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        - QuizTime:
        - Are you Ready!
- Read the Below Instructions Carefully:
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- Mains Questions:
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- Model Answer:
- Relevance to the UPSC Prelims and Mains syllabus under the following topics:
- Prelims:
- Mains:

Summary:

- New Pea Disease: Scientists at Haryana Agricultural University discovered “Witches’ Broom,” a disease threatening India’s pea production.
- Pathogen Identified: The disease is caused by ‘Candidatus Phytoplasma asteris’ (16SrI), spread by insects and difficult to control.
- Impact on Agriculture: Significant threat to food security and farmer income due to potential yield losses and economic hardship.
- Mitigation Strategies: Emphasizes the need for research, farmer awareness, and integrated pest management to combat the disease.

What is the news?

- A recent discovery by scientists at Chaudhary Charan Singh Haryana Agricultural University (CCSHAU) casts a shadow over India’s pea

production. They have identified a new and potentially devastating disease affecting pea crops, aptly named “Witches’ Broom.” This disease, associated with the pathogen ‘Candidatus Phytoplasma asteris’ (16SrI), poses a significant threat to pea yields and farmer livelihoods.

- The American Phytopathological Society (APS), USA, which recognizes new diseases in plants, has accepted and published the report of this new disease by the scientists in its prestigious journal ‘Plant Disease’ as the first research report.

Witches’ Broom: A Grim Description

- The name “Witches’ Broom” accurately reflects the disturbing symptoms observed in infected pea plants. These include stunted growth, bushy and distorted appearance, and a transformation of flowers into green, leafy structures. This grotesque metamorphosis not only reduces pea pod formation but also weakens the overall plant, making it more susceptible to secondary infections.

Candidatus Phytoplasma asteris: A Stealthy Foe

- The culprit behind Witches’ Broom disease is ‘Candidatus Phytoplasma asteris’ (16SrI), a microscopic, parasitic bacterium. Unlike other

bacteria, it lacks a cell wall, making it difficult to control. Spread primarily by insects like leafhoppers, this pathogen infiltrates the plant's vascular system, disrupting nutrient flow and manipulating its growth hormones. The resulting symptoms are a desperate attempt by the plant to survive amidst this internal chaos.

The Stakes are High: Food Security and Farmer Income

- Peas are a vital source of protein and vitamins in the Indian diet. They are also an important cash crop for many farmers. An outbreak of Witches' Broom disease could have a devastating impact on both food security and farmer income. Yield losses can be significant, potentially leading to price hikes and shortages in the market. Farmers who depend on pea cultivation for their livelihood face significant economic hardship.

A Call to Action: Research, Awareness, and Control Measures

- The discovery of Witches' Broom disease underscores the importance of continuous vigilance and research in agriculture. CCSHAU scientists deserve recognition for their timely identification of this new threat. However, the battle is far from over. Further research is

crucial to understand the specific lifecycle of the pathogen, its transmission patterns, and develop effective control measures. This may involve exploring resistant pea varieties, developing targeted insecticides for the insect vectors, or even investigating potential biocontrol agents.

- Disseminating awareness among farmers about the signs and symptoms of Witches' Broom disease is equally important. Early detection can help contain the spread and minimize the damage. Farmers should be trained on implementing best practices like crop rotation, sanitation measures, and monitoring their fields for signs of infection.

Conclusion: A United Front Against Witches' Broom

- The emergence of Witches' Broom disease poses a serious challenge to India's pea production. However, it is not an insurmountable one. Collaborative efforts between scientists, policymakers, and farmers are essential for developing effective control strategies. By prioritizing research, raising awareness, and implementing appropriate measures, we can safeguard our pea crops and ensure the continued prosperity of our farmers.

About Candidatus Phytoplasma asteris

(16SrI): A Microscopic Plant Pathogen:

- Candidatus Phytoplasma asteris is a parasitic bacterium belonging to a group of plant pathogens called phytoplasmas. These microscopic organisms lack a cell wall and live within the phloem (vascular tissue) of their host plants.

Identification:

- The “Candidatus” designation indicates that the organism hasn’t been successfully cultured in a controlled laboratory setting. Scientists primarily rely on molecular techniques to identify these pathogens. In the case of Candidatus Phytoplasma asteris, the 16SrI ribosomal RNA (rRNA) gene sequence is used for identification. The 16S rRNA gene is a highly conserved gene present in all organisms, but it has enough variability in specific regions to differentiate between species. By analyzing the sequence of this gene, scientists can determine if the organism belongs to the Candidatus Phytoplasma group and further pinpoint it to the aster yellows group (aster yellows – AY – phytoplasmas) based on the specific sequence within the 16SrI subgroup.

Pathogenicity:

- Candidatus Phytoplasma asteris is the causal agent of Witches' Broom disease, a serious threat to pea crops. This disease disrupts the plant's normal growth hormones, leading to stunted growth, distorted branching, and the transformation of flowers into leafy structures. This significantly reduces pea pod formation and ultimately crop yield.

