

72nd BPSC Mains

GS-2

TECHNOLOGY MODULE (SAMPLE)



SANRAKSHAN 3.0

Mains Mentorship for 72nd BPSC Mains

Guided By- Suraj Jha



Science & Technology : BIHAR

- PYQ →
- ① Role of Tech. in Agri Devt of Bihar (67th)
 - ② " " Industrial Devt " " (69th)
 - ③ " " Flood Control & DM " (67th)
 - ④ " " Flood & Drought " (66th) & 65th
 - ⑤ " " in water conservation " (68th)
 - ⑥ STEM education & its Role in providing quality edⁿ in Bihar for future workforce. (70th)

Role : Agri Development

The Bihar govt is currently implementing the 4th Agri. Roadmap (2023-28), with a budget of over ₹1.62 lakh crore.

① Digital & precision Agri :

- ⇒ Agri-Stack & Digital IDs - Bihar, integrating land records with farmer profile.
 - ⇒ helpful for PM-KISAN scheme benefit
- ⇒ Remote Sensing & GIS : -digital crop survey to assess damage from flood (N-Bihar) or Drought (S-Bihar)
 - ⇒ faster insurance payouts..
- ⇒ Drones : used for 'Nano-urea' spraying & soil health mapping

② Climate-Resilient Technologies :

- ⇒ Smart Irrigation - promotion of Drip & Sprinkler Irrigation under 'Kas Khet Ko Pani' initiative.

60% area under
cultivation (NA)
while NA : 42%
Forest Area 48%.



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⇒ Climate-Smart Seeds -

eg Swarna Sub-1: Flood Tolerant
Short duration varieties by Rajendra Prasad Central
Agricultural University & Bihar Agri. University
(Sabour)

⇒ N-Balance Tech - in EC

using algorithm to calculate the exact
Nitrogen needs of soil < reducing waste
GNG emission

② Post-Harvest & Value Addition:

⇒ Makhana & Litchi processing - GI tag product
ST < modern grading
vacuum packing
Radiation processing → mer. shelf life.
to reach global market

⇒ Solar powered cold storage:

to prevent the rot of perishables (veg ✓
fruits ✓)

④ Farm Mechanization:

⇒ Custom Hiring Centres (CHCs) - Small farmer rent
expensive tech of laser land levellers
zero-tillage machines
Happy seeders through mobile Apps
Also use of tractors,
power tillers, seed drills, harvesters
reduces labour dependence.

⑤ Digital Technology & Smart Farming:

⇒ Mobile Apps & Kisan portals - real time info on
weather price Best
prac
⇒ e-NAM platform - market Access
& price Discovery

⑥ Flood & Disaster Mgt Support:

Use of satellite data & early warning Sys.

- Challenges :
- Digital literacy - low awareness among marginal farmers
eg Apps: 'Bihar'
 - Land fragmentation eg difficult to use large-scale machinery.
eg 40% farmers marginal (land < 1 hec)
 - Inadequate lab-to-land Connectivity
eg despite PUSA & Sabour University
 - High Initial Cost & Maintenance ← drones
solar pumps
sensors
 - Geographic & Infra Constraints -
eg Bihar's unique "Dual disaster" zone

Govt. steps taken :

- ① BHARAT 2.0 : by Bihar govt ~ to bridge digital literacy gap
 - ② Mukhya Mantri Nait Krishi -
Sanyamta Yojana : to counter land fragmentation.
↳ provides 50%-80% subsidy to PACs to set up CMCs.
 - ③ Digital Agri-stack (Agri-ID)
↳ Bihar govt issuing digital IDs to millions of farmers.
↳ streamline "lab-to-land" connectivity.
- Also, subsidy for seeds & tech inputs: via DBT w/o leakage
- ④ A dedicated organic corridor & Jalvik Corridor Yojna
along banks of Ganga (13 dists) - using S&T
Soil health monitoring promotes high value organic prod.
 - ⑤ JEEVIKA-led Agri Entrepreneurship:
to tackle lack of maintenance & local tech. support ✓



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⇒ Upgrade the Kisan Call Centres with AI driven voice Assistant in local dialects - to provide instant solⁿ to tech problems.

