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POMEGRANATE CROP MANAGEMENT SYSTEM: A WEB BASED APPLICATION

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ABSTRACT

Pomegranate (Punica granatum L.) is an important fruit crop grown in tropical and sub-tropical regions, which gives higher return and has great export potential. In recent years, there is a great increase in the pomegranate cultivation area in the country. Without sufficient crop knowledge and experience, pomegranate crop is facing several issues with respect to its cultivation to get good yield as well as marketing problems. The effectiveness of crop management information can be improved by integrating all the crop cultivation information. Information Communication Technology based advisory system plays an important role in reaching a large number of farmers, and other stakeholders at minimal efforts without compromising the quality of information. Research findings and developments at ICAR-IIHR, Bengaluru are disseminated to farmers through various media for exchange of knowledge and experience to farmers. In this paper, we provide complete know how of the pomegranate crop production and management practices through the developed web application that helps farmers in giving the best solution to the farmers and other stakeholders in pomegranate crop cultivation. In this project, information on pomegranate production, cultivation practices for improving fruit yield, superior cultivars, micro-nutrients, disease and pest management aspects are covered to reap maximum benefits.

KEYWORDS: Pomegranate, Crop production, Disease, Pest & Web Application

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Original Article

1. INTRODUCTION

Pomegranate (*Punica granatum* L.) is an important fruit crops in arid and semi-arid regions of India, and is one of the leading countries in pomegranate production with higher return. Increased demand and high export potential (Koujalagi et al., 2014) has made pomegranate a popular fruit of tropical and subtropical regions in recent times. With the expansion in area under pomegranate cultivation (Pal *et al*., 2014), sufficient knowledge and experience is essential to get good yield and quality produce. Digital technology will be key to increasing agriculture productivity by delivering recommendations to farmers based on crop, planting details, variety selected, soil and climate, crop protection measures. In the era of advanced information technology, an interactive and quick system is strongly needed which can provide the detailed information about horticulture crop cultivation, the varieties and technologies developed. ICAR-IIHR located in Bangalore, Karnataka has developed many technologies that are contributing significantly to farming community providing information about various management aspects and bringing awareness. Once the production and protection technology of high yielding varieties / improved parental lines and hybrids are developed, its dissemination needs to be more focused. Keeping the importance of this information in view, a web based information system for Horticultural crops is developed. Data are the rich source of information. A lot of information is generated by the scientists involved in pomegranate research. Systematic recording of data in agriculture greatly increases the amount of information that can be extracted regarding knowledge of crop potential. The production technology involves several management outcome, including scheduling, input resource, selection of variety, application of fertilisers and scheduling of irrigation. Computer-based information system (Al- Shakkah

& Osman, 2011) offer the greatest opportunity to disseminate the information generated to the farming community and to know the impact of technologies developed in different regions of India. In view of this, a web framework was designed and developed using web technologies to retrieve and display information on different aspects of pomegranate crop cultivation and pest and disease control (Ugwuishiwu *et al.,* 2012).

2. METHODOLOGY

It is a great challenge to extract knowledge from data, which has led to methods and techniques such as web based applications that can store and communicating information in various forms, which lacks basic access to up-to-date information on best farming practices that can bridge the knowledge gap. Information on many aspects including pest management, crop research and improvement, cropping system etc. has been gathered from domain experts of institutes. A web-based system a cost-effective way of communications channel and can be used by user from any computer connected to the Internet using a standard browser. The pomegranate crop management has been designed as a web application and deployed at Institute servers running under windows platforms. The application is developed at ICAR-IIHR using Microsoft web expressions. The design for the web interface and the structure and content of the web pages for pomegranate crop management were developed with GUI using HTML5 and CSS scripting languages. The web pages provide interface and functions to display the data. Web applications run on multiple platforms regardless of OS or device as long as the browser is compatible. They are not installed on the hard drive of user device, thus eliminating space limitations. All the pomegranate crop information is stored and hosted in the main server using Internet Information Service (IIS 7.0) and Windows Operating system. All the web pages has navigation menu which links to information on specific contents and helps in accessing crop production, crop protection, crop management and varietal information of pomegranate crop. The application of different categories and modules linked, sequentially. The disease and pest management module provides the control measures for the various disease and pest affecting the crops by displaying its symptoms and management aspects. It was designed with dynamic contents as slider images in the applications using Java codes to display the disease symptoms along with the control measures.

