A HYPERTEXT INFORMATION SYSTEM FOR RECOMMENDING GROUNDCOVERS

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ABSTRACT

A hypertext information system was developed to recommend possible groundcovers for use. The user may specify up to 4 of 33 criteria, and the program selects groundcovers that meet the criteria from a list of 48 groundcovers. The program also provides specific information on each groundcover and general information on care, establishment, and spacing. Running on an Apple Macintosh™ computer using the software HyperCard™ 2.0, this system offers Extension and industry personnel, and homeowners information in a computerized, easy-to-use format.

INTRODUCTION

Hawaii has experienced a large increase in population, housing, and commercial construction. With the increased development in housing, hotels, and resorts and with the reduction in lot sizes for single-family dwellings have come increased interest in using groundcovers to landscape limited areas. Moreover, as these developments are being located on a wide range of lands, there is a need to choose groundcovers that will do well in many different areas.

Extension personnel are called upon to recommend groundcovers and to diagnose problems. Industry personnel and homeowners need up-to-date information on groundcovers to make sound management decisions. Information usually comes from several sources, including extension bulletins, research papers, and proceedings of commodity group meetings and workshops. With such diverse sources, a computer-based information system can help in consolidating and presenting the information in an easily accessible format.

Database programs have been developed for selecting southern landscape plants (Taylor et al., 1990), flowering species (Smith et al., 1989), and alfalfa varieties (Hannaway, et al., 1987). A the Farmer’s Bookshelf to help extension personnel, industry personnel, and homeowners 1) select groundcovers according to cultural and landscape criteria and 2) obtain information on an individual groundcover.

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A hypertext information system called the "Farmer's Bookshelf" has been
developed for crops in Hawaii (Bittenbender and Kobayashi, 1989; Kobayashi and
Bittenbender, 1991). The objective of the work reported here was to develop a
module of
database was developed to select groundcovers (Kobayashi, 1987), but it required the
user having the dBASE III™ (Ashton-Tate) program, was limited in its search
criteria, and did not have hypertext capability.

MATERIALS AND METHODS

HyperCard™ (Apple Computer, Inc.) is an information management
program based on the principle of "hypertext." Hypertext is a body of written and
pictorial material interconnected in a complex way (Nelson, 1965). Hypertext uses a
system of interlinked pieces of information in which materials are not read
sequentially such as in a book (Nielsen, 1990). The authors of the text set up several
alternatives for readers to explore rather than a single stream of information. Given
the option of branching off to other related information, the reader determines
which of them to follow when reading the text.

HyperCard uses the concept of an index card with information being stored
on a set of "cards" called a "stack." A card is a computer-screen-sized work area that
contains text and graphics (Figure 1). Objects on a card (e.g., a word, block of text, or
picture) are used to link one card to another card. By selecting the object with the
cursor and pressing the mouse button, the user navigates from card to card.

Painting tools in HyperCard were used to draw the background and headings
on the cards. "Buttons" then were added to the cards (Figure 1). A button is an
object on a card that when "clicked on" (moving the cursor over the button and
pressing the mouse button) causes the button's instructions to be executed. Added
to the background of the cards were "fields," areas that hold text information (Figure
2). The programming language of HyperCard called HyperTalk™ (Shafer, 1988) was
used to write the instructions for buttons and fields to carry out specific actions.
Portions of publications on groundcovers (Degen et al., 1973; Rauch, 1985) were
added to the fields on the cards (Figure 2).

RESULTS AND DISCUSSION

The groundcover stack contains several card "backgrounds." Each
background is a layout shared by one or more cards. The TOPICS card, the first card
of the stack, is a table of contents that displays the various topics on groundcovers
(Figure 1). The user may see information on general topics such as care,
establishment, and spacing of groundcovers by clicking on the appropriately named
buttons. The user also may access lists of the common or scientific names of the 48
groundcovers in the stack (Figure 1) and then obtain specific information on that
groundcover (Figure 2).
The CRITERIA card displays the 33 criteria from which the user may choose up to 4 criteria (Figure 3). The program offers the advantage of allowing the user to choose more than 1 criterion from any group. For example, the user may select the criteria “Shady” and “Partial shade” to find those groundcovers that can be grown under shady and partial shade conditions. With the clicking on “Search” button, the stack is searched for those groundcovers that meet these user specified criteria. If any groundcover is found, a list is displayed (Figure 4). The user then has the option of saving the names of the recommended plants and information on each groundcover to a diskette file or printing it.

