Potato J (2020) 47 (1): 59-64

POTATO VARIETY: A WEB BASED TOOL FOR SEARCH ON POTATO VARIETIES

Shashi Rawat[1], Ratna Preeti Kaur[2]*, Shefali Sood[3] and SK Chakrabarti[4]

ABSTRACT: Potato variety is a web-based decision support system (DSS) tool for facilitating search of information related to potato varieties. It provides a ready reference for farmers and seed producers enabling dissemination of complete knowledge about the varieties for their right targeting and improving their adoption based on their specific attributes and adaptability to agro-climatic zones. The dynamic web pages of the application are developed using ASP.NET with C# language, HTML (Hyper Text Mark up Language) and JavaScript. The data is stored in the form of normalized tables in MS SQL database. The Potato Variety Database is uploaded on the application server maintained at ICAR-CPRI Shimla or can directly be accessed by URL: "http://14.139.61.86/Potato_Variety". It is a user friendly, web-based decision and information based system for Indian potato varieties based on any of the search criterion like location, agro-climatic zones, morphology, duration, yield etc.

KEYWORDS: Decision support system, Indian potato varieties

INTRODUCTION

Globally, potato is considered as an important non-cereal food crop because of its high yield potential, early maturity and excellent food value which make it inevitable for improving food security and household incomes besides alleviating poverty especially in developing world (Devaux *et al*., 2014). India is the 2nd largest potato producer with 3rd largest acreage and average productivity of 22.76 t/ha (CPRI, 2015). ICAR-Central Potato Research Institute, Shimla is dedicated to development of new high yielding varieties (HYVs) of potato. This institute has evolved 62 different varieties of potato with varying useful traits and maturity groups for different agro-climatic zones of India till date. Genetic makeup of the varieties has major influence on yield and quality of potato tubers (Marwaha *et al*., 2010). These varieties further show wide variation in their attributes under different agro-climatic conditions (Uppal and Paul, 2001; Kumar *et al*., 2003). Generally, new varieties are developed while keeping in consideration the prevailing farming scenario of the target area, market requirements, agro-climatic conditions etc. They have better yields besides other important aspect like disease resistance, nutrient and water efficiency, processing attributes, quality, etc. over old varieties. However, there is a severe dearth in the acceptability and adoption of these newly released varieties at the farmers' fields. Gatto *et al.* (2017) have reported that all the 10 most important HYVs' adopted in South-east and South-Asia cover ~60% of the total area, are older than 10 years, and mostly released 20-30 years ago have weaker resistance to abiotic and biotic stresses. This may be attributed to several reasons including lack of knowledge about the newly released varieties and non-availability of the seed in the market. Simultaneously, it is also observed that sometimes the farmers are unaware of the actual attributes of

[1]ICAR-Central Institute of Agricultural Engineering, Abi Bagh, Berasia Road, Bhopal – 462038, Madhya Pradesh, India
[2]ICAR-Central Potato Research Institute, RS Jalandhar, Post Bag No. 1, Model Town PO, Jalandhar 144003, Punjab, India
[3]ICAR-Central Potato Research Institute, Shimla-171001, Himachal Pradesh, India
[4]Uttar Banga Krishi Vishwavidyalaya, Pundibari, Cooch Behar, Dist. Cooch Behar- 736165, West Bengal, India
*Corresponding author: kaur.rp@gmail.com

the varieties they generally grow. Since, they comprise the primary level of potato marketing, it is important for them to know the varietal and cultural practices, to harness full potential of the variety. Even the potato seed producers thereby, are unable to market the seed in the correct agro-climatic zones. Thus, an urgent need is felt for knowledge delivery system on potato varieties vis-a-vis their husbandry to the potato growers. Although, the relevant literature on potato varieties is available in the form of technical bulletins and research papers, these are mostly not readily available to the famers and marketing community. Thus, in order to achieve mass awareness about these varieties, the easily query-able web-based tools may prove as innovative ICT methods. Thus, CPRI-Shimla developed a web based varietal database for ready reference by farmers and seed producers to enable quick dissemination of complete knowledge about the potato varieties to the target clientele based on their specific attributes. This information tool would be highly useful for expending potato cultivation even in non-traditional areas for meeting proposed target of producing 125 million tonnes potatoes by the year 2050 (Singh *et al*., 2014).

