Farmer's Bookshelf: Evolution of a Horticultural Information Delivery System

Kent D. Kobayashi, H.C. Bittenbender, and I. Scott Campbell, Tropical Plant & Soil Sciences Department, University of Hawaii at Manoa, 3190 Maile Way, Honolulu, HI 96822-2279

ABSTRACT

Conceived in 1987, the Farmer's Bookshelf information delivery system has evolved from a Macintosh computer, floppy diskette-based system to a World Wide Web-based system. Beginning with only a few fruit crops, the Farmer's Bookshelf today provides information on a wide range of diversified crops. Further features include recommending groundcovers, landscape trees, and phosphorus fertilization. The Farmer's Bookshelf diagnoses field problems of macadamia, calculates nut spoilage, and computes the amount of turfgrass irrigation. The Web-based version has enabled the Farmer's Bookshelf to link to other resources for up-to-date information. We see the Farmer's Bookshelf continuing to evolve to meet the ever-changing needs of clientele.

INTRODUCTION

Clientele (producers, advisors, and researchers) of various horticultural industries need up-to-date information to help them make decisions. Effectively disseminating this information to users occurs in a rapidly changing environment of presentation methods (Biggs, 1996). Information delivery systems are an important method of technology transfer, providing a wide range of information to agricultural clientele. One such system is HortBase, a horticultural World Wide Web-based information system of the American Society for Horticultural Science (ASHS) (Green, 2000). Another Web-based system SORTINFO aids in selecting varieties of wheat, oats, and other field crops (Jensen, 2001).

Over the years, computer technology and information delivery technology have changed considerably. Software for developing information systems, based on hypertext and hypermedia, has enabled these systems to run on personal computers (Carrascal et al., 1995). With the advent of the World Wide Web, we see widespread accessibility to vital information through the Internet.

The Farmer’s Bookshelf information delivery system had its origin in the late 1980s when there were few agricultural information systems. One of the more prominent systems was FAIRS (Florida Agricultural Information Retrieval System) at the University of Florida (Beck et al., 1984), which recently was replaced by EDIS (Extension Digital Information Source). The idea for the Farmer's Bookshelf came about from realizing that an information system such as FAIRS was needed in Hawaii. The purpose of this paper was to examine the evolution of the Farmer’s Bookshelf information delivery system from its earliest beginnings to the present.

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MATERIALS AND METHODS

Macintosh Version

The Farmer's Bookshelf was created in 1987 as increasingly more powerful Macintosh (Apple Computer) computers were being introduced, and high quality software for these computers became readily available. Based on the Macintosh, the Farmer's Bookshelf was developed using the software HyperCard (Apple Computer) (Goodman, 1987), which was shipped with each Macintosh. Hypertext/hypermedia software enables the linking of related information, allowing the user to browse and quickly get the information needed (Carrascal et al., 1995). Although the Farmer's Bookshelf was initially developed using HyperCard, as a possible alternative, we tested a similar software called SuperCard (IncWell DMG).

The first crop included in the Farmer's Bookshelf was macadamia. This was done by transferring information from the macadamia industry analysis (Bittenbender et al., 1987), a printed format, to the Farmer's Bookshelf, a computerized format. We later added an avocado crop file (Bittenbender and Kobayashi, 1989).

From its start with two fruit crops, the Farmer's Bookshelf was broadened to include other fruit crops. In subsequent years, we incorporated numerous diversified crops into the Farmer's Bookshelf—ornamentals (Kobayashi and Bittenbender, 1991), home garden vegetables, vegetables, and turfgrass.

Besides including more crops, we enhanced the Farmer's Bookshelf by expanding its features. The Farmer's Bookshelf mimicked a spreadsheet program in calculating the nut spoilage of macadamia (Kobayashi and Bittenbender, 1989). It helped diagnose possible problems of macadamia seen in the field (Kobayashi et al., 1991), similar to Tospovirus, a diagnostic pictorial database for tospovirus (Lea-Cox et al., 2000). The Farmer's Bookshelf also kept track of farmers and their orchards by linking to Excel (Microsoft Corp.) spreadsheets and graphs of nutrient levels in the orchards (Kobayashi et al., 1990).

Ensuing features included calculating the amount of irrigation for turfgrass (Kobayashi and Bittenbender, 1991) and recommending groundcovers based on user-specified criteria (Kobayashi and Bittenbender, 1993). The Farmer's Bookshelf also recommended the amount of phosphorus fertilizer to add, based on the soil series, crop, and soil analysis (Kobayashi et al., 1995). Using several criteria selected by the user, it also recommended trees to use in landscaping (Kobayashi et al., 1996). We subsequently added cost of analysis spreadsheets for the production of various crops, which users could download as Excel files. Since the Farmer's Bookshelf was still a floppy diskette-based information system, we distributed the crop files on one diskette to clientele requesting it.

