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WEB-BASED SOLUTIONS FOR GUAVA CROP MANAGEMENT

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ABSTRACT

Guava (*Psidium guajava* L), one of the important tropical fruit crop in India has gained considerable prominence due to its high nutritive value and good economic returns. Due to increased demand, many farmers have taken up guava cultivation on a commercial scale. The dissemination of scientific knowledge and research plays a vital role in enhancing quality guava production. Farmers face lot of problems in agriculture from sowing to harvest and further with post-harvest period and marketing of the product. Digital technologies can help farmers to access vast amount of information related to crop production, weather forecasts, market prices, pest and disease management and best agricultural practices. This information helps them make informed decisions about their farming activities. For higher productivity in farming an information-based decision-making system is the need of the hour. Web application is a cost-effective way of communications channel and at ICAR-IIHR, researchers has developed many technologies that are contributing significantly to farming community providing information about various management aspects and bringing awareness. In this project, a web based application on Guava crop management has been developed in English and in Hindi which provide information on guava crop cultivation and its management practices, varieties and technologies developed at ICAR-IIHR, Bengaluru for reaching wider community of farmers, students and other stakeholders.

Key words : Guava crop, Varieties, Crop production, Crop protection, Digital.

Introduction

Guava (*Psidium guajava* L), one of the important fruit crop is commercially cultivated in many tropical and sub-tropical countries of the world (Rai *et al.*, 2010). Guava fruit offer diversity in shape, skin and flesh colour, and flavour to the consumer. The term “Amrood” is often used in Hindi and other regional languages to refer to this delicious and nutritious fruit. In the recent past due to increase in population and increased demand it is essential to improve quality guava production with the available resources (Santhi *et al.*, 2020). The demand for guava is increasing in the country for fresh, processing and medicinal purpose (Asim *et al.*, 2023). It bears fruit every year and gives good economic returns (Singh, 2007). Being a shrubby tree that is adapted to both tropical and sub-tropical climate, guava plants can survive high temperatures and drought conditions. Advancement in technology is leading an evolutionary change in

agricultural practices.

The effective use of digital technologies can improve the agricultural production methods (Qin *et al.*, 2022) and promote the income of the farming community. Since, climatic changes have severely affected global fruit crop production, selection of climate resilient crops is inevitable. The priority to develop new hybrids for better climate resilience and high quality fruits is highly desired. To help farmers in guava farming, research is underway to develop high yielding varieties having less seeds and sweeter pulp. ICAR-IIHR have come up with the second largest guava in the country, named Arka Poorna which has fewer seeds, making it suitable for the table purpose and for processing which is also rich in Vitamin C (Dinesh *et al.*, 2010). The dissemination of developed varieties and technologies needs to be carried out by different means of communication to reach wider community. Computer-based information system offer the greatest

opportunity to disseminate the crop information generated to the farming community (Thomas *et al.*, 2020) and are proved to be most efficient tool for interchange of knowledge and facts (Malik *et al.*, 2018). By designing and developing farmer-friendly and simple interfaces, people can have access to crop information in an effective manner. Data are the rich source of information and a lot of crop information is generated by the scientists involved in guava crop research. This paper describes a web framework which was designed and developed using web technologies to retrieve and display information on guava crop cultivation aspects and pest and disease management measures. The use of web-based applications makes it easy to access the information irrespective of language via a web browser.

Materials and Methods

A crop decision support system helps to bridge the gap between farmers and agriculture domain experts (Rodríguez-García *et al.*, 2021). A web-based system is a cost-effective way of communication channel that can be used by a user from any computer connected to the internet using a standard browser. The design for the web interface and the structure and content of the web pages for guava crop management were developed with GUI using HTML5 and CSS scripting languages. The web pages provide the interface and functions to display the data. Web applications run on multiple platforms regardless of Operating system or the gadget as long as the browser is compatible. They are not installed on the hard drive of a user device, thus eliminating space limitations. All the web pages have a navigation menu that links to information on specific contents and helps in accessing crop production, crop protection, crop management and varietal information on guava crops. Different categories of the application and respective modules are linked appropriately. The disease and pest management module provides the control measures for the various diseases and pests affecting the crops by displaying the symptoms and its management practices. It was designed with flash objects, a graphical element used for automatic scrolling of images using Java codes to display the disease symptoms along with the control measures.

Results and Discussion

The web application on Guava crop has been developed at Indian Institute of Horticultural Research, Bangalore for the benefit of farmers on Guava cultivation and crop management. The application was developed in windows platform with GUI using HTML and CSS scripting languages. The following features present in



Fig. 1 : Home page of web application.

the application of guava cultivation are given below:

- Crop production
- Crop protection
- Varieties
- Technologies

The home page displays various contents for guava production including soil & climate, propagation, nutrient requirements, irrigation methods, crop regulation, spacing and planting of guava crop. The necessary hyperlinks are provided in the home page and also in navigational menu. The web application includes crop protection modules consisting of Pest and Disease diagnosis and management information.

Crop protection module : Quality production of guava is low in India because of several diseases affecting the crop (Misra, 2005) due to wide range of variation in the climatic conditions (Satpal *et al.*, 2011). The crop protection modules on guava crop was developed with flash objects for disease and pest management information. Disease management modules was developed as auto scrolling objects, with various layers embedded in it using dynamic sliders. By clicking the auto scrolling thumbnail images, the details of disease appears below the sliders. On choosing the specific type of disease, causing organism, its symptom, best control



Fig. 2 : Disease management module.