MATERIALS AND METHODS

The work on development of this database was done at Agricultural Knowledge Management Unit (AKMU) of ICAR-CPRI, Shimla (HP). This MS–SQL database for potato varieties was prepared using the *CPRI Technical Bulletin No. 78* entitled, 'Indian Potato Varieties and their salient features' authored by Kumar *et al* (2014) for 51 potato varieties released by ICAR-CPRI, Shimla (HP) till 2014., which may be of utmost interest to the potato grower. Potato varieties developed by ICAR-CPRI, Shimla (HP) have been recommended for cultivation in different agro-climatic regions of India for different growing periods. Besides, special attributes of different varieties *viz*. late blight resistance, early blight resistance, processing quality, frost resistance, nematode resistance, etc. have been included in this database. The user-friendly links to the available information related to the varieties have been included in the home page and can be easily accessed. The overall layout of the database is depicted in Fig. 1. From the home

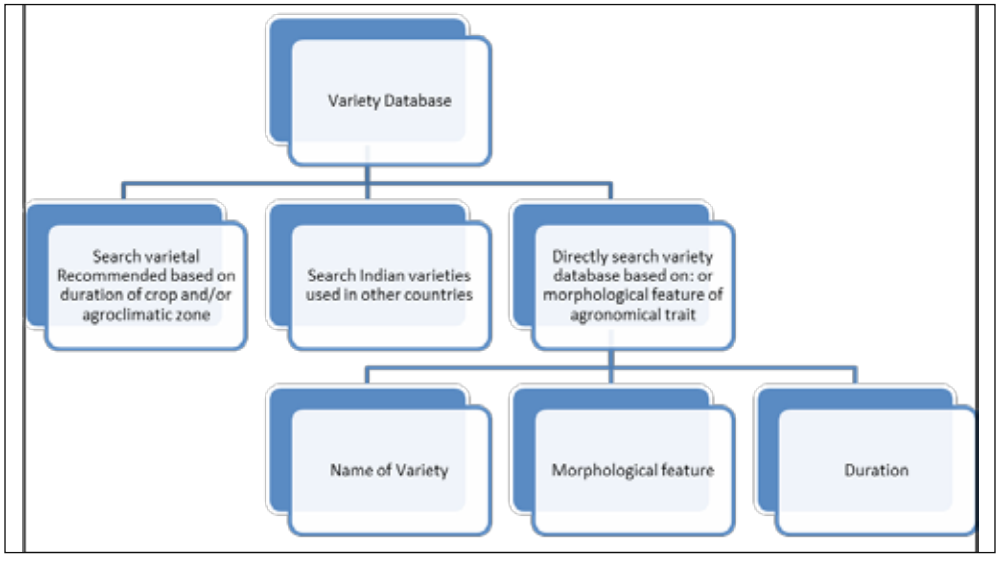

Fig. 1: Layout of information in the POTATO VARIETY database.

page the various links can be accessed *viz. Home, Recommendations, Country-wise, Search and Literature,* as mentioned below:

1. **Recommendations**: This is the main page for query, where the end-user can search for varieties suitable for a specific agro-ecological zone and having a specific crop duration. The eight different agro-ecological zones considered based on potato cultivation included in this database are North Bengal and Sikkim hills, North-eastern hills, North-eastern plains, North-western hills, North-western plains, Plateau region, Southern hills, West-central Plains. The three crop durations of long, medium and short have been mentioned but this period of cultivation of varieties varies between plains and hills. For cultivation in plains the duration of early, medium and late crop is 70-90 days, 90-110 days and >110 days respectively. Whereas for hills the respective durations are 100-110, 110-120 days and >120 days. Based on the information selected by the user from drop down list on Agro-ecological zone and duration of crops, the tool provides information about potato varieties recommended for that zone as illustrated in the Fig. 2.
2. **Country-wise**: This link refers to the Indian varieties released and commercially grown in other countries like Sri Lanka, Bhutan, Nepal, Bangladesh, Madagascar, Bolivia, Mexico, Philippines, Afghanistan and Vietnam. The name of varieties/hybrids are displayed against the country selected by the users in drop down format (Fig. 3).
3. **Search**: It allows user to search the database based on name, adaptability area, morphological features and agronomical features. Fig. 4 shows view of *Search tab*. The specific name of the variety can be queried using *Name tab*. The search using adaptability areas shows 16 different areas where the different varieties have been observed to perform well. The search using *morphological feature tab* is used to determine the varieties having specific morphological attributes like flower colour, tuber colour and sprout colour. *Agronomical features tab* allows selection of varieties based on the maturity, storability and average yield potential of the crop.

