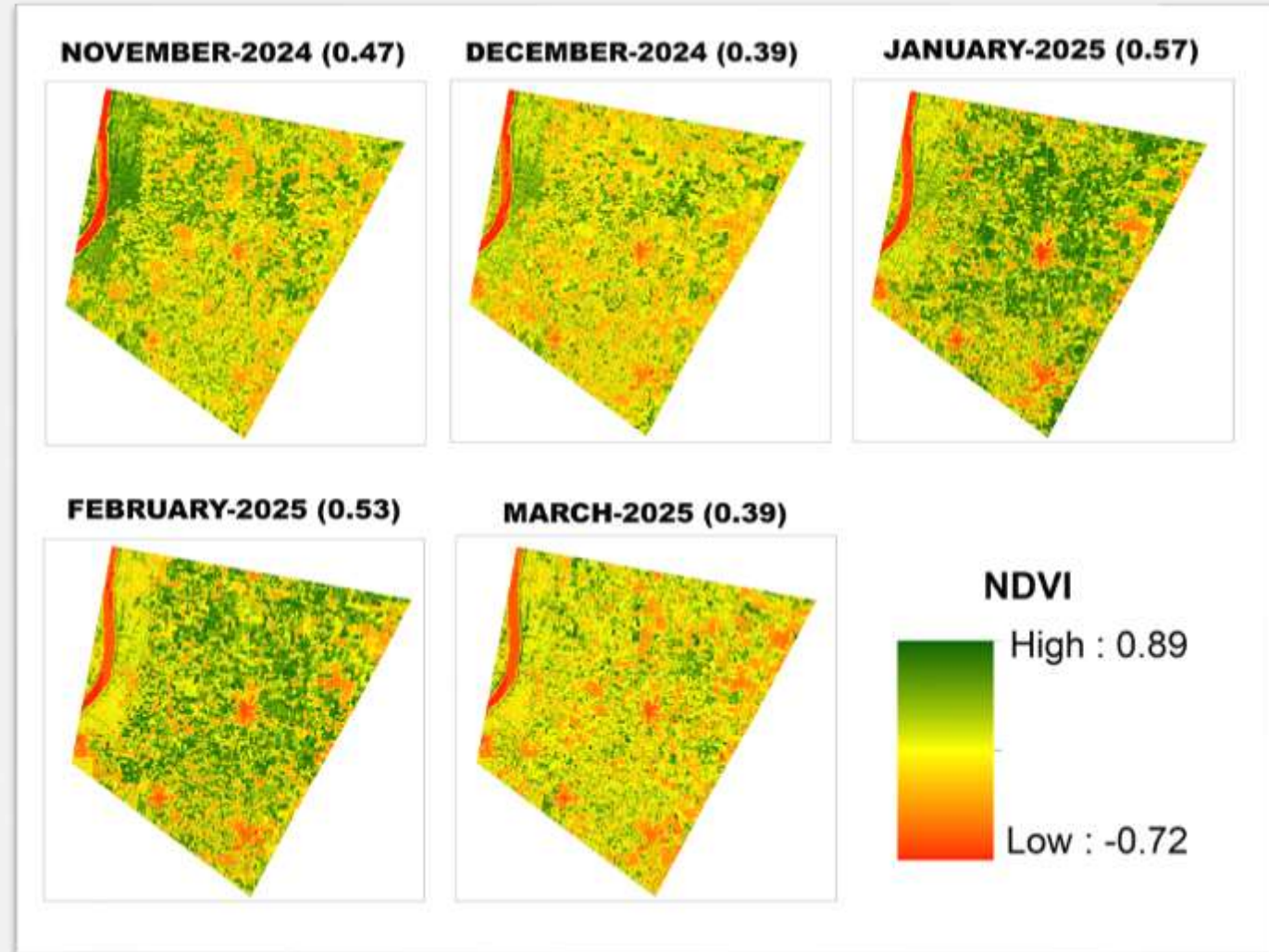
GROUND-DATA COLLECTION



300 GPS-tagged ground truth points collected from different crop fields using AgroCast App.

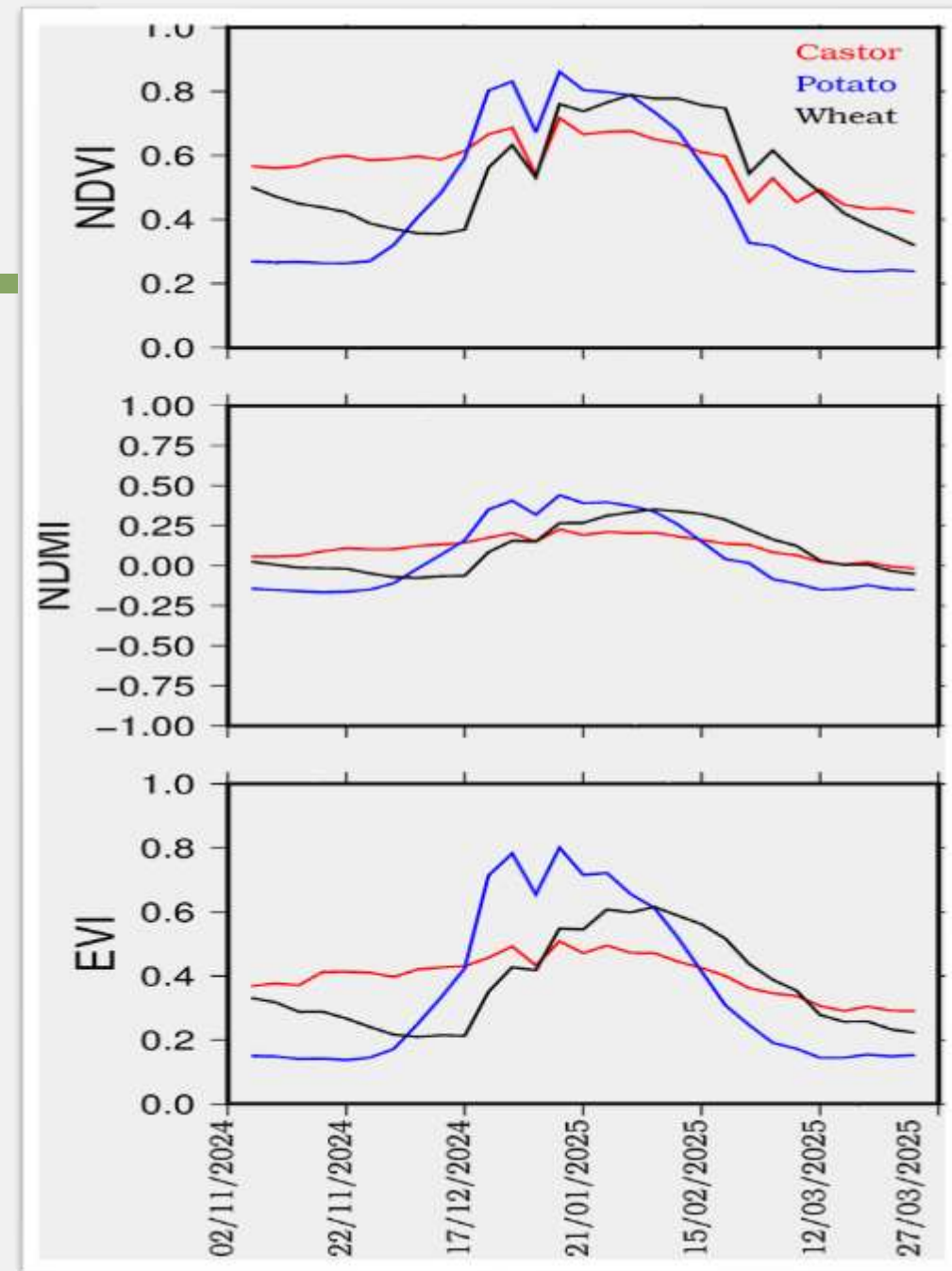
NDVI ANALYSIS

- NDVI values showed lower readings in November and December due to early crop stages and winter dormancy.
- A sharp rise was observed from January onwards, indicating active crop growth.
- This trend supports decision-making for irrigation and nutrient management.



