Crop Scheduling Software for Community Supported Agriculture (CSA) and Small-Scale Diversified Farming Operations

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Small diversified farms are becoming increasingly visible in Florida’s agricultural landscape. Approximately thirty of these farms in Florida have adopted the economic model of Community Supported Agriculture (CSA). CSAs are communities of consumers and farmers; consumers subscribe to a membership with a farm or collaborative of farms. Consumers purchase “shares” of farm products in advance of the production season and receive a portion of the harvest each week, but also share the risk of crop failure with the farmer. In return, the farmer receives income at the start of the season when it is needed the most. This article presents some preliminary findings obtained from a SARE producer grant initiated in part to 1) locate and assess the appropriateness of existing computerized planning systems that could be adopted by small diversified farmers and CSA operators, and 2) survey CSA operators in Florida to determine the variables most needed for data entry (crop production, harvest, and delivery components) with emphasis on crop planning and rotation plans, planting and harvest schedules.

Farmers growing a range of fruit and vegetable crops with multiple harvest times on small acreage, like those involved in CSAs, face many crop scheduling challenges including:

- managing complex crop production, harvesting, and delivery schedules for their customers
- rearranging planting schedules and rotations when new crops or varieties are introduced
- frequent crop planting and harvesting
- adjusting schedules to accommodate new customers during the season
- meeting the changing needs for products from established customers
Successful CSAs often use hand-written ledgers or customized spreadsheets to track farming activities and growers are in need of efficient, affordable farm planning software for small diversified operations. Commercially-available farm management software is typically designed either for a limited variety of crops and are not readily adaptable for use by small-scale diversified growers. When potentially useful software is available, it is geared mostly toward temperate zone growers. Because Florida farmers typically experience an 8-10 month growing season, growers are uniquely challenged to plan and implement efficient crop production schedules.

We identified three recordkeeping systems in use by several farms through Internet searches, inter-farmer communications, and survey responses. We obtained and reviewed three record keeping systems designed for small diversified farmers. We found that these packages functioned well for recordkeeping but were limited in their ability to facilitate crop scheduling and rotation. In general, the packages required a large amount of data to set and track each crop. An increase in efficiency of these packages could have been accomplished by building linkages between related fields or worksheets to avoid duplicating data entry. A summary of the systems analyzed is presented in Table 1.

### Table 1. Summary of Crop Planning Software Evaluated

<table>
<thead>
<tr>
<th>Package</th>
<th>Format / Source</th>
<th>Description</th>
<th>Benefits</th>
<th>Limitations</th>
<th>Suggested Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brookfield Farm</td>
<td>(Dan Kaplan) $25.00 for an Excel spreadsheet. Order at: <a href="http://www.brookfield">http://www.brookfield</a></td>
<td>Templates contain input fields for record-keeping and planning for planting, harvest, rotation based on quantity, dates, and expected yields.</td>
<td>Can model each planting area as desired</td>
<td>Complicated to use- no linking across related fields</td>
<td>Conversion to relational database will provide automatic linking to build tables without duplicate data entry</td>
</tr>
<tr>
<td></td>
<td>farm.org/</td>
<td></td>
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<tr>
<td>Market Farm Forms</td>
<td>(Marcie Rosenzwieg) $50.00 for manual and CD. The CD is compatible with both Macintosh and PC. Order at: <a href="http://www.nwpub.net/marcie.html">http://www.nwpub.net/marcie.html</a></td>
<td>Templates contain input fields for record-keeping and planning similar to Brookfield.</td>
<td>Some calculations to assist with planning already included</td>
<td>Projections based on CSA shares</td>
<td>Conversion to relational database will provide basic information preloaded for use on any operation</td>
</tr>
<tr>
<td>FarmNotebook</td>
<td>(Boann’s Banks Farm) Free for the first month, then $25.00 a year after that for an online database template. Order at: <a href="http://www.farmnotebook.com/">http://www.farmnotebook.com/</a></td>
<td>Online database with input fields for record-keeping and planning based on seeding or transplanting dates.</td>
<td>Good start for future expansion to full-function software</td>
<td>No common denominator for record keeping- no calculations possible</td>
<td>Add fields for planting including spacing, expected/historic yield and update yield predictions based on harvest history</td>
</tr>
</tbody>
</table>
A survey instrument was designed to 1) describe the types of farms, crop planning strategies and recordkeeping systems currently in use, 2) identify the variables farmers thought were important or critical to their crop production systems, and 3) list the type of information thought valuable to their multi-crop planting requirements. We administered through Survey Monkey by invitation to CSA and small diversified farmers. Through grower group meetings and UF-IFAS Extension programs, we identified and compiled a list of 21 CSA farms in Florida; however, only 7 chose to respond. Surprisingly, we encountered resistance from farms who did not wish to disclose any information about their activities, fearing interference from regulatory agencies would hamper their CSA operations. Therefore, we expanded our scope and invited responses from participants in the CSA-listserv on PrairieNet.org. A total of 25 additional growers from outside Florida responded to the survey. A total of 32 respondents included 30 CSA operators, 19 operators selling to multiple direct market outlets, and 11 operators selling to retailers. Not all respondents answered every question.