Transmission:

- The disease spreads primarily through insect vectors, most commonly leafhoppers. These insects feed on infected plants and acquire the phytoplasma in their mouthparts. When they subsequently feed on healthy plants, they can transmit the pathogen, initiating a new infection cycle.

Challenges:

- Difficult to control: The lack of a cell wall in Candidatus Phytoplasma asteris makes it challenging to target with conventional pesticides designed to disrupt bacterial cell wall synthesis.
- Insect transmission: The reliance on insect vectors for spread makes controlling outbreaks difficult, especially in areas with large populations of these insects.

Conclusion:

- Candidatus Phytoplasma asteris is a significant plant pathogen affecting pea crops. Understanding its biology and transmission is crucial for developing effective control strategies. Research efforts are focused on finding targeted control methods, such as specific insecticides or antibiotics, and identifying potential resistant pea varieties.

QuizTime:

0 votes, 0 avg

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Are you Ready!

Thank you, Time Out !

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General Studies

CURRENT AFFAIRS QUIZ

Read the Below Instructions Carefully:

- Click on - Start Quiz
- Attempt all questions (You can attempt or leave)
- After Attempting Last Question.
- Enter Name & Email
- Click on - Check Result
- Scroll down - Check out Solutions too.

Thank you.

Loading ...

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Category: **General Studies**

The recent discovery of Witches' Broom disease in India primarily affects which of the following crops?

- ○ Wheat
- ○ Rice
- ○ Pea

○ Cotton

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Category: **General Studies**

A key challenge associated with controlling the spread of Witches' Broom disease is:

○ The easy availability of broad-spectrum fungicides.

○ The ineffectiveness of crop rotation in managing the pathogen.

○ The absence of a cell wall in the causal pathogen.

○ The limited weed control practices followed by farmers.

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Category: **General Studies**

An effective strategy for mitigating the impact of Witches' Broom disease on pea crops would likely involve:

○ Encouraging farmers to adopt genetically modified pea varieties.

○ Promoting the use of a specific type of chemical fertilizer.

○ Developing and deploying targeted insecticides against insect vectors.

○ Restricting the inter-state movement of pea seeds altogether.

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Category: **General Studies**

In the context of collaborative efforts to address emerging plant diseases, the role of agricultural extension workers primarily involves:

○ Conducting fundamental research on the pathogen's biology.

○ Formulating national policies for disease control and prevention.

○ Educating farmers about disease identification and best management practices.

○ Securing funding for research initiatives from international organizations.

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Category: **General Studies**

The emergence of Witches' Broom disease highlights the importance of:

○ Reducing government subsidies for agricultural inputs.

○ Encouraging excessive use of chemical pesticides in agriculture.

○ Prioritizing research and development in agricultural practices.

○ Promoting complete organic farming practices across the country.

Prev Finish

Check Rank, Result Now and enter correct email as you will get Solutions in the email as well for future use!

Check the Result

Your score is

0%

Restart quiz

Please Rate!

Send feedback

Mains Questions:

Question 1:

The recent discovery of Witches' Broom disease affecting pea crops in India poses a significant threat to food security and farmer livelihoods. Discuss the challenges associated with this disease and suggest potential strategies for mitigating its impact.(250 words)

Model Answer:

Challenges associated with Witches' Broom disease:

- Devastating impact on yield: The disease stunts plant growth, disrupts flower development, and reduces pea pod formation, leading to significant yield losses.
- Difficult to control: The causal pathogen, Candidatus Phytoplasma asteris, lacks a cell wall, making it challenging to target with conventional pesticides.
- Spread by insects: Transmission through leafhoppers can make it difficult to contain outbreaks, especially in areas with large populations of these vectors.
- Limited knowledge: As a recently identified disease, there's limited information on its lifecycle, optimal control methods, and potential resistant pea varieties.

Strategies for mitigating the impact:

- Research and development: Intensify research to understand the pathogen's biology, develop effective control measures, and identify potential resistant pea varieties.
- Farmer awareness programs: Educate farmers about the signs and symptoms of Witches' Broom disease to enable early detection and prevent further spread.
- Integrated pest management: Promote practices like crop rotation, sanitation measures, and use of biocontrol agents to manage insect vectors and reduce disease transmission.
- Development of targeted interventions: Explore the

development of specific insecticides or antibiotics effective against the pathogen Candidatus Phytoplasma asteris.

Question 2:

The editorial highlights the collaborative effort required to combat Witches' Broom disease. Discuss the role of various stakeholders in mitigating the threats posed by this and similar emerging plant diseases.(250 words)

Model Answer:

Stakeholders and their roles:

- Scientists and researchers: Conducting research on the disease, developing control measures, and identifying resistant varieties.
- Government agencies: Providing funding for research, formulating policies to control the spread, and disseminating information to farmers.
- Agricultural extension workers: Educating farmers about the disease, promoting best practices, and facilitating access to control methods.
- Seed companies: Developing and distributing resistant pea varieties if identified through research.
- Farmers: Implementing best practices like crop rotation, sanitation, and monitoring their fields for signs of infection.