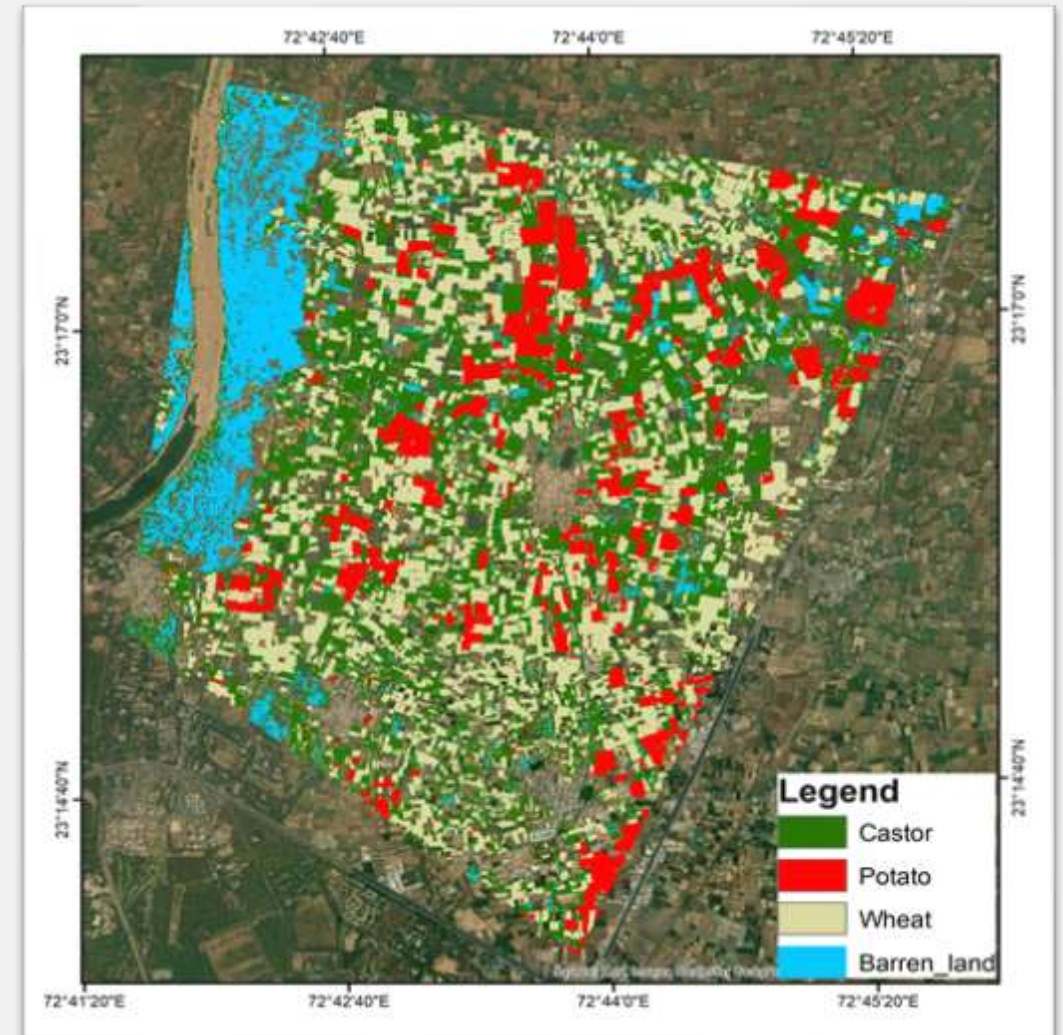
CROP-SPECIFIC INDEX TRENDS

- **POTATO:** High peaks in NDVI and EVI in early January; rapid decline indicates short growth cycle.
 - **WHEAT:** Sustained higher NDVI and NDMI levels, reflecting longer and balanced growth.
 - **CASTOR:** Consistent but lower index values, indicating steady and prolonged crop cycle.
- ☐ These trends assist in crop phenology modeling and early yield estimation.



CLASSIFICATION RESULT

Crop Name	Area (ha)
CASTOR	968.61
WHEAT	915.07
POTATO	344.46



YIELD ESTIMATION: SEMI-PHYSICAL APPROACH

1

fAPAR Calculation

NDVI and Simple Ratio (SR) values were derived from the preprocessed imagery to compute the fraction of absorbed photosynthetically active radiation (fAPAR).

2

PAR Calculation

The intercepted photosynthetically active radiation (PAR) was calculated using solar radiation data.

