Computer Propagation and Production Planning with the Help of a Database

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INTRODUCTION

Propagation and production planning is probably the most important task in wholesale nurseries today. To be profitable and to manage production costs, it is important to propagate and grow the optimum combination of cultivars in the sizes and forms the market demands. The cost to develop and maintain bed space is high. Other major expenses include: water, fertilizer, chemicals, and labor. With so many new cultivars being introduced today, it is even more important to be able to compare their demand with the demand for standard crops. We needed a tool to help collect information on our plants, our past sales, our target markets, and the amount of space needed for propagation, jamming plants can tight, and later spacing the crop.

DATABASE SOFTWARE

I chose Filemaker Pro 3.0 by the Claris Corporation because it has a user friendly reputation, yet it offers advanced features for future needs. I use Power Macintosh computers to run Filemaker Pro 3.0, which is also available for Windows and Windows NT.

DEVELOPING THE DATABASE

It is important to remember that a computer and its software are only tools. Calculations must make sense on paper before the first fields are defined. Some of the first fields to define contain a plant identification number, scientific name, and common name. Your imagination and needs will suggest many others. The beauty of a database is the ease in which you can define fields to hold text, numbers, pictures, calculations, and summaries.

THE MAIN MENU

When the program opens, the main menu appears (Fig. 1). From this menu you can go to other submenus and back by simply clicking buttons. Three of the main submenus list several data entry and report choices. These screens include categories for propagation, jamming, and spacing plants. These menus are important because they integrate the different parts of the program together for easier use. From the main menu you can go to the main data entry page.

THE MAIN DATA ENTRY PAGE

The main data entry page is where it all begins (Fig. 2). This is the heart of the program. Without complete and accurate data, reports and summaries are useless. On this page, entry fields are provided to record previous sales, target markets, and production space needed during propagation, jamming, and spacing container plants.