3. RESULTS

Figure 1: Pomegranate Crop Management Home Page.

The web application on "**Pomegranate Crop management**" is developed at Indian Institute of Horticultural Research, Bangalore, to enable farmers to make their management decision for pomegranate crop cultivation. The app is available in IIHR institute website for farmers to adopt in their farm for pomegranate crop management. The following general features present in the web app of pomegranate cultivation are given below:

- Crop production
- Disease management
- Pest management
- Varieties

Also, a Query window for farmers is available in the web applications, to post the cultivation problems occurred in their farms. The queries received by the application will be communicated to respective domain experts and the response are conveyed back to farmers by Email.

3.1 Crop Production

The following crop production aspects viz., Soil & climate, Fertilizer requirement, Crop nutrition, Harvesting, Land preparation & planting, Flowering, Nematode management of Pomegranate cultivation are covered under crop production modules (Figure 1). The necessary hyperlinks are provided in the home page and also in navigational menu.

Effective crop protection requires an understanding of the types of pests and diseases that attack crops and an awareness of different methods of controlling them (Gent *et al.,* 2013). The web application includes crop protection measure consisting of Pest and Disease diagnosis and management modules.

3.2 Disease Management Module of Pomegranate

In this interactive module, the users have options to choose the type of disease from the scrolling display. Farmers normally observe visual symptoms of disease on fruit. The different diseases affecting pomegranate crop are displayed as auto scrolling images through dynamic sliders (Figure 2).

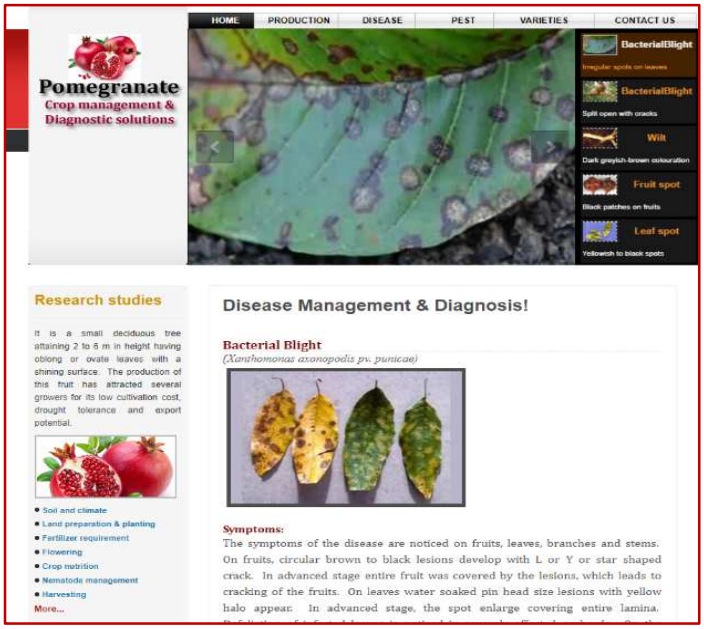

Figure 2: Disease Management Module.

By clicking the auto scrolling thumbnail images, the details of disease appears below the sliders. On choosing the specific type of disease, its symptom, management/control measures will appear on same parent window. The following fungal and bacterial diseases affect Pomegranate crop viz., Bacterial Blight, Leaf spot, Fruit Spot, Wilt, Anthracnose and Alternaria. The famers 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 an example, if the users chooses the disease bacterial blight, the various symptom of bacterial blight affecting the pomegranate leaves are displayed (Figure 2).