3

NPP Calculation

Net primary productivity (NPP) was computed using the formula:
$$\text{NPP} = \text{fAPAR} \times \text{PAR} \times \text{RUE}.$$

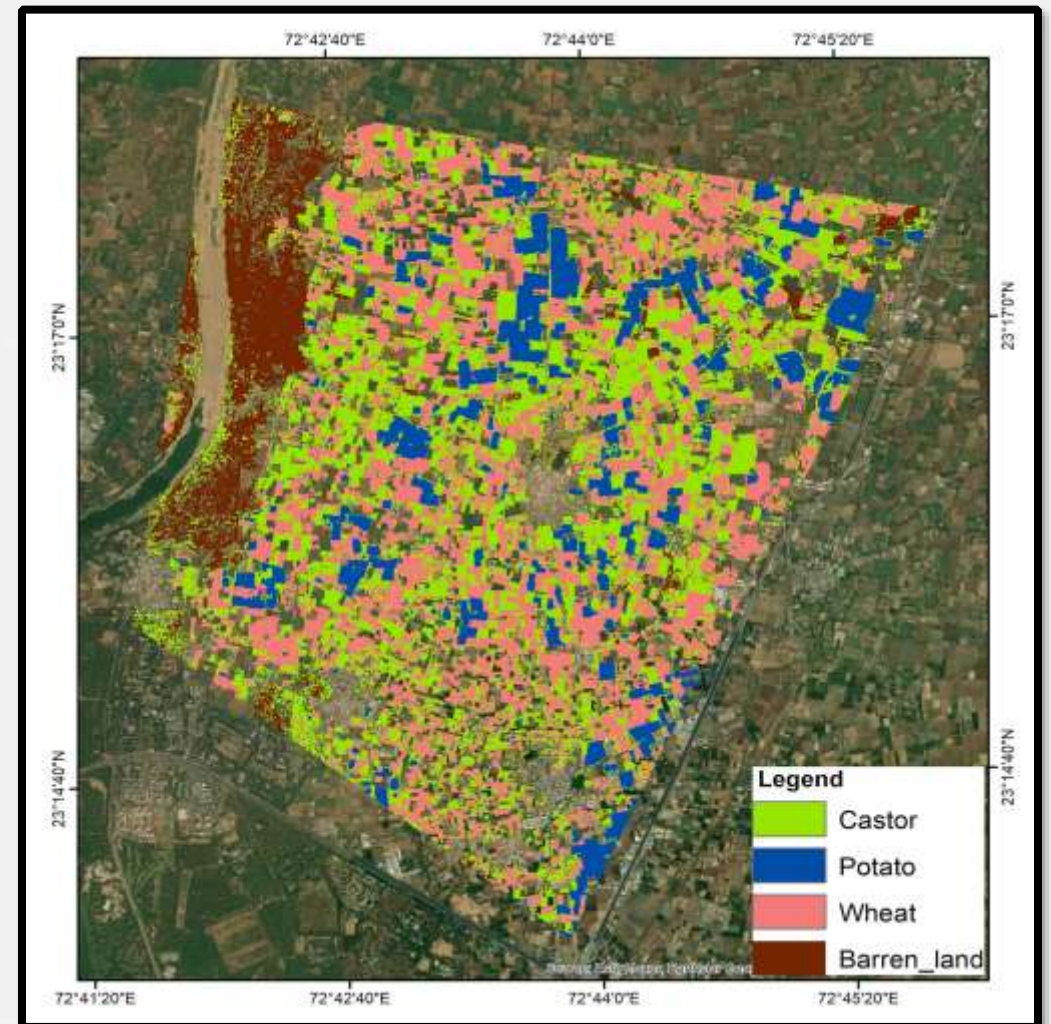
4

Yield Estimation

Yield was estimated using the harvest index (HI), following the formula:
$$\text{Yield} = \text{NPP} \times \text{HI}.$$

YIELD PREDICTION

	Area (ha)	Production (Ton)	Yield (Ton/ha)	
			Predicted	Average of 2018 to 2023
CASTOR	968.61	2305.29	2.38	2.39
WHEAT	915.07	2973.97	3.25	3.57
POTATO	344.46	9396.87	27.28	30.35



CONCLUSION

Post harvest losses can be minimized by adopting remote sensing and GIS based techniques by getting insights of crops, harvest date, yields, market rate, and market demand.

FUTURE ENHANCEMENT

- Use high-resolution satellite and drone data for more accurate farm-level insights.
- Incorporate weather forecast data for adaptive planning.
- Market linkage or contract farming to minimize post harvest losses.



THANK YOU FOR YOUR ATTENTION

Contact us



+91-9825236598



harsh.shah@agrocastanalytics.com



www.agrocastanalytics.com



Research Park, IIT Gandhinagar, Gujarat, 382355, India