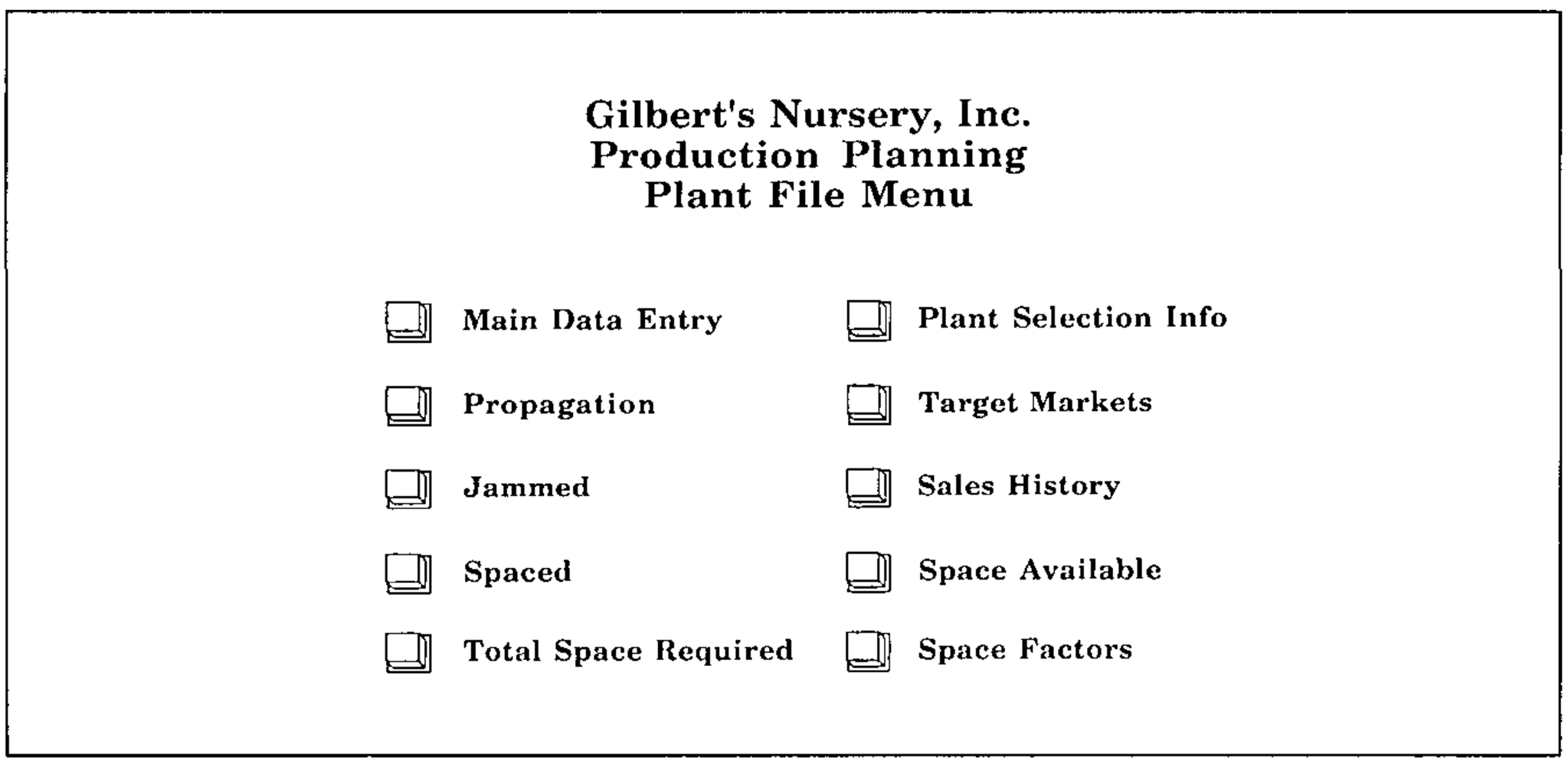

Figure 1. The main menu of the database for production planning with associated buttons for propagation, jamming and spacing plants, space requirements, target markets, and sales history.

Previous Sales. When making decisions on how many plants to propagate and grow, it is important to have all needed and useful information available. Previous sales information fields hold our sales amounts for all the sizes that we grew during the years 1989 to 1997 YTD. This data is imported monthly from a similar sales database on our file server. All sales staff can access this information any time. Information in the sales file is copied to our main database by doing a "relookup" based on inventory number. When this is done all sales figures are updated in minutes rather than hours needed for manual updating. While past sales figures are not the only thing to consider in determining propagation and production amounts, it is good to have them in front of you.

Target Markets. The target market fields concern the markets we are selling to (Fig. 2). These target market fields do not automatically change any of the fields in the space planning part of the program. At the left side of the target market fields are the various container sizes we grow or may grow in the future. At the top of the target market section are target market groups which include retailers, landscapers, distribution centers, growers, and mailorder companies. By having these fields in one place it easier to be realistic when making production choices. Once amounts have been entered for plants being considered for production, it is helpful to view this data as a single line report. Each single line report is on a different layout. In single line format the plants can be sorted in different ways that may suggest changes in amounts either up or down. When our best projections have been entered, it is time to move on to entering propagation amounts.

Propagation Data Entry. I defined fields based on the final selling container size of the plant and the production method required. Currently we propagate in various container sizes from 2-inch pots to 1-gal containers. In the future we hope to grow more liners in 4-inch pots to standardize as much as possible. Some 4-inch liners will go directly to the final selling container size, especially 1-, 2-, and 3-gal sizes. This method should speed production and eliminate the very inefficient method of shifting 1-gal to 3-gal. Larger sizes will still need to be shifted. Some liners may be sold in 3-inch, 4-inch, or 1-qt pots. These items have their own separate reports. They are also added to the grand total reports.

Jammed Container Production Areas. In most cases liners are canned in the spring and placed in a growing area jammed can-tight for several months to a year. After this initial growing period plants are moved and spaced-out in an area to be finished off in the same container, or they are hauled to the canning area and shifted up to larger containers. The quantities of plants that were canned from the previous propagation harvest are entered into the appropriate spread sheet fields. Any of the larger container sizes that can be grown jammed can-tight for a period of time are also logged. When plants in the jammed areas get large enough to need spacing, their quantities are removed from the jammed data entry fields and the amounts actually harvested are entered into the spaced fields.

Spaced Production Areas. Many of the plants placed in these beds will remain there until the order crews pull them. Others may be shifted to larger container sizes.

