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# **CAPSTONE PROJECT**

## **SMART FARMING AGENT**

**Presented By:**

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**Department : Electronics Engineering**

# OUTLINE

- Problem Statement
- Technology used
- Wow factor
- End users
- Result
- Conclusion
- Git-hub Link
- Future scope
- IBM Certifications

# PROBLEM STATEMENT

## AI Agent for Smart Farming Advice

Small-scale farmers often struggle with timely access to **accurate agricultural advice** related to crop planning, pest management, weather forecasts, and market prices. They rely on scattered sources or local agents, leading to **delays, low productivity, and financial losses**.

- **Proposed Solution:**

An **AI-powered Smart Farming Agent** using **Retrieval-Augmented Generation (RAG)** and **IBM Granite models** that delivers **real-time, localized, and language-friendly farming advice** on weather, soil, crops, pest management, and mandi prices through a simple conversational interface.

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# TECHNOLOGY USED

IBM cloud lite services

Natural Language Processing (NLP)

Retrieval Augmented Generation (RAG)

IBM Granite model

# IBM CLOUD SERVICES USED

- IBM Cloud Watsonx AI Studio
- IBM Cloud Watsonx AI runtime
- IBM Cloud Agent Lab
- IBM Granite foundation model

# WOW FACTORS

This agent will **significantly improve decision-making for farmers**, reduce dependency on fragmented information sources, and **enhance crop productivity and profitability** by delivering **personalized, real-time agricultural advice** in simple language.

## Unique Features:

- **Localized advice:** Provides region-specific crop, soil, and pest management recommendations.
- **Multilingual interaction:** Supports **English, Hindi, and Marathi**, making it accessible to grassroots farmers.
- **Weather-aware recommendations:** Suggests farming activities and crop choices based on **real-time weather forecasts**.
- **Integrated mandi price lookup:** Fetches **current market prices** to help farmers make better selling decisions.

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## END USERS

- Small and medium-scale farmers
- Agricultural extension officers
- Agri-tech startups
- State agriculture departments & cooperatives

# RESULTS

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watsonx Agent ✓ Deployed Online

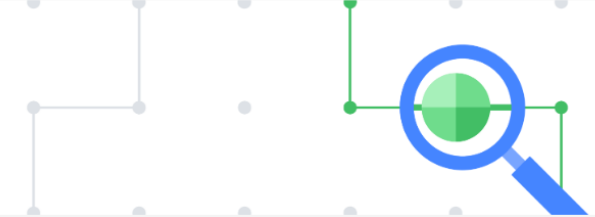
[API reference](#) [Test](#) [Preview](#)


New chat +

 watsonx Agent 11:15 PM

Welcome to watsonx Agent


Change this description to reflect your particular agent




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# RESULTS

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 You 11:06 PM

Which crops are suitable to grow in Maharashtra during Kharif season?


 watsonx Agent 11:06 PM



The crops suitable to grow in Maharashtra during Kharif season are:


1. Onion - Varieties such as Bhima Super are suitable for kharif season and can be cultivated during late kharif cultivation in the states of Maharashtra, Karnataka, and Gujarat.
2. Paddy (Rice) - The Kharif Staple, suitable for cultivation in Kharif season in Maharashtra.
3. Soybean - Kharif soybean followed by rabi sorghum is ideal when soil is deep.
4. Chickpea - Recommended for Kharif and pre-Rabi seasons, moderately resistant to wilt and SMD.
5. Moong dal - Good for monsoon season and as a green manure, but may not be suitable for waterlogged soils.


It's important to note that the suitability of crops for a particular region and season can depend on various factors such as climate, soil type, and water availability. It's always a good idea to consult with local agricultural experts or check with the relevant authorities for the most up-to-date and accurate information.

# RESULTS


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 You 11:07 PM  
What are the best short-duration crops for Rabi season in India?

 watsonx Agent 11:07 PM  
Some of the best short-duration crops for the Rabi season in India include:

1. Potato: Varieties like Kufri Lauvkar and Kufri Jyoti are suitable for the Rabi season and have a short duration.
2. Sesame: Sesame is a short-duration crop that can be grown in the Rabi season, and it is relatively drought-tolerant.
3. Corn: Corn is another short-duration crop that can be grown in the Rabi season, and it is responsive to own crop prices.
4. Dry seeded aman rice: This is a short-duration crop that can be grown in the Rabi season, and it facilitates timely sowing of other Rabi crops.

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**Preview**



You 11:07 PM

Suggest drought-resistant crops for low rainfall areas.




watsonx Agent 11:07 PM




Based on the search results, some drought-resistant crops for low rainfall areas include:


1. Oats
2. Agave
3. Drought-tolerant corn
4. Chicory
5. Sesame
6. Dryland crops such as sorghum, millet, and cowpeas


It's important to note that the suitability of crops for a particular region and season can depend on various factors such as climate, soil type, and water availability. It's always a good idea to consult with local agricultural experts or check with the relevant authorities for the most up-to-date and accurate information.

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 You 11:07 PM



How can I control whitefly in brinjal crops organically?

 watsonx Agent 11:07 PM

To control whitefly in brinjal crops organically, you can try the following methods:1. Use neem oil as a growth and feeding inhibitor.2. Spray plants with water to dislodge whitefly eggs and larvae.3. Attract natural predators, such as beneficial insects that prey on whiteflies, to offer natural pest control.4. Use insecticidal soap, which is OMRI-listed for organic use.5. Plant certain crops, such as eggplant, buckwheat, or marigold, which can draw in whitefly-eating predators.6. Use cow urine, which has been shown to be an effective and natural method for controlling whiteflies.7. Introduce auxiliaries, such as natural enemies, into closed shelters to control whiteflies.It's important to note that a combination of these methods may be more effective than using a single method. Additionally, it's always a good idea to consult with local agricultural experts or check with the relevant authorities for the most up-to-date and accurate information.

