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Research Reports:

A Computerized Spreadsheet Program for Estimating Costs and Returns of Selected Field-Grown Nursery Stock[1]

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Abstract

A computerized, menu-driven spreadsheet program was developed to assist nursery producers and other nursery professionals with generating customized nursery budgets for field-grown nursery stock and Christmas trees. The compiled spreadsheet is a "stand alone" program with its financial models based on enterprise budgets taken from extension publications. The program enables the user to estimate production cost and potential profit of an existing or prospective crop. Advantages of the program include the user modifying existing data bases rather than entering all relevant information. Users of the program can also evaluate risk parameters of a decision through the "what-if" capabilities of the spreadsheet.

Index words: Nursery budgets, cost analysis, economic analysis

Significance to the Nursery Industry

Nursery budgets developed by computerized spreadsheets have numerous uses once the information has been updated to reflect the user's own cost and profit potential. A nursery operator can compare the nursery's own estimated cost and profit potential for various nursery stock against those of a typical operation. As costs and prices change, a nursery producer can enter those changes into the budgets and assess the impacts upon the nursery operation. Through "what-if" analysis, a nursery operator can begin to form probabilities about possible outcomes of a financial decision. The budgets can also help determine the cost effectiveness of production processes.

Computers have the ability to simplify complex problems and aid in decision making. The ability to use computerized budgets such as the one presented here and other computerized financial tools can be a useful part of the producer's total management package.

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Introduction

Estimating cost and the potential profit of producing field-grown nursery stock is difficult for most existing and prospective nursery growers. The production process usually involves numerous stages of production and a long time period. While out-of-pocket expenses may be low and relatively easy to determine, overhead and indirect cost such as interest expense may be high and yet often difficult to

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calculate. In addition, frequent price and input cost changes cause growers to continually reassess the potential profit of many prospective or existing types of nursery stock.

Several previous studies have estimated the cost of field-grown nursery stock (1, 2, 3, 4). Most previous studies present a detailed analysis of the cost of facilities, machinery, labor requirements, and variable expenses of selected types of field-grown nursery stock for typical nursery operations. While providing tremendous amounts of useful economic information, the budgets are inflexible and require extensive changes and recalculations before being applicable to a specific nursery operation.

A computerized spreadsheet is a useful tool when developing financial models such as enterprise budgets. Uses of computerized spreadsheets may range from large complex models detailing company-wide projected profit and loss statements to the analysis of specific segments of the business such as enterprise budgets. An inherent advantage of a computerized spreadsheet is that financial relationships can be programmed into the model and pertinent data are automatically updated eliminating the need to recalculate desired information when prices and inputs change.

Computerized spreadsheets are particularly useful when developing daily, weekly, and even monthly financial reports. They are also valuable when determining financial consequences of costs or price changes such as those analyzed in an enterprise budget. Computerized spreadsheets also allow the user to assess risk levels resulting from a decision through the "what-if" capabilities of the spreadsheet program.

Another advantage of a computerized spreadsheet is that all production technologies and recommended production practices can be programmed into the spreadsheet. Prospective growers who may not be knowledgeable of the technical components of the production process may find this information useful. In addition, estimates of typical costs and profit levels also provide a standard by which existing growers can compare their own profit and cost of production.

Having the technologies and recommended production practices included in the program is different from other nursery budgeting programs (7) and commercial accounting programs which may also provide a limited number of budgeting capabilities. While these types of computer programs can be used in a specific nursery operation, they require the user to input all relevant information regarding the production process.

The purpose of this paper is to outline the capabilities of a computerized spreadsheet program which can assist nursery operators in estimating their own cost of production and potential returns of selected field-grown nursery stock. The program is also useful to both prospective and existing nursery growers in the analysis of new nursery stock.