DATA ENTRY LISTS AND REPORTS

Submenus provide buttons to click to display and print many different lists and reports that are helpful in making production decisions (Fig. 3). In the data entry areas at the left of a submenu screen, each of the production sizes are represented. These data entry layouts are generally single line and represent the same fields as seen on the main data entry screen (Fig. 4). Having single line data entry lists makes it easier to compare plants and quantities. Changes can be made on the screen with these lists. At the right of these screens are lists of reports that may be viewed or printed but cannot be changed on the screen. In all three screens, reports are

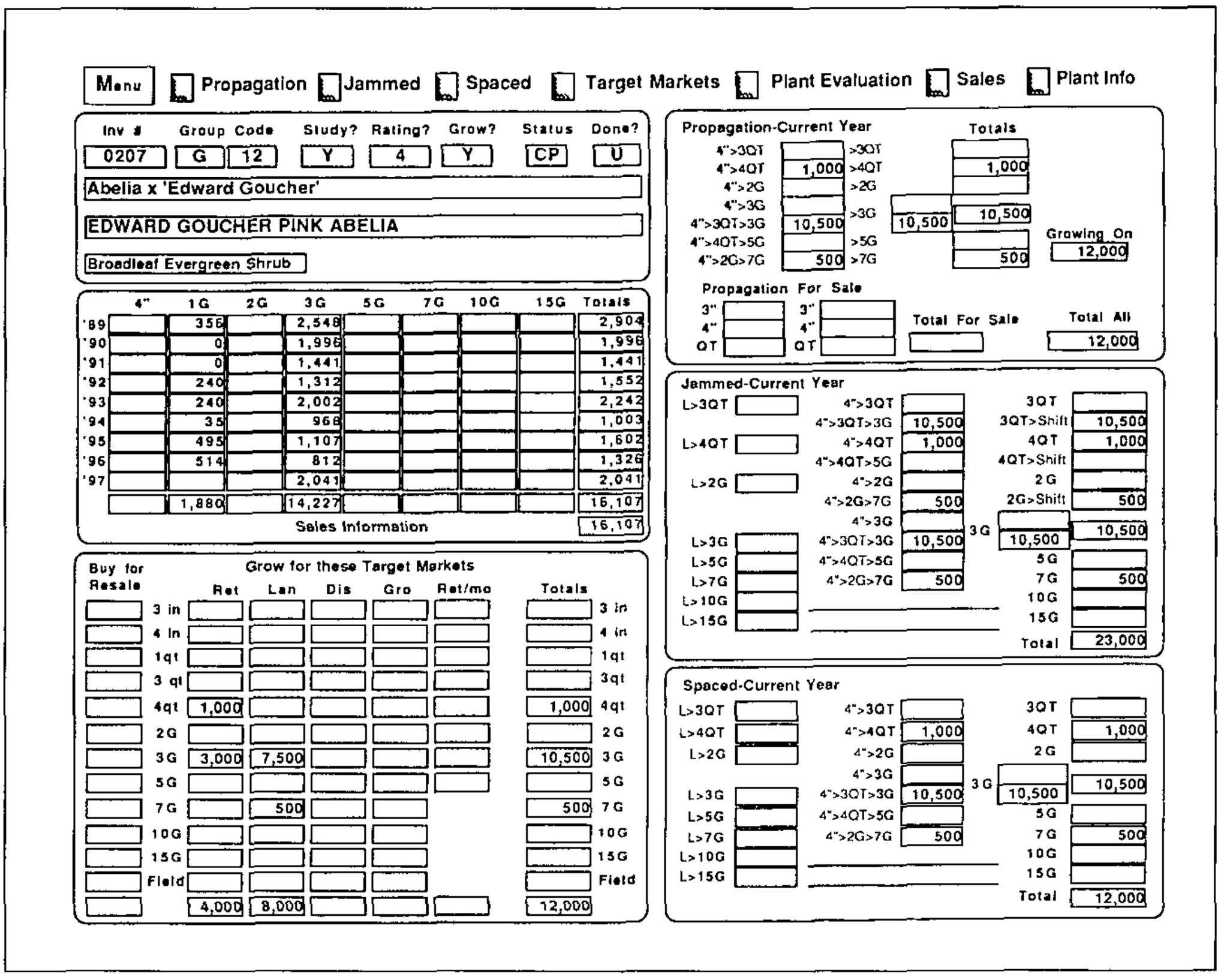

Figure 2. The main data entry layout including the finished plant size, markets targeted, and plant numbers for propagation, jamming, and spacing plants during production.