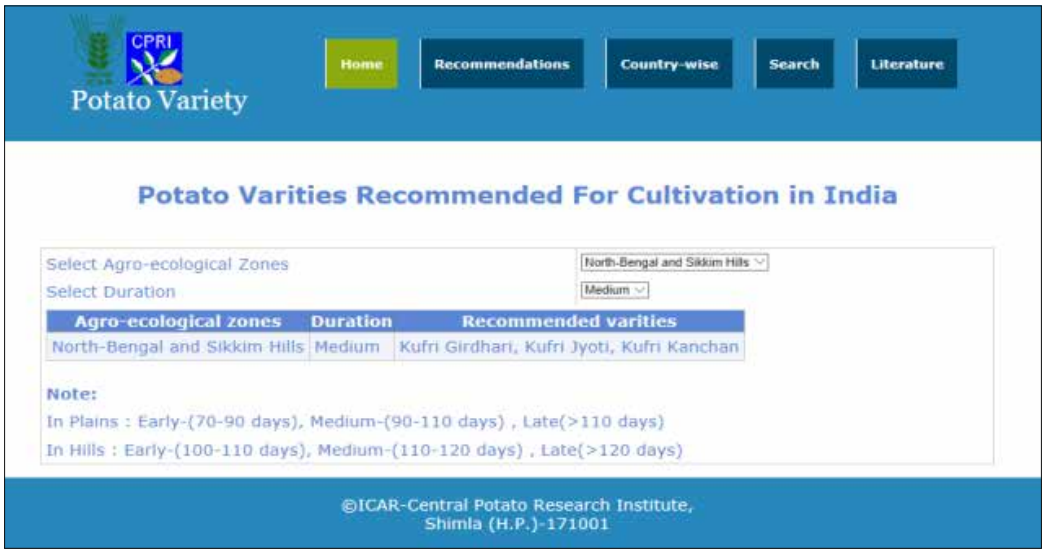

Fig. 2. View of recommendations tab.

Fig. 3. View of country-wise tab.