Materials and Methods

The computerized spreadsheet program LOTUS 123 was used first to develop the financial models. The LOTUS 123[3] spreadsheet templates were then compiled using the BALER[4] spreadsheet compiler. A compiled spreadsheet has the advantage of being a "stand alone" program without requiring a host spreadsheet such as LOTUS 123. Also, all formulas are copy-protected which prevents an unfamiliar user from destroying a part of the spreadsheet. The financial models, nursery facilities and enterprise budgets including crop production schedules that were used in the spreadsheet program were adapted from information contained in Experiment Station and Extension publications (1, 6). The compiled spreadsheet includes the cost of two different sizes of nurseries and enterprise budgets for six different types nursery stock and one type of Christmas tree. A "Fixed Facility and Data" file includes the capital requirements and annual fixed costs representative of a 50 and a 100 acre field nursery along with machinery, chemical, and other input costs. Files for each of the different types of nursery stock include a production schedule with associated labor and machinery requirements, an estimated costs and returns section and accompanying footnotes. An economic rather than an accounting approach to budgeting was used (5). The economic approach considers the opportunity cost of all resources and determines the annual cost of fixed facilities based upon replacement cost.

Results and Discussion

The computer program *Enterprise Budget Worksheets for Nursery Stock* is "menu-driven" meaning that most of the information that the user needs is displayed on the screen. The user can move through the screens in search of the different types of nursery stock and the desired sections of the spreadsheet. A flow chart of the computer program is presented in Fig. 1. The compiled spreadsheet is programmed with a limited number of worksheet commands which allows the user to change prices, costs, add and delete sections and adjust the spreadsheet to reflect the user's own nursery operation.

The flow chart describes the process of entering and using the spreadsheet and begins with accessing the compiled spreadsheet directly from the disk operating system (MS-DOS[5] or PC-DOS[6]). Once the nursery program is accessed, the University of Tennessee logo, disclaimer statements and directions are presented. The program then moves to the MASTER MENU where the different types of nursery stock plus facilities and data files are listed. The user retrieves the desired nursery stock by entering the appropriate number.

Upon retrieving the desired nursery stock, the program also retrieves the facility and data file and automatically updates the nursery stock budget to reflect the cost in that file. This is a useful feature which allows nursery producers to access the facility and data file directly from the master menu, change the facility and data file to reflect their own cost of inputs and save the changes.

After a nursery crop is selected, the program displays a list of the different sections of the spreadsheet. From this menu, the user can access the capital requirements, annual fixed costs, machinery cost, estimated cost and returns, the labor and equipment summary, and footnotes sections of the spreadsheet. The print commands are also listed in the MAIN MENU and will print each section of the spreadsheet upon request. From within the spreadsheet, the user can QUIT and return to the MASTER MENU. A user can make

[3]Lotus 123 is a registered trademark of Lotus Development Corporation.

[4]Baler is a trademark of Brubaker & Associates.

[5]MS-DOS is a registered trademark of Microsoft Corporation.

[6]PC-DOS is a trademark of International Business Machines Corporation.