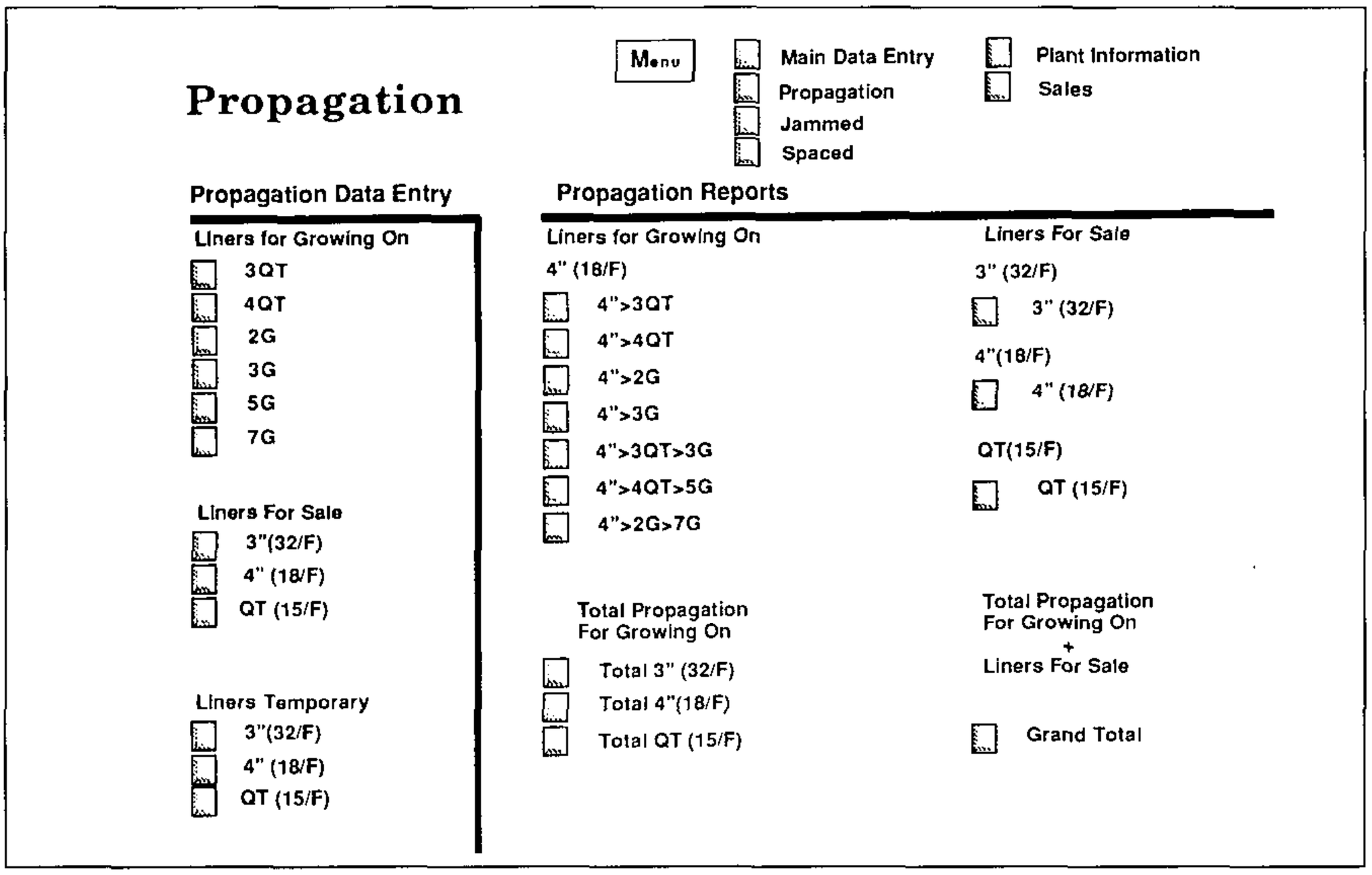

Figure 3. The propagation submenu displays data entry lists and reports. It also displays buttons to return to the main menu or other submenus.

available for each of the methods of production, plus summary reports for each container size. The last report on each screen combines all sizes, and gives grand totals of amounts and space required.