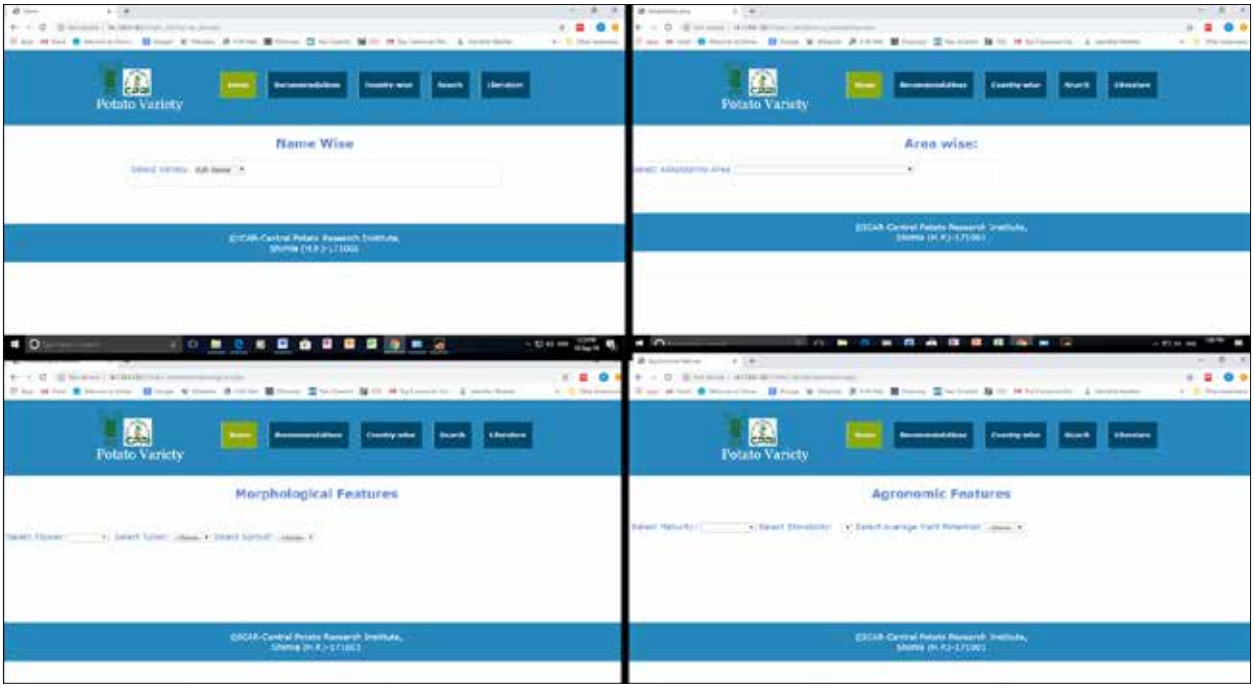

Fig. 4. Screen shot of 4 different search menu for variety name, area, morphological and agronomic characters

4. **Literature**: This tab gives information on the references used for compilation of variety database (Fig. 5).

RESULTS AND DISCUSSION

Database development: The dynamic web pages of the application was developed using ASP.NET with C# language, HTML (Hyper Text Mark up Language) and Java Script. The data is stored in the form of normalized tables in MS SQL database. The relational approach is used to design the database. Relationship between tables is maintained using primary and foreign

Fig. 5. View of Literature tab

key fields. The data is being fetched from the database using SQL connectivity into a more simplified user-friendly "Views" which makes it easy to use and understand. The *Potato Variety Database* is uploaded on the application server maintained at ICAR-CPRI Shimla or can directly be accessed by URL: *"http://14.139.61.86/Potato_Variety"*.

Applications of web-based tool; The development of this web-based tool will enable the farmers to make a proper selection of the varieties available for adoption, for their specific requirements (region, duration, special attributes etc.) and enhance their knowledge of those under cultivation. Simultaneously, it will reduce the gap between the development of a variety and its adoption at the farmers' level besides breaking the stereotype of growing only one kind of variety. It will enable the farmers with know-how of the recent varieties with specialised characters, which may finally enhance the adaptability of area-specific and attribute-specific varieties with improved incomes to the growers. *POTATO VARIETY* is a kind of decision support system for 51 varieties released by ICAR-CPRI, Shimla HP upto 2014 hosting their salient features for planting considerations by the growers. It is a user-friendly, web-based decision and information-based system for Indian potato varieties based on any of the criterion location, agro-climatic zones, duration, yield, etc.

CONCLUSION

This Decision support system (DSS) is easily available on *http://14.139.61.86/Potato_Variety* which provides expert advice on the Indian potato varieties. The availability of varietal information on this web tool on a single server, accessible at multi-location, in an easily query able format is proposed to go a long way in contributing towards the increase in the overall potato production and sustainable resource utilization.

LITERATURE CITED

CPRI (2015) CPRI Vision 2050. Central Potato Research Institute, Shimla, Himachal Pradesh, India 1:33p

Devaux A, Kromann P and Ortiz O (2014) Potatoes for sustainable global food security. *Potato Res* **57**: 185-199

Gatto M, Hareau G, Pradel W, Suarez V, and Qin J (2017) Release and Adoption of Modern Potato Varieties in Southeast, East, and South Asia. In,

Transformation in agricultural and food economy in Asia (Proceedings of the 9th ASAE International Conference: 11-13 January 2017 Bangkok, Thailand) **1**: 1415-44

Kumar D, Ezekiel R and Khurana SMP (2003) Effect of location, season and cultivar on the processing quality of potatoes. *J Indian Potato Assoc* **30**: 247-251

Kumar V, Luthra SK, Bhardwaj V and Singh BP (2014) Indian Potato Varieties and their Salient Features. ICAR-Central Potato Research Institute, Shimla, Himachal Pradesh, India. Technical Bulletin **78** (revised): 64p

Marwaha RS, Pandey SK, Kumar D, Singh SV and Kumar P (2010) Potato processing scenario in India: Industrial constraints, future projections, challenges ahead and remedies-A review. *J Food Sci Technol* **47**: 137-156

Singh BP, Rana RK and Govindakrishnan PM (2014) Vision 2050. Central Potato Research Institute, Shimla Himachal Pradesh, India: 26p

Uppal DS and Khurana SMP (2001) Chipping performance of potato varieties grown at different locations. *J Indian Potato Assoc*. **28**: 233-236