- Collaborative effort: Effective control of Witches' Broom disease and similar emerging threats requires collaboration between all stakeholders. Scientists provide the knowledge base, governments create enabling policies, extension workers bridge the gap between research and practice, seed companies offer solutions, and farmers implement them in their fields. This collective effort is crucial for safeguarding crop production and ensuring food security.

Remember: These are just sample answers. It's important to further research and refine your responses based on your own understanding and perspective.

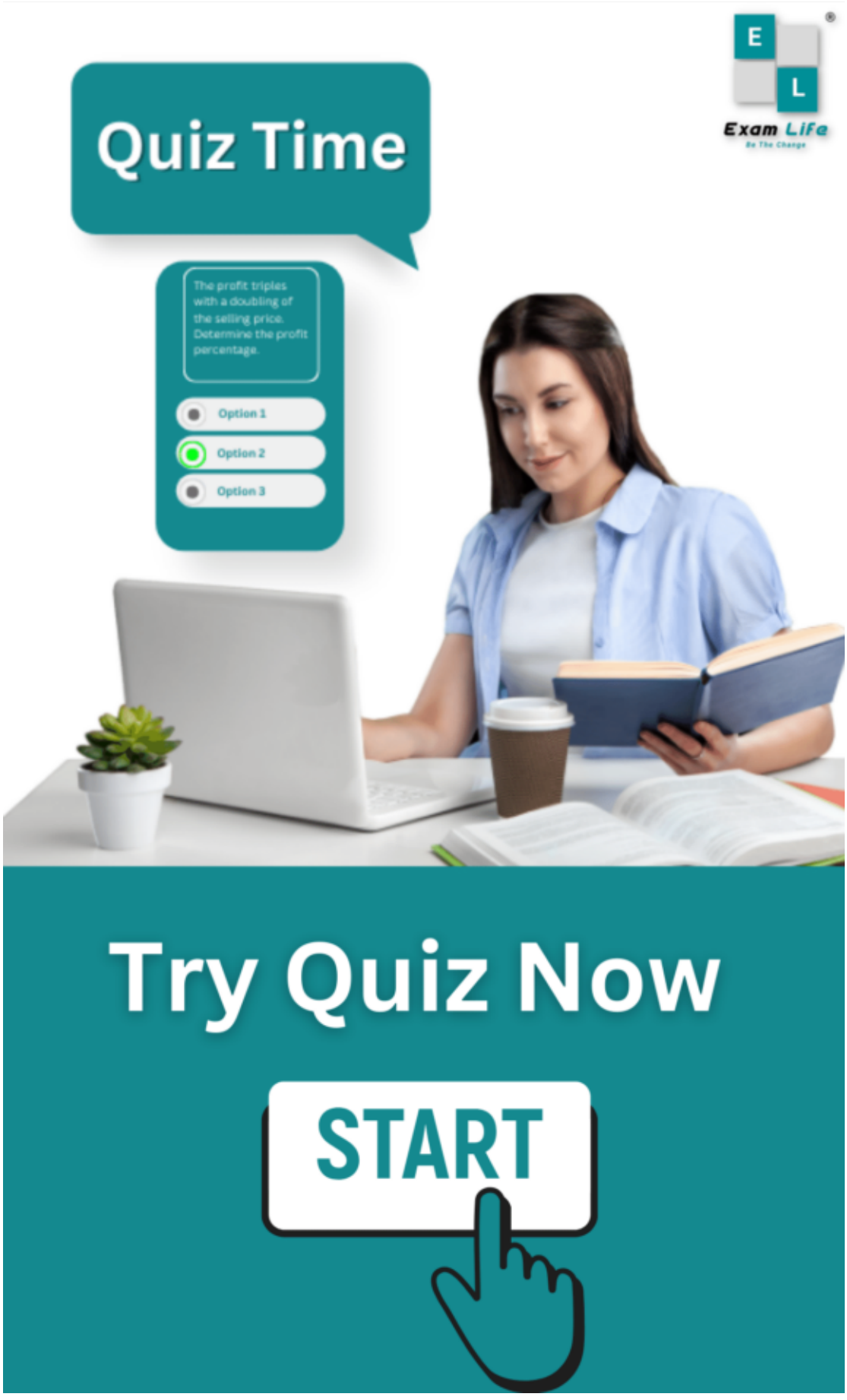
Relevance to the UPSC Prelims and Mains syllabus under the following topics:

Prelims:

- **General Science:** This section might indirectly test your knowledge about plant diseases and basic plant pathology concepts.

Mains:

- **Agriculture and allied sectors:** This section could potentially have questions related to emerging agricultural challenges and the importance of research and development in addressing them.Here’s how you can leverage this information for your HCA exam preparation:
- **General Science:** While preparing for general science, ensure you have a basic understanding of plant diseases and their impact on crops. You can study common types of plant pathogens (like bacteria) and their control methods (even if not specifically related to Witches’ Broom disease).
- **Agriculture and allied sectors:** Focus on broader themes like the importance of research in developing disease-resistant crop varieties, integrated pest management (IPM) practices, and the role of agricultural extension services in disseminating information to farmers.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Option 1
Option 2
Option 3
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