TOTAL SPACE REQUIREMENT REPORT

One very important report shows the plants and the total space needed for propagation, jammed, and spaced production areas (Fig. 5). At the end of the report, the total amount of space available, total space in the current selection, and any deficit or surplus space are listed for comparison. As you can see in this report I must either decrease the amount of production or increase the amount of growing areas needed for jammed and spaced plants. This report can be run at any time to check how actual or planned propagation and production are matching up with actual space available. By knowing this information I can make adjustments as needed.

UPDATING FROM YEAR TO YEAR

I recommend daily data backup. At the end of the current season of growth several things must be done to transition to the next season. All data should have been entered and any corrections made. Hard copy reports should be printed and saved. One of the main reports is a copy of each page of the main data entry screen. This hard copy should be placed in a notebook for future reference. When actual field counts are made they should be recorded by hand on these pages. From the current plant file, a copy should be saved for the next season and named appropriately. At this time sales data should be updated, new target market projections made and new numbers entered for propagation, jammed, and spaced fields.

HOW SPACE IS CALCULATED

The main data entry screen contains fields for recording propagation factors that take into account normal plant losses in propagation (Fig. 2). Total number of flats, and square feet needed use these factors to calculate the propagation units needed to meet production goals (Fig. 5). In the jammed and spaced reports, plant quantities and square feet needed are the primary elements. Another layout includes data fields that represent the square feet of all growing areas of the nursery, but separate production areas needed for propagation, jamming, and growing spaced plants. Actual square feet are entered in these data fields, which is based on the square feet that a single jammed or spaced plant occupies.

SALES REPORTS

Sales reports are single line reports with totals for studying past sales (Fig. 6). Some reports give sales for container sizes for each of the years since 1989. Other

Propagation For Production Data Entry For 3G — Propagation — Menu

G	C	S?	R?	G?	#		4">3G	4">3QT>3G	Total
G	12	Y	7	Y	0200	Abelia chinensis	900		900
G	12	Y	4	Y	0207	Abelia x 'Edward Goucher'		10,500	10,500
G	12	Y	U	Y	0225	Abelia x grandiflora 'Little Richard'		10,000	10,000
G	12	Y	4	Y	0235	Abelia x grandiflora 'Sherwoodi'	6,000		6,000
G	12	Y	U	Y	0237	Abelia x grandiflora 'Sunrise'		1,900	1,900
G	12	Y	5	Y	0462	Agarista popufolia		3,600	3,600
G	12	Y	U	U	0690	Aucuba japonica		1,000	1,000
G	12	Y	4	Y	0720	Aucuba japonica 'Rozannie'		500	500
G	12	Y	4	Y	0781	Azalea 'Ben Morrison'		1,000	1,000
G	12	Y	4	Y	0795	Azalea 'Beth Bullard'		1,000	1,000
G	12	Y	5	Y	0802	Azalea 'Blaauw's Pink'		2,000	2,000
G	12	Y	4	Y	0809	Azalea 'Buccaneer'		1,000	1,000
G	12	Y	5	Y	0844	Azalea 'Coral Bells'		2,000	2,000
G	12	Y	3	Y	0851	Azalea 'Corsage'		1,000	1,000
G	12	Y	5	Y	0865	Azalea 'Delaware Valley White'		2,000	2,000
G	12	Y	5	Y	0886	Azalea 'Fashion'		2,000	2,000
G	12	Y	U	U	0889	Azalea 'Flame Dance'		500	500
G	12	Y	4	Y	0918	Azalea 'Girard's Fuschia'		1,000	1,000
G	12	Y	5	Y	0919	Azalea 'Girard's Hot Shot'		1,000	1,000
G	12	Y	4	Y	0922	Azalea 'Girard's Pleasant White'		1,000	1,000
G	12	Y	4	Y	1167	Azalea 'Girard's Renee Michelle'		2,000	2,000
G	12	Y	4	Y	0921	Azalea 'Glacier'		2,000	2,000
G	12	Y	4	Y	0935	Azalea 'Greetings'		1,000	1,000
G	12	Y	4	Y	0956	Azalea 'Hershey's Red'		2,000	2,000
G	12	Y	4	Y	0977	Azalea 'Higasa'		500	500
G	12	Y	5	Y	0984	Azalea 'Hino Crimson'		2,000	2,000
G	12	Y	4	Y	1012	Azalea 'Joga'		500	500
G	12	U	U	U	1022	Azalea kaempferi 'All Season'		1,000	1,000
G	12	Y	3	Y	1054	Azalea 'Macrantha Single Pink'		2,000	2,000
G	12	Y	3	Y	1068	Azalea 'Martha Hitchcock'		800	800
G	12	Y	4	Y	1082	Azalea 'Mother's Day'		2,000	2,000

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Figure 4. Propagation data entry for producing 3-gal container plants.