The key to success lies in making technology affordable, accessible & community-driven.

⑨ Fertiliser uses - shift towards Nano urea & organic corridors
(13 dist along Ganga) ✓

Bihar Agri is transitioning from "subsistence" to "commercial" through AI tools & food processing. However, dependency of farmers on shrinking A&DP share, pervading the core structural challenge that S&T must solve.



Date:	UPSC		Topic
Question No.	: Science & Tech : Agri & Food Security :		Remarks
⑥ <u>IoT & Sensors</u> : Real time Soil moisture and nutrient monitoring, ✓ (Prevent fungus)	① <u>CRISPR Gene editing</u> :	<u>Productivity ↑</u> Climate resilient Seeds - eg Salt tolerant Rice, HY Mustard (DMN)	<u>Preservation ↑</u> Slow down prod ⁿ of ethylene - (ripening)
	② <u>Autonomous Robotics</u> :	AI guided harvester - gentle picking of delicate fruits (precision spraying: pesticides, fertilizers)	Automatic Sorting, grading - detect internal bruises.
	③ <u>Indoor/Vertical farming</u> :	Year round prod ⁿ - via Hydroponics/ Aeroponics - 95% less water	climate transit time, grown urban areas eg Delhi, Bangalore
	④ <u>Blockchain</u> -	ensure transparent credit & insurance for farmers	Supply chain mgt, QR code for freshness eg APEPA's GrapeNet ✓
	⑤ <u>Nanotech</u> :	Nanofertilizers - mer. absorption eg Nanovitea	Nano-coating on fruits (wax) extend shelf-life by 2-3X.
<u>Nano Drone Ridi Scheme</u> - train ISKCON members <u>Agri Infra Fund</u> 3% interest subvention for building: cold storage & processing units <u>PM-KISAN</u> - uses DBT & Aadhar Based IoT to transfer 6000/yr to +11 cr farmers govt steps <u>Digital Crop Survey</u> (25-26) <u>(Digital Agri Mission)</u> <u>AgriStack</u> - unique ID to provide seamless subsidy delivery <u>PLI Scheme for Food processing</u>: 10,900 cr outlay for promotion of global Indian food brands <u>PM-Kisan SAMPAD Yojana</u> for cold chain / mega food parks <u>PM-SHRISCHOOL</u> - STEM focus to teach agri-tech & STEM for Next gen. of farmers <u>BNASINI</u> (Vernacular AI) GAI chatbot to help farmers			

Date: Question No.	UPSC	Topic Remarks
	Challenges - Power inconsistency → dependent on costly diesel - High initial cost: ROI for precision tool takes 3-5 yrs - Data privacy concern over tech giant - Small Landholdings → ~86% farmers own < 2 rec. - Digital divide: despite 59, ~43% rural household have high speed IoT - Gender skill Gap: women own less than 20% of smartphone in rural pockets - Climate volatility - e.g. black swan event like sudden heatwave (2024-25) - Poor harvest loss - 30% produce lost due to gap in cold chain (NABARD) Way forward - Solar Micro Cold Room - Common Service Centre 2.0 - AgriTech Hub - Universal Crop Insurance - AI based automated claim settlement within 48 hours of disaster - FPO digital integration → mandatory use of Blockchain for transparency - Smart water budgeting - IoT based to prevent groundwater depletion - PPP - Incentivize Agri-Tech to co-develop tech with university. - Custom Hiring Centre - promote 'uber for drone/tractors' model to make tech accessible via rental. NITI Aayog's Roadmap for Frontier Tech (2025) - roadmap for adoption of AI, Blockchain, Agri-tech. [Lab-to-land to data-to-decision]	