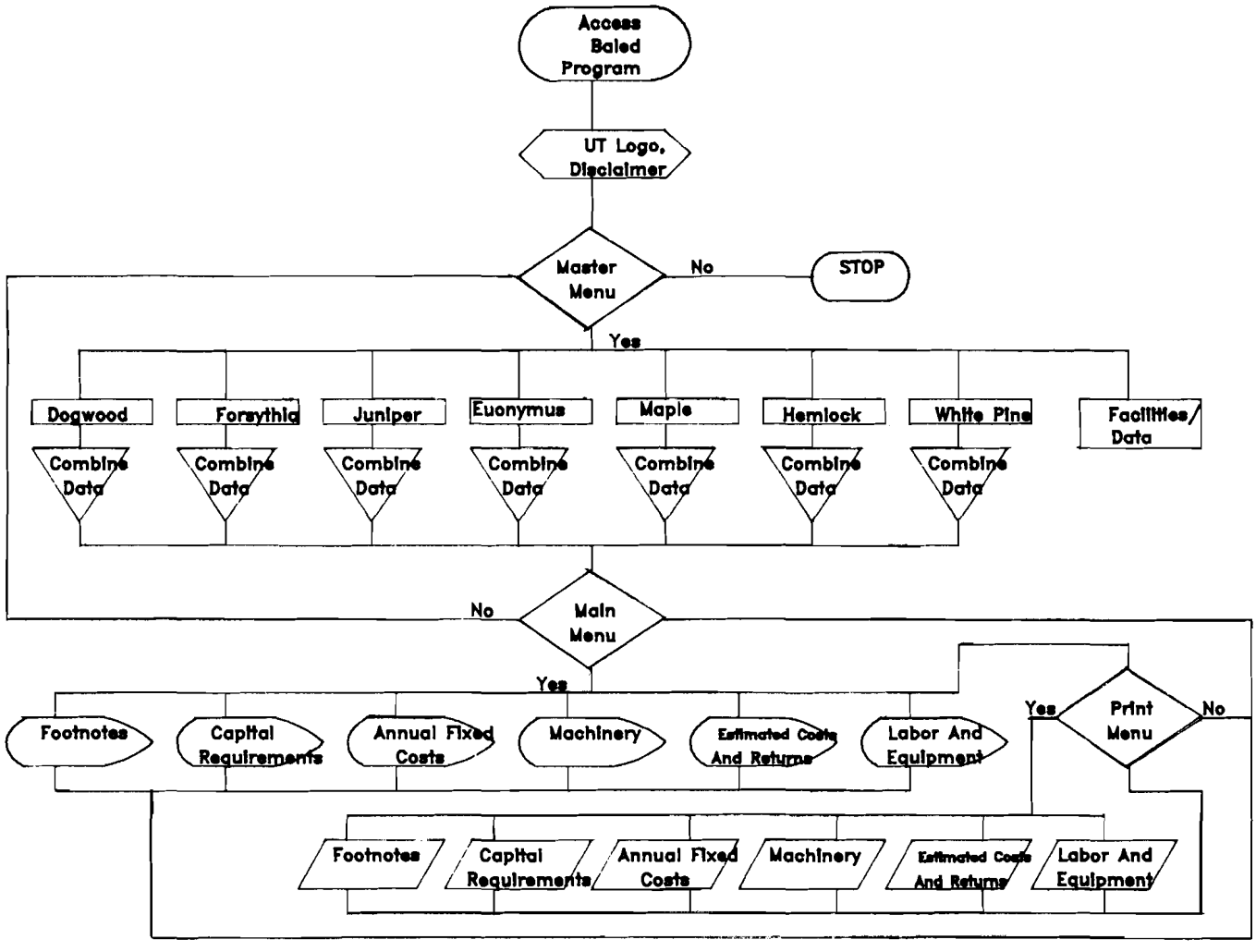

Fig. 1 Flowchart of the Computer Program *Enterprise Budget Worksheets for Field-Grown Nursery.*

numerous changes within the spreadsheet for each specific crop. All prices, costs and quantity levels can be adjusted by the user. These cells are highlighted in blue or a darker shade of the screen color. All cost and returns estimates will automatically be updated to reflect the changes. Unnecessary production processes are deleted by simply entering a zero for quantity used.

Additional space is provided for production processes which are not included in the spreadsheet. A user can enter a description of the process into the description column and enter the quantity used and cost in each respective cell. All costs and returns will automatically be updated since the formulas for each addition are already programmed into the spreadsheet. The spreadsheet can be printed or saved for future use. After all changes have been printed or saved, the program returns to the MASTER MENU, and the user can either leave the program or make another menu selection.

The advantage of this spreadsheet program is that most of the relevant data needed to determine the costs and potential profits to a "typical" field-grown nursery operation in U.S. climatic zones 7 and 8 is included in the program. The budgets can be adjusted to reflect small differences in cost and price situations of different nursery operations. The disadvantage of this program, however, is that for nursery operations which differ significantly in size, operation and production practices, the computerized spreadsheets may prove too restrictive. In which case, it may be easier for nursery operators to construct their own budgets.

The computer program *Enterprise Budget Worksheets for Stock* is available through the Department of Agricultural Economics and Resource Development, P.O. Box 1071, University of Tennessee, Knoxville, TN 37901-1071 for $15 which includes disk, operations manual and the Extension publication *Planning Manual for Nursery Stock*. The program can be used on any IBM or IBM compatible computer with DOS 2.0 or higher and RAM storage of at least 280 kilobytes. The disk combinations allow use on computers with a hard disk, single, or dual disk drives. Those interested in purchasing the program should first request an order form.