Grand Total
Space Requirement Summary

G	C	#		Propagation amt.	flats	sq ft	Jammed amt.	sq ft	Spaced amt.	sq ft
G	15	7861	Stachyurus praecox	660	37	82	1,200	746	600	1,662
G	15	7862	Stachyurus salicifolius	275	15	34	500	311	250	693
G	15	7987	Syringa oblata var. dilatata (NCSU Arb)	550	31	68	1,000	622	500	1,385
G	15	7979	Syringa patula 'Miss Kim'	1,320	73	164	2,400	1,493	1,200	3,324
G	15	7981	Syringa x 'James McFarlane'	2,200	122	274	4,000	2,488	2,000	5,540
G	15	8231	Vaccinium ashei 'Titblue'	1,980	110	246	3,600	2,239	1,800	4,986
G	15	8233	Vaccinium ashei 'Woodard'	1,980	110	246	3,600	2,239	1,800	4,986
G	15	8320	Viburnum plicatum tomentosum 'Mariesii'	1,100	61	137	1,800	1,099	1,000	2,570
G	15	8327	Viburnum plicatum tomentosum 'Shasta'	1,100	61	137	2,000	1,403	1,000	4,316
G	15	8326	Viburnum plicatum tomentosum	1,100	61	137	2,000	1,244	1,000	2,770
G	15	8328	Viburnum plicatum tomentosum 'Summer	1,100	61	137	2,000	1,323	1,000	3,543
G	15	8351	Viburnum (utile x burkwoodi) Park Farm	3,300	183	411	5,000	3,007	3,000	7,310
G	15	8353	Viburnum x bodnantense 'Pink Dawn'	550	31	68	1,000	622	500	1,385
G	15	8383	Viburnum x juddii	880	49	110	1,800	1,595	1,000	5,816
G	15	8481	Weigela florida 'Minuet'	1,320	73	164	2,400	1,493	1,200	3,324
G	15	8485	Weigela florida 'Red Prince'	1,320	73	164	2,400	1,493	1,200	3,324
G	15	8495	Weigela florida 'Variegata nana'	660	37	82	1,200	746	600	1,662
				1,390,213	77,234	173,004	2,076,060	1,305,934	1,306,306	3,774,179

Available	Needed	Available	Needed	Available	Needed
166,920	173,004	548,700	1,305,934	1,571,895	3,774,179
Difference	-6,084	Difference	-757,234	Difference	-2,202,284

Figure 5. Summary of the grand total space requirement for propagating, jamming, and spacing selected plant species during production.

