

Development and utility of online knowledge repository of safflower in Agropedia

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Introduction

The demand for addressing the needs of the agriculture sector becomes even more critical for the nation's development. Many social enterprises are currently addressing the agriculture space, attempting to bring new technologies to rural areas to improve the efficiency and profitability of farmers. One such example is agropedia, an online platform developed by the Indian Institute of Technology Kanpur (IITK), which serves as a one-stop hub for information on the agriculture ecosystem. This platform provides, among other things, a space for stakeholder interaction, best practice sharing, news updates, and an online library certified by the Indian Council of Agricultural Research (ICAR). Agropedia has also collaborated with Krishi Vigyan Kendra (KVK), a training and education center for farmer and rural entrepreneurs, to develop "Voice Krishi Vigyan Kendra" (vKVK), a mobile-based advisory system that sends SMS and voice-based messages to field officers and farmers around the country.

Agropedia platform

One of the major aims of agropedia is knowledge management. Knowledge management refers to managing a repository of knowledge that needs to be identified, captured, stored and processed via Information Technology (IT) tools so that it can be applied further in a new context. The knowledge is disseminated in multiple languages such as English, Hindi and other regional languages through appropriate interfaces to users categorized as anonymous, authentic users and editors.

The key elements of the system are knowledge objects and knowledge models (Sini, 2009). Knowledge objects describe agricultural resources such as documents/information in the form of text, image, audio, video, etc. Knowledge models are used to organize, search and navigate agricultural content. Knowledge models are visual representations of important concepts in agriculture with appropriate relationships defined between them. Models can be prepared using several tools but for its easier integration with other models and incorporation in the agropedia portal, these tools need to save or export to Web Ontology Language.

The content in agropedia is aggregated and organized through the use of knowledge models. To enable any specialist to easily develop a knowledge model and connect it to the knowledge base in agropedia, standardization of processes and coding has been done for nine crops i.e. rice, wheat, chickpea, pigeon pea, vegetable pea, sorghum, groundnut, sugarcane and litchi.

The website allows creation of knowledge models with the help of Concept Maps (C-Maps). A C-map is a diagrammatic representation of the concept using nodes and arrows, which show relationships between them. The cMap software allows users to easily construct cMaps and link them with the associated resources which can be in form of

intercropping, sequence cropping, fertilizer management, weed management, pests and diseases control were uploaded in Agropedia platform.

Development of knowledge model of safflower

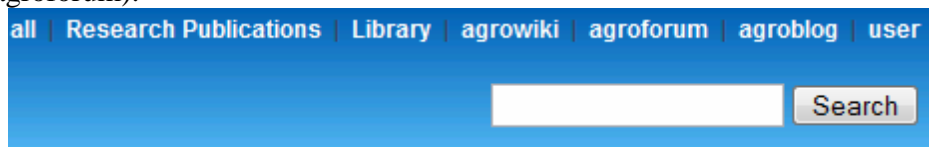
Knowledge model is the structural representation of knowledge developed by using pieces of knowledge and relationships between them. It was created by using the Concept Map (cMap) tool. In other words, a collection of Concept Maps associated with resources (like text, image, audio, and video clips) known as knowledge models. Concept map is a diagrammatically presentation of a concept with arrows and nodes; where nodes present the related terms of the focused concept and the arrow shows the relations of that concept with the other nodes. Concept maps for each topic *viz.*, crop production, crop protection, alternate uses of the crop, contingency planning etc were created and brought together to create knowledge model. Concept maps specific to safflower were created. Safflower knowledge model was created by domain expert using concept ontology editor tools. These models are then used as the essential element to organize the data pool. Indexing is performed by the user after uploading a document. The user is presented with a list of concepts from the Knowledge Models from where he or she can select one or more concepts to associate to the uploaded resource. The system will relate the URI of the selected concept(s) to the document. Similarly when the user search for information, can select concepts from the model, and the system will retrieve all resources which have been previously associated to these concepts. The content was added by crop expert after creating username and password. Content was visible in the platform once the content is certified.

Searching the content for safflower production practices

There are two types of searches in agropedia.