# RESULTS

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 You 11:07 PM

What are the common pests in cotton farming and their management?

 watsonx Agent 11:07 PM


The common pests in cotton farming and their management include:




1. Boll weevil (*Anthonomus grandis*) and pink bollworm (*Pectinophora gossypiella*) - These pests can be managed through the use of insecticides, crop rotation, and biological control methods.
2. Aphids - These pests can be managed through the use of insecticidal soap, neem oil, and introducing natural predators such as lady beetles.
3. Whiteflies - These pests can be managed through the use of yellow sticky traps, insecticidal soap, and introducing natural predators such as parasitic wasps.
4. Spider mites - These pests can be managed through the use of miticides, neem oil, and introducing natural predators such as predatory mites.


It's important to note that integrated pest management (IPM) strategies that combine multiple control methods, such as cultural, biological, and chemical controls, are often the most effective way to manage cotton pests. Additionally, the use of resistant crop varieties, crop rotation, and sanitation practices can also help to reduce pest pressure.


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 You 11:08 PM  
What are the common pests in cotton farming and their management?

 watsonx Agent 11:08 PM  
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Some additional resources for managing cotton pests include:


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 You 11:08 PM  
Give me eco-friendly pest control solutions for tomato farming.




 watsonx Agent 11:08 PM  
Here are some eco-friendly pest control solutions for tomato farming:


1. Natural Bug Repellent for Plants: 15 Organic Sprays That Actually Work - This article provides 15 homemade, organic solutions for pest control, including sprays made from hot peppers, garlic, and soap.
2. Organic Pest Control Methods for Tomato Plants - This discussion thread on Farmnest provides advice on dealing with pests in tomato plants, including the use of neem oil, diatomaceous earth, and introducing beneficial insects.
3. Organic Garden Pest Control - Roots and Refuge - This article provides tips on organic garden pest control, including the use of physical barriers, crop rotation, and introducing beneficial insects.
4. Safe and Effective Organic Insecticide for Tomatoes - This Reddit thread provides recommendations for safe and effective organic insecticides for tomatoes, including the use of neem oil, pyrethrin, and diatomaceous earth.
5. Sustainable Pest Management - SARE - This article provides information on sustainable pest management, including the use of crop rotation, cover crops, and introducing beneficial insects.
6. Tomato Plants Problems You May Face and Their Solutions - This article provides solutions to common problems faced by tomato plants, including pests, diseases, and nutrient deficiencies.
7. Amending Soil For Tomatoes: Tackle Black Spot, Rot, Aphids - This article provides tips on amending soil for tomatoes, including the use of organic fertilizers and eco-friendly pest solutions.



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 You 11:09 PM  
What is the recommended NPK ratio for paddy crops?

 watsonx Agent 11:09 PM  
The recommended NPK ratio for paddy crops is 4:2:1. However, this ratio may vary depending on the location, soil type, and other factors. It's important to consult with local agricultural experts or check with the relevant authorities for the most up-to-date and accurate information. Additionally, it's recommended to use a balanced fertilizer that contains all three macronutrients (N, P, and K) in the appropriate ratio.

 You 11:09 PM  
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 watsonx Agent 11:09 PM  
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Type something... 



# RESULTS

## Deployed AI Agent

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 You 11:10 PM

How do I calculate the cost of cultivation for sugarcane?

 watsonx Agent 11:10 PM

The cost of cultivation for sugarcane can be calculated by considering various factors such as manures, weeding, plant protection, harvesting, and other expenses. The total cost of cultivation can be estimated by adding up these expenses. For example, according to the Tamil Nadu Agricultural University, the cost of cultivation for sugarcane is as follows:

- Manures & Manuring: 5000
- Weeding after cultivation & Irrigation: 5000
- Plant protection: 1000
- Harvest and other Expenses: 9000
- Total: 28500

It's important to note that these costs may vary depending on the location, soil type, and other factors. Therefore, it's recommended to consult with local agricultural experts or check with the relevant authorities for the most up-to-date and accurate information.

► How did I get this answer?

Type something... 

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## CONCLUSION

- **Bridges the knowledge gap:** Provides farmers with **real-time, reliable, and localized agricultural advice** on crops, weather, pests, and market prices.
- **Empowers decision-making:** Helps farmers **plan better, reduce risks, and improve productivity** through actionable, AI-driven insights.
- **Enhances accessibility:** Offers **multilingual, easy-to-use interaction**, making advanced agricultural guidance accessible even to grassroots farmers.

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# FUTURE SCOPE

- Voice-based interaction for illiterate farmers
- Integration with IoT (soil sensors, weather stations)
- Mobile app deployment for easy accessibility
- Expanded multilingual support (regional dialects)
- Partnership with agri-markets for live trading prices

# IBM CERTIFICATIONS



**IBM SkillsBuild**

Completion Certificate



This certificate is presented to  
**SHIVRAJ NALAWADE**

for the completion of

**Lab: Retrieval Augmented Generation with  
LangChain**

(ALM-COURSE\_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 25 Jul 2025 (GMT)

**Learning hours:** 20 mins

## GITHUB LINK

- <https://github.com/shivraj-nalawade/smart-farming-agent.git>



**THANK YOU**