IBM-compatible Version

Users of IBM-compatible computers began requesting a DOS (IBM Corp.) version of the Farmer's Bookshelf. We experimented with the hypermedia software LinkWay (IBM Corp.), which ran under DOS, but found it inadequate. Soon after, we tested the hypermedia software PLUS (Spinnaker Software Corp.), found it suitable, and developed the Windows (Microsoft Corp.) version of the Farmer's Bookshelf using PLUS (Kobayashi and Bittenbender, 1994). Distribution of the Windows version consisted of one diskette of the crop files and one diskette of the runtime version of PLUS.
World Wide Web-based Version

With the World Wide Web becoming more prominent as an information delivery system (Green, 2000), we looked to moving the Farmer's Bookshelf on the Web. The text and graphics from the HyperCard and PLUS versions of the Farmer's Bookshelf were transferred to the Web version by rewriting them in HTML (Hyper Text Markup Language), the authoring language used to create documents on the Web.

RESULTS AND DISCUSSION

Macintosh Version

Realizing that an information delivery system such as FAIRS was needed for Hawaii was only the start. Finding the software for this system and the platform that would support the software (e.g., main frame, IBM-compatible, or Macintosh computer) remained. It was a blending of the need for information delivery and coming up with the necessary computer and software that made the Farmer's Bookshelf possible.

Apple Computer ships their software HyperCard with their Macintosh computers. Therefore, in its early days, the Farmer's Bookshelf was developed for Macintosh users. Since HyperCard was provided with each Macintosh, we did not have to supply any software or runtime software with the crop files.

We experimented with the software SuperCard, which was similar to HyperCard. Compared to HyperCard, this high-quality software had additional desirable features. However, a runtime version of SuperCard would have had to be distributed with the crop files. Further, users would have needed to buy a personal copy of SuperCard if they had wanted to make modifications to the crop files. We did not see any clear-cut advantage of SuperCard over HyperCard and decided not to use it.

Files of various crops were copied onto a floppy diskette and mailed to clientele when requested. At first, we provided the diskettes, but this practice soon became expensive. Later, to offset some of the expense we asked users to send us a blank diskette, copied the crop files onto the diskette, and mail it back to them. Shipping was still free. The idea was never to commercialize the Farmer's Bookshelf (Biggs, 1996). However, asking clientele who requested a copy to send us a diskette helped reduced expenses.

To keep things simple, we tried to make sure that all the crop files fitted on one diskette and kept graphic files down to a minimum in number and size. As a result, the resolution of the graphics was only adequate, not approaching the superior quality seen on the Web. One diskette was suitable as long as the number of crop files remained low.

The Farmer’s Bookshelf provided spreadsheet-like features in its program on calculating the nut spoilage of macadamia (Kobayashi and Bittenbender, 1989). Using HyperTalk, the programming language of HyperCard (Shafer, 1988), we created a “spreadsheet” with HyperCard, which proved to require much programming. Although it was possible, we concluded that having spreadsheet-like functions was better left to a spreadsheet software such as Excel rather than trying to emulate it with HyperCard.

IBM-compatible Version

After preliminary testing, we decided not to use the software LinkWay. Although it ran on DOS computers, it was time-consuming to have separate versions of the Farmer's Bookshelf to support both CGA and VGA graphic formats. Compared to HyperCard, LinkWay's features
were crude, and programming was clumsy. Thus, we decided not to use LinkWay and began searching for another hypermedia software.

After reviewing several software, we chose the software PLUS to develop the IBM-compatible version of the Farmer's Bookshelf. HyperCard files were translated into PLUS files (Kobayashi and Bittenbender, 1994). To avoid the problem of having users buy the PLUS software, we distributed a runtime version of PLUS for Windows (on diskette) with the diskette of the crop files. Although acceptable, PLUS was sluggish running under Windows compared to HyperCard, and users could not modify the crop files as with HyperCard.

**World Wide Web-based Version**

As Web-based information delivery systems became more prevalent (Green, 2000; Lea-Cox et al., 2000), the Farmer's Bookshelf was moved to the Web by rewriting it using HTML (Figures 1, 2). In the 1990s, the need to provide flexible information formats and the ability to update the system would have to be more immediate (Adelaine et al., 1996).