Fig. 3 : Pest management module.

measures recommended by the institute will appear on same parent window screen. The following diseases affect guava crop viz., wilt, anthracnose, die-back, canker, and fruit rot and dry rot, styler end rot and seedling blight. The farmers can compare the similar type of infestation in their field, they can diagnose the infestation and adopt the management measures for controlling the disease. For example, if the users choose the disease fruit rot, the various symptom of circular brown spots affecting the fruits are displayed (Fig. 2).

Insect pest problems are the main constraint in the production and productivity of guava. Gundappa *et al.* (2018) the major ones with the control measures that can be adopted are given in this module. Several pest images (Fig. 3) are displayed according to their type of pest and its infestation as flash objects which automatically appear with thumbnail images. Users can click the thumbnail image for more details. The management measures that can be adopted are given in this module. By clicking the appropriate image, the detailed page appears for more symptoms and diagnostic measures. The common pests affecting the guava crop are fruit fly, green shield scale, mirid bug, mealy bug, bark eating caterpillar and tea mosquito bug. For example, on choosing the pest mirid bug, the symptoms such as drying of shoot, brown specks/spots on leaf and fruits are displayed and its corresponding control measures.

The guava varieties released at ICAR-IIHR with its description and the other promising guava varieties released across the country with salient features are

included in the system. For farmer interaction, query window on web application of guava is also incorporated by designing data forms through which they can post their cultivation problems. Also, a Query window for farmers is available in the web applications, to post their cultivation problems. The queries received by the application will be communicated to respective domain experts and the responses are conveyed back to farmers by Email. This will be very useful for farmers involved in guava crop cultivation.

Conclusion

Information services that are internet-enabled have become increasingly popular in recent years. This knowledge-based system offers a user friendly interface and does not require extensive skills.

Timely and informed decision-making is crucial for maximizing guava production. Using the digital platform by adopting improved management practices and making informed decisions based on the specific needs of guava cultivation, farmers can optimize production and maximize yield. Regular monitoring, timely interventions and adaptation to changing conditions are essential for profitable guava cultivation. The web application on Guava crop management was developed at ICAR-IIHR, Bengaluru, which would be useful for farmers and other stakeholders for better crop cultivation and management. It is available in the public domain at <https://guava-crop.web.app/> in English and at <https://guavacrop-hindi.web.app/> in Hindi which can be accessed on all browser compatible devices across all platforms.

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References

- Asim, M., Ullah S., Razzaq A. and Qadri S. (2023). Varietal discrimination of guava (*Psidium guajava*) leaves using multi features analysis. *Int. J. Food Prop.*, **26**, 179–196.
- Dinesh, M.R. and Vasugi C. (2010). Guava improvement in India and future needs. *J. Horti. Sci.*, **5(2)**, 94-108.
- Gundappa, B., Rajkumar M.B., Singh S. and Rajan S. (2018). Pests of Guava. In *Pests and their management*, Springer. pp. 491-516
- Malik, M., Sehgal M., Kanojia A.K. and Singh R. (2018). A review paper on decision support system/expert system developed on mango. *Int. J. Plant Prot.*, **11**, 119-123.
- Misra, A.K. (2005). Important diseases of guava in India with

- special reference to wilt. *ActaHorti.*, **735**, 507-523.
- Rai, M.K., Asthana P., Jaiswal, V.S. and Jaiswal U. (2010). Biotechnological advances in guava (*Psidium guajava* L.): Recent developments and prospects for further research. *Trees*, **24**, 1-12.
- Rodríguez-García, Miguel Ángel, Francisco García-Sánchez and Rafael Valencia-García (2021). Knowledge-Based System for Crop Pests and Diseases Recognition. *Electronics*, **10(8)**, 905.
- Singh, S.P. (2011). Guava (*Psidium guajava* L.). In: Yahia, E.M. (ed) *Postharvest biology and technology of tropical and subtropical fruits*. Woodhead Publishing Limited, Cambridge, pp 213–246e
- Santhi, V.P., Parthiban S., Vijayalakshmi K., Auxilia J. and Masilamani P. (2020). A Review on recent advances in enhancing the productivity of guava (*Psidium guajava* L.) through Hi-Tech practices. *Int. J. Curr. Microbiol. App. Sci.*, **9(8)**, 1922-1934.
- Satpal, B., Sharma J.R., Sehwat S.K., Ahlawat V.P., Bhatia S.K. and Dahiy D.S. (2011). Present Status of Guava Research and Future Thrusts in India. *Haryana J. Hort. Sci.*, **40 (3 & 4)**, 105-116.
- Thomas, R.R. and Chandrapakash M.K. (2020). Pomegranate crop management system: A Web based application. *Int. J. Agr. Sci. Res.*, **10(1)**, 33–38.
- Qin, T., Wang L., Zhou Y., Guo L., Jiang G. and Zhang L. (2022). Digital technology-and-services-driven sustainable transformation of agriculture: Cases of China and the EU. *Agriculture*, **12(2)**, 297.