Sales Report By Can Size 1989-1997 YTD ☐ Sales ☐ Menu

G	C	S?	R?	G?	#		4"	1G	2G	3G	5G	7G	10G	15G	Total
T	63	Y	4	Y	1915	Cercis canadensis 'Forest Pansy'						80			80
T	63	Y	U	U	1917	Cercis canadensis 'Silver Cloud'		80				5			85
T	63	Y	7	Y	1920	Cercis canadensis ssp. texensis		100							100
T	63	Y	U	U	1918	Cercis canadensis texensis						129			129
T	63	Y	4	Y	1919	Cercis canadensis texensis 'Texas		55				74			129
T	63	Y	4	Y	1922	Cercis chinensis 'Avondale'		183				10			193
T	63	Y	5	Y	2041	Chionanthus retusus			33			356			389
T	63	Y	4	Y	5338	Lagerstroemia faurlei 'Fantasy'						142			142
T	63	Y	4	U	5436	Lagerstroemia indica 'Byers White'					275				275
T	63	Y	3	U	5345	Lagerstroemia indica 'Carolina Beauty'		88		75	3,293	272	28		3,756
T	63	Y	U	U	5352	Lagerstroemia indica 'Catawba'		141			492				633
T	63	Y	4	U	5359	Lagerstroemia indica 'Centennial'		959		556	1,672	426			3,613
T	63	Y	U	U	5383	Lagerstroemia indica 'Hope'				36	15				51
T	63	Y	4	U	5422	Lagerstroemia indica 'Victor'		836		552	1,837	1,246			4,473
T	63	Y	4	U		Lagerstroemia x 'Hopi'				0	9				9
T	63	Y	4	Y	5457	*Lagerstroemia x 'Natchez'*		593	65		3,008	1,023	144		4,833
T	63	Y	4	Y	5464	Lagerstroemia x 'Tuscarora'				30	2	1,057	196		1,285
T	63	Y	5	Y	5835	Magnolia sieboldii		350							350
T	63	Y	3	Y	5929	Magnolia x 'Randy'						58			58
T	63	Y	4	Y	5932	Magnolia x 'Spectrum'						13			13
T	63	Y	U	U	6280	Parrotia persica 'Select'						49			49
T	63	Y	7	Y	6847	Prunus mume 'Peggy Clarke'		50				50			100
T	63	Y	4	Y	6899	Prunus subhirtella var. pendula 'Plena'						191			191
T	63	Y	4	Y	7929	Styrax japonica 'Carillon'						29			29
T	63	Y	U	U	7935	Styrax japonica 'Crystal'						8			8
T	63	Y	4	Y	7940	Styrax japonica 'Issai'						83			83
T	63	Y	4	Y	7942	Styrax japonica 'Pink Chimes'						29			29
T	63	Y	7	Y	7945	Styrax japonicus 'Emerald Pagoda'			81			41			122
T	69	Y	U	U	2575	Cryptomeria fortunei 'Green Grizzly'							23		23
T	69	Y	U	U	2602	Cryptomeria japonica 'Wintergreen'			6			90	20		116
T	69	Y	7	Y	2604	Cryptomeria japonica 'Yoshino'		500	466			434	624		2,024
T	69	Y	4	Y	2615	Cupressocyparis leylandii		10,668	1,388		20,393	7,692	825		40,966
T	69	Y	5	Y	2630	Cupressus ariz. glabra 'Carolina						162			162
T	69	Y	U	U	8098	Thuja plicata 'Gigantea'						75			75

Totals By Can Size

4"	1G	2G	3G	5G	7G	10G	15G	Grand Total
59,824	959,798	40,374	986,091	46,766	21,751	6,352		2,119,954

Figure 6. Sales report by container size ranging from 4-in. pots to 15-gal containers of selected plant species.

reports give total sales for all can sizes for the same period. These reports are a great way to study past sales by sorting in different ways.

PLANT INFORMATION

Fields can be defined for any plant feature desired. Flower color, flower season, bark color, bark type, plant shape, hardiness zone, propagation method, best propagation time, native range, and pH requirement are among the many features that may be defined. Once the fields are defined and placed on a layout, or layouts, they can be selected and sorted in many ways, once data has been entered.

SOME MECHANICS OF BUILDING A DATABASE

The first step in building any database is deciding what information to collect. Knowing what to do with this information comes next. The heart of any database other than the data itself is the defined fields. In defining fields, it is helpful to work out some system of naming and recording these with an explanation of their use and how they relate to other fields. Filemaker Pro 3.0 will print a list of field definitions which is very helpful. When calculation and summary fields are created it is a good idea to test them by entering certain numbers and **checking the results** on a single record first. Then add more than one record and **test the results** before trusting the new fields. Layouts allow fields to be displayed in many different ways. Different sizes, fonts, and colors can be specified. It is easy to move fields around on a layout. Fields can be copied from one layout to another. There are endless ways of finding, sorting, and displaying information. Scripts are a very useful tool in automating a database. Scripts are a series of operations in the database that can be created and later edited to automate certain operations. A button or graphic item can be added to a layout and attached to a script. When the button is clicked with the mouse the script is performed. One last helpful feature of a database is the ability to import or export data between clones of the same file or to other programs.

CONCLUSION

Filemaker Pro 3.0 has made it easy to develop our database to collect and work with plant information, space planning, and market targeting. It has made us more aware of how much space must be available to produce our plants. It has also given us a tool to make comparisons among plants we grow or will consider growing.