The Web-based system solved the problem of having to support two Farmer's Bookshelf versions—Macintosh and Windows (Kobayashi and Bittenbender, 1994). There were other advantages, too. A Web-based system provides global access by a wider range of clientele. It allows for easy and rapid updating of information and eliminates the need of mailing diskettes with updated files to clientele. In addition, we are no longer limited to putting all the crop files on one or several diskettes. We can now include figures, tables, and color photographs—files that often are too large for a diskette.

As with Web-based information systems, the Farmer's Bookshelf provides links to other information resources, a feat not possible on a diskette-based system. Clientele need current information. The Farmer's Bookshelf links to newspaper articles about agriculture, which are updated daily, articles in local magazines, and national agricultural publications (Figure 3). The Farmer's Bookshelf keeps users informed of local agriculturally related events, upcoming gardening events, and workshops. There are links to weather reports of the major cities in Hawaii and drought information. Links to the Hawaii Department of Agriculture supply the latest news on pests, pesticides, regulations, and agricultural statistics on crops.

Recently, other links have been added to the Farmer's Bookshelf including agricultural search engines, agricultural distance education (learning), agricultural glossaries and dictionaries, and plant selectors. We included links to sources of agricultural software and agricultural calculators.

Ever expanding in the kind of information provided, the Farmer's Bookshelf added a section on nutraceuticals featuring the crop 'awa. There are links to the Hawaiian Native Plant Propagation Database and the Seed Program where users can purchase vegetable and fruit seeds from the College of Tropical Agriculture and Human Resources.

In conclusion, the Farmer's Bookshelf information delivery system has changed and evolved over the years since its conception. As new technology for Web-based information systems is introduced, we will continue to revise and update it to meet changing clientele needs.
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LITERATURE CITED


Figure 1. Main web page of the Web-based Farmer’s Bookshelf information delivery system. The URL is http://agrss.sherman.hawaii.edu/bookshelf/fb.shtml.
FRUITS

Farmer's Bookshelf
Information system of tropical crops in Hawai'i

- Avocado
- Banana
- Coffee
- Lychee
- Macadamia
- Mango
- Papaya
- Persimmon
- Pineapple

Other Links
Agricultural pests—fruits and nuts. Knowledge Master, CTAHR.
Free CTAHR publications about fruits.
Hawaii Agricultural Industry Associations.

Other Fruits
Fruit Facts. California Rare Fruit Growers, Inc.

Guava. Fort Valley State University.
Guava. Purdue University.
Tropical guava. California Rare Fruit Growers.

Carica papaya. Purdue University.
Carica papaya. Angosy University
Papaya. California rare Fruit Growers.

Taro (Colocasia esculenta). Southern Illinois University Carbondale.
Welcome to the taro page. Windward Community College.

Figure 2. Web page for the fruit section of the Farmer's Bookshelf displaying links to the individual crops and links to other sources of information on fruits.
What's New!

NEWS ARTICLES

- Kauai farmers fear loss of lo'i. Honolulu Advertiser, 3/25/02.
- Dole keeps dividend at 15 cents a share. Honolulu Star-Bulletin, 3/22/02.
- Hawaii native tabbed as Ag inspector general. Honolulu Star-Bulletin, 3/19/02.
- Garden's papaya tree came from Australia. Honolulu Advertiser, 3/17/02.

UPCOMING EVENTS

- Agriculturally-related Events
  - Coming Events. Honolulu Advertiser, 3/25/02.
- Community Calendar. Honolulu Advertiser, 3/25/02.
- Courses, Workshops and Conferences: University of Hawaii Ku Lama, 3/22/02.
- Events Calendar. University of Hawaii Ku Lama, 3/22/02.

MAGAZINE ARTICLES

- Big projects, Big Island. Hawaii Business, 11/01.

NEWS RELEASES, REPORTS, WEATHER

- HASS Publications. Monthly, quarterly, semi-annual, and annual reports on the number of farms, acreage, yields, production, farm price, and value of fruits and nuts, vegetables, and flowers and nursery products. Hawaii Dept. of Agriculture.
- Pest Advisory. Provides information on new pests and diseases that have become established in Hawaii. Hawaii Dept. of Agriculture.
- Overview of major regulations affecting pesticide use in Hawaii. There are as many as 20 Federal regulations and many more State laws and rules. Hawaii Dept. of Agriculture, Pesticides Branch.

Figure 3. Farmer's Bookshelf provides up-to-date information through links to newspaper articles, upcoming agricultural events, magazine articles, weather and drought information, and news releases from the State Department of Agriculture.