3.3 Pest Control Module

Many pests limit the profitability of pomegranate production, the major ones with the control measures that can be adopted are given in this module. Several pest images (Figure 3) are displayed according to their type of pest and its infestation as sliders which automatically appears with thumbnail images. Users can click the thumbnail image for more details. If the symptoms appears similar to the problems observed in farmer's field, they can view the details of the specific pest by clicking the main image. 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 following pest affecting the pomegranate crop are stem borer, shot hole borer, thrips causing scab, causing leaf curl, mealy bug, fruit sucking moth, and pomegranate butterfly. For example, on choosing the pest thrips, its symptoms such as causing scab, leaf infestation, its damage etc., and the control measures are displayed.

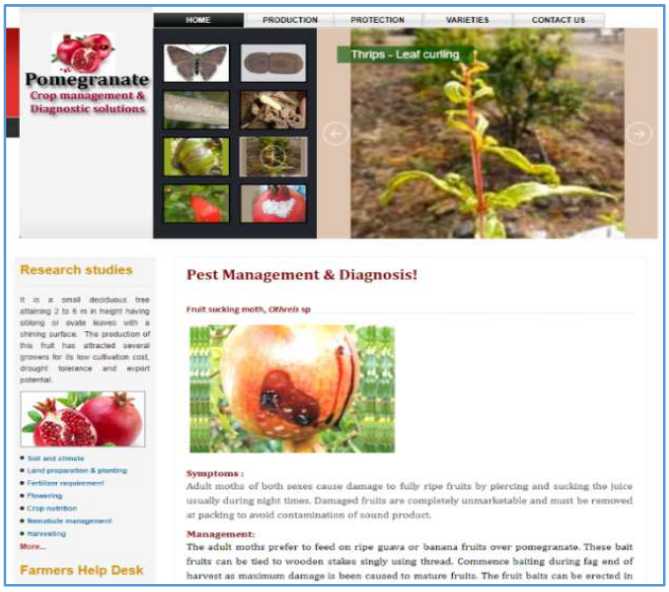

Figure 3: Pest Management Module.

4. CONCLUSIONS

The web application on Pomegranate 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 http://webapps.iihr.res.in:8085 and can be accessed on all browser compatible devices across all platforms.

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REFERENCES

1. *Al-Shakkah, M.S., & Osman, W.R.S. (2011). Computer based information system functions for decision making in organizations. International Journal of Computer Science and Information Security, 9 (10), 22–29.*
2. *Gent, D. H., Mahaffee, W. F., McRoberts, N., & Pfender, W. F. (2013). The use and role of predictive systems in disease management. Annu. Rev. Phytopathol., 51,267–289.*
3. *Alou, I. N., van Asten, P. J., & Tenywa, M. M. (2014). Biophysical And crop management gradients limiting yields of east African highland banana (Musa spp. AAA-EA) within farms in low input cropping systems. International Journal of Agricultural Science and Research (IJASR), 4(3), 27–43.*
4. *Koujalagi, B.L., Patil, C.B., & Murthy, C. (2014). Growth trends in area, production, productivity and export of pomegranate in Karnataka: An economic analysis. International Journal of Commerce and Business Management. 7(1), 11–15.*
5. *Kumar Nagar, R., & Verma, A. K. (2017). Comparative Study on Weeds and Crop Growth as Influenced By Integrated Weed Management and Balanced Fertilization In Coriander (Coriandrum sativum L.). International Journal of Applied and Natural Sciences (IJANS) ISSN (P), 2319–4014.*
6. *Pal, R.K., Babu, D, Singh, N., Maity, A & Gaikwad, N. (2014). Pomegranate Research in India- Status & future Challenges. Progressive horticulture. 46, 184–201.*
7. *Das, A., Shirgire, S., & Ghadage, V. Boosting crop yield, animal husbandry activities and natural resources management through integrated research approach for sustaining socio-economical status of tribal farmers.*
8. *Ugwuishiwu, C.H., Udanor, C. & Ugwuishiwu, B.O. (2012). Application of ICT in Crop Production. International Journal of Soft Computing and Engineering, 2 (4), 227–231.*

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