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Evaluation of Dinitroaniline Herbicides for Weed Control in Container Landscape Plant Production[1]

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Abstract

Five formulations of three dinitroaniline (DNA) herbicides [Surflan (oryzalin); Pre-M, Southern Weedgrass Control (pendimethalin); and Barricade (prodiamine)] were applied at 4.48 kg ai/ha (4.0 lb ai/A) every four months to container-grown landscape plants. These treatments were compared with untreated and weed-free controls, as well as the combination herbicides Rout and Ornamental Herbicide 2 composed of oryzalin or pendimethalin, respectively, [1.12 kg ai/ha (1.0 lb ai/A)] with Goal (oxyfluorfen) [2.24 kg ai/ha (2.0 lb ai/A)]. The combination herbicides caused the greatest amount of acute phytotoxicity, severely damaging *Hemerocallis* hybrid 'Aztec Gold' and *Liriope muscari* 'Big Blue'. Water dispersable granular formulations of Pre-M (pendimethalin) and Barricade (prodiamine) were phytotoxic to *Photinia* × *fraseri* while the granular formulations were not. Surflan (oryzalin) caused the greatest reduction in crop growth and was the only treatment that reduced survival. Surflan (oryzalin) and Ornamental Herbicide 2 (pendimethalin + oxyfluorfen) inhibited daylily flowering 98% and 65%, respectively. *Hairy* bittercress (*Cardamine hirsuta*), spotted spurge (*Chamaesyce maculata*), and yerba-de-tago (*Eclipta alba*) control generally was best with Barricade (prodiamine) and treatments containing Goal (oxyfluorfen). All herbicides, except Surflan (oryzalin), reduced weed biomass after two herbicide applications. All herbicides provided significant weed control after three applications.

Index words: Weed control, growth, phytotoxicity, flowering

Species used in this study: sprengeri fern [*Asparagus densiflorus* (Kunth) Jessop 'Sprengeri']; Aztec Gold daylily [*Hemerocallis* hybrid 'Aztec Gold']; Chinese holly [*Ilex cornuta* Lindl. & Paxt.]; shore juniper [*Juniperus conferta* Parl.]; dwarf white crape myrtle [*Lagerstroemia indica* L.]; Big Blue lilyturf [*Liriope muscari* (Decne.) L.H. Bailey 'Big Blue']; giant lilyturf [*Liriope muscari* (Decne.) L.H. Bailey 'Evergreen Giant']; mondo grass [*Ophiopogon japonicus* (Thunb.) Ker-Gawl]; red top [*Photinia* × *fraseri* Dress]; variegated pittosporum [*Pittosporum tobira* (Thunb.) Ait. 'Variegata']; live oak [*Quercus virginiana* Mill.]; and Southern Charm azalea [*Rhododendron indicum* (L.) Sweet. 'Southern Charm'].

Herbicides used in this study: Surflan (oryzalin) 4-(dipropylamino)-3,5-dinitrobenzenesulfonamide; Pre-M, Southern Weedgrass Control (pendimethalin) N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzene; Barricade (prodiamine) N^3,N^3,-Di-*n*-propyl-2,4-dinitro-6-(trifluoromethyl)-*m*-phenylenediamine; Goal (oxyfluorfen) 2-chloro-1-(3-ethoxy-4-nitrophenoxy)-4-(trifluoromethyl) benzene.

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Significance to the Nursery Industry

The results of this study indicate that the landscape plants tested were generally more tolerant of Pre-M, Southern Weedgrass Control (pendimethalin) and Barricade (prodiamine) than the other herbicides. This may have been due in part to the lower solubility of these products which may have reduced their movement down into the nursery crop root zone. Additionally, weed control was generally good for the least soluble herbicides, thereby making them good candidates for possible inclusion in environmentally sound crop management systems.

Introduction

Weed control is an important aspect in the production of container-grown landscape plants (2, 5). Mechanical (hand) weeding is expensive and can cause crop injury (1, 4), while chemical control can lead to crop phytotoxicity (3, 7). Dinitroaniline (DNA) herbicides control a fairly wide spectrum of weeds and, due to the low solubility of some DNA herbicides (8), they have the potential for providing persistent weed control while reducing the chances for contamination