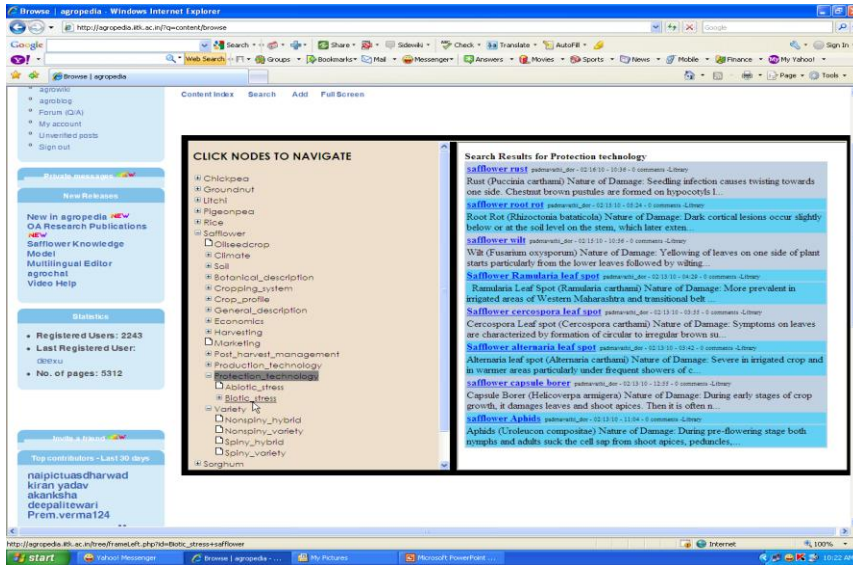


(1) **Keyword Search:** This is google like search, provided on the top right corner. User has to enter the keyword safflower. User has the option either to search from all the spaces in agropedia (Searchall) or search from a particular content type (library,agrowiki,agroblog, agroforum).



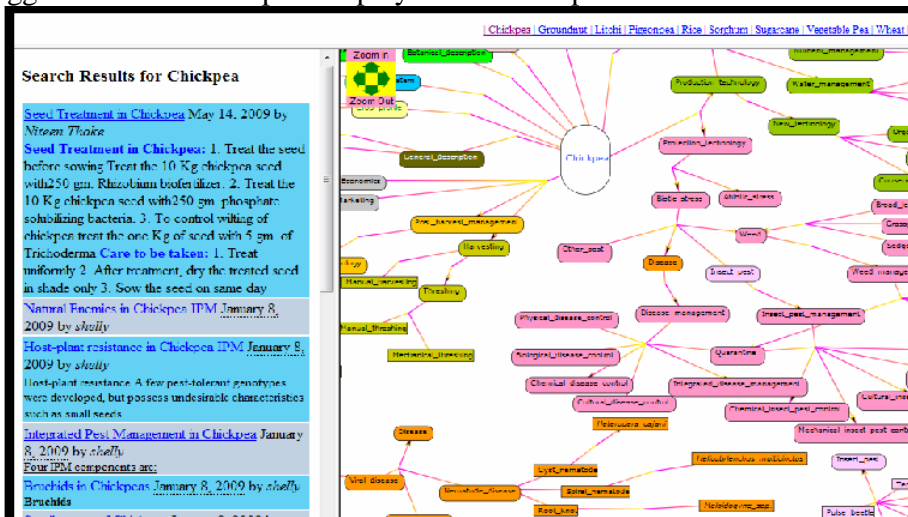
(2) **Semantic Search:** This is a tagged based search. This search is provided in the library section of the extension section. The distinguishing feature of this search is that it does not search the keyword in the document itself, it searches the document tagged with that keyword. This increase the relevancy of the content with the information a user is searching for. Three different interfaces are provided for this search.

(a) **Content Index:** Crop taxonomy of nine crops is represented in a hierarchical structure in left pane and when the user clicks on safflower, results tagged with that taxonomy are displayed in the right pane.



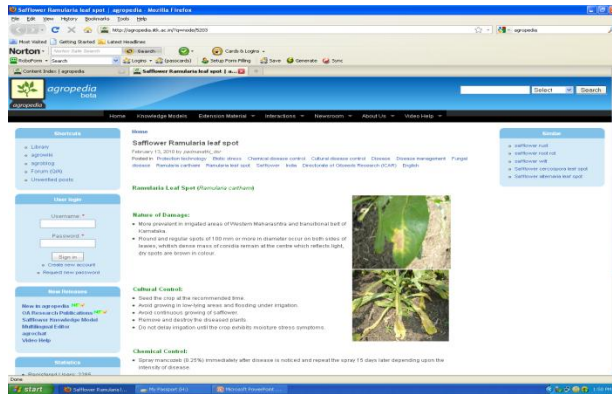
Searching through content index

(b) **Browse content:** This interface provides the user with a concept map like interface of safflower crop. The map is rendered in the right pane. When a user clicks a concept, results tagged with that concept is displayed in the left pane.



Searching through browse content

(c) **Search:** This interface provides user with a drop down list of nine crops already present in the knowledge base of the platform and a text box. User has to select safflower and enter a taxonomy term. On clicking the search button, results tagged with that concept is displayed below the text box.



Conclusion

Low productivity of the crop is because of poor crop management under input starved conditions. The online availability of information facilitates the easy accessibility of the content by extension workers become easy. Therefore the extension workers can advise the farmers in time which is very important in crop cultivation in general and in insects and disease management in particular. Involvement of other stakeholders from production to marketing, seed production, processing of safflower and their regular interaction in the platform shall go a long way in improving the productivity, sustenance and profitability of the crop and its growers.