The user also may click on the name of any of the recommended groundcovers which then displays a CHAPTER card (Figure 2) with information on the groundcover. CHAPTER cards have scrollable windows of text with vertical arrows to view more text than is shown in the field at once. Moving forward or background through the cards on different groundcovers is done by clicking on the horizontal directional arrows at the bottom of the card. While viewing a card, the user has the option of printing the text or saving it to a diskette file. The user may select specific textual materials from any card that is then automatically put into a field on a separate card designed for this purpose. The user may then edit the information in this field, print it, or incorporate it into a word processing document. A feature for rapidly locating specific information is the “Find” button to search for a particular word or phrase or the Index that lists key words (Figure 1). Clicking on an index word takes the user to all the occurrences of this word in the stack.

The groundcover stack runs on a Macintosh™ (Apple Computer, Inc.) computer. One megabyte of RAM and the HyperCard program version 2.0 are needed. A computer with a hard drive and a floppy disk drive is recommended. The stack is distributed via a diskette to individual users. It is also available on the College of Tropical Agriculture and Human Resources’ electronic bulletin boards “The Coconut Telegraph” and “Ag-Net Hawaii” and the national information service GEnie™ (Rockville, MD). A copy of the groundcover stack may be obtained by contacting the authors.

The groundcover stack offers several advantages to the user. By simply moving the cursor and pressing the mouse button, it offers a computerized format to browse through and access information quickly and easily. It provides various presentation formats including text and graphics. Updates and additional cards are easily made by editing the information on an existing card, pasting in new information from a word processing file, or duplicating a card and pasting in new information.
LITERATURE CITED


Figure 1. The TOPICS card of the groundcover stack shows the various topics of information. The user clicks on the name of a topic to go to the card on that topic (e.g., Care). The user may search for specific words in the stack by using the “Find” button or going to the Index.
This rapidly spreading plant has unusual metallic purple leaves. The underside of the leaves is dark purple. Metallic plant grows to about 6 inches high. It may be grown in full sun where it requires an abundance of moisture, or in shady locations. A slightly acid, moist soil is best. Recommended spacing is 12 to 15 inches.

<table>
<thead>
<tr>
<th>Tolerances</th>
<th>Plant height</th>
<th>Elevation</th>
<th>purple flowers</th>
</tr>
</thead>
<tbody>
<tr>
<td>sun</td>
<td>to 12 in</td>
<td>sea level-1500 ft</td>
<td>white flowers</td>
</tr>
<tr>
<td>partial shade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>shady</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2. The CHAPTER card of the groundcover stack shows fields of information on a groundcover. Information in these fields can be printed or saved to a diskette. The user can use the horizontal scroll arrows at the bottom of the card to see information on other groundcovers.
### Criteria for Selecting Ground Covers

**Elevation**
- [ ] Sea coast
- [ ] Sea level - 1500 ft
- [ ] Mid-elevation - 4000 ft

**Height**
- [ ] to 3 in
- [ ] 3-6 in
- [x] to 12 in
- [ ] 18-24 in
- [ ] to 36 in

**Tolerances**
- [ ] Wind
- [ ] Dry soil
- [ ] Moist soil
- [x] Poor drainage

**Erosion control**
- [ ] Erosion control

**Flower color**
- [ ] Blue
- [ ] Bronze
- [ ] Cream
- [ ] Orange
- [ ] Pink
- [ ] Purple
- [ ] Red
- [ ] Yellow
- [ ] White

**Tolerances**
- [x] Shady
- [ ] Partial shade
- [ ] Sun

**Other Tolerances**
- [ ] Heat
- [ ] Humid
- [ ] Arid
- [ ] Clay soil
- [ ] Sandy soil
- [ ] Acid soil
- [ ] Alkaline soil
- [ ] Light foot traffic

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Figure 3. The CRITERIA card of the groundcover stack shows the 33 criteria from which the user can select up to 4. The user can quickly clear the check boxes to start a new search or review the list of recommended groundcovers from a previous search.
The ground covers below have met the specified criteria:

Metallic plant
Mondo grass

Click on the name of a ground cover to see additional information about that ground cover.

Save Information
Print Information

Figure 4. List of recommended groundcovers that met the user specified criteria. The user may click on the name of a groundcover to obtain further information. The list of groundcovers and information on each groundcover may be printed or saved to a diskette.