Over 60% of respondents said CSA activities accounted for 50% or more of their operations, indicating that, regardless of size, CSA operations contribute significantly to the farm’s bottom line. Overall farm sizes ranged widely (from <1 acre to 1000 acres), but the portion used for CSA operations was 5 acres or less (23 of 29 respondents). Most respondents with five acres or less (23 of 32) felt they had enough land to handle the CSA needs. Twenty seven out of 31 grow 16 or more different crops for their CSA operations, and 30 out of 31 reported growing 8 or more different crops. Nearly half of respondents (16 out of 31) used past and expected future demand to make crop planting decisions; 7 indicated they look at an aggregate of several previous years to help them decide; 4 indicated their decisions are based on soil limitations.

Growers either planned their plantings on paper or computer (18 of 32), or used a list of crops (13). Systems in use for planning include Market Farm Forms, Brookfield Farm spreadsheets, a homegrown mix of the two, and self-designed spreadsheets. Farms are using QuickBooks (Intuit, Inc. http://quickbooks.intuit.com/), FileMaker Pro (FileMaker, Inc. http://www.filemaker.com/) to maintain membership databases, MS Money (Microsoft, Inc. http://www.microsoft.com/money/default.mspx), and homegrown spreadsheets for record-keeping.

Growers responded to several questions about the importance of various features and data entry fields when selecting and using crop planning systems. For crop planning, factors such as planting only the crops the customers/CSA members want (57%), maximizing the variety of crops grown (60%), crop yields (53%), rotation schedules (62%), and timing of the plantings (66%) were all rated as ‘Very Important’ or the ‘Most Important’ factors, while 43% rated including cover crops in the plans as ‘Very Important’ or ‘Most Important’. ‘Least Important’ was defined as ‘the one I sacrifice for the sake of more important factors’. The desired outputs for crop planning systems are summarized in Table 2.

Table 2. Desired Outputs for a Crop Planning System
Desired Crop Planning System Outputs | Takes Priority | Important/Very Important | Least Important*
--- | --- | --- | ---
Suggest for each row/bed/section, possible choices by plant family, based on prior history | 3 | 30 | 3
Suggest for each row/bed/section, subsequent choices for succession crops by plant family, based on the initial crop and prior history | 1 | 19 | 3
Calculate how many rows/bed feet of a crop to plant, based on amount/number of shares needed for a given week/delivery | 9 | 16 | 3
Calculate when a crop needs to be planted, based on when it needs to be harvested | 4 | 22 | 1
Provide a weekly list of crops to plant, how much, and where to plant them | 8 | 19 | 1
Provide a weekly list of crops to start for later transplanting, and how much to seed | 7 | 19 | 1

Farmers indicated a number of other planning factors and/or inputs they’d like to see in their multicrop planning systems:

- Crop failure information - recording reason for failure and calculations for replanting
- Hydroponic crop management
- Area-specific information (for North Florida, South Florida, or Minnesota, for example)
- Record keeping for machinery costs, soil amendments, and labor costs (by crop)
- Recording actual yields for later planting cycle planning
- Suggesting quantity of seed to order (by variety)
- Listing of crops for interplanting (by row/bed/section or crop)
- Provide for a rotation scheme by crop management (row width/plastic mulch/multi-row bed, short/long season crop) vs by plant family
- Calculate projections allowing for inputs by multiple demands (# CSA shares, quantities for farmers markets/farm stands, restaurants, etc)
- Compare past yields and sales data to adjust planting quantities
- Allow for use of lunar planting calendars

Based on our findings, we infer that a viable, easy-to-use system will require a database approach. The database needs to be pre-loaded with crop/varietal information such as what FarmNotebook provides, with additional items such as planting spacing, recommended planting times by zone, maturity dates, expected yields (per unit). All of this information should be available in a standardized form, for which seed suppliers can offer database updates in an easy-to-load file format. This information should then be able to be customized by the individual grower. Similar to Brookfield Farm & Market Farm spreadsheets, but in database form for automatic cross-linking and updating, each farm can create a map of its planting areas, by the area unit that is convenient for the farm. Internal conversion tables can
be set up to calculate the necessary quantities of seed, (for example, to plant a 100’ row, or to yield 600 lbs per harvest).

Summary

We surveyed CSA farm operators to see what they wanted or needed in a multicrop planning system. Based on their responses, we have identified and developed an initial set of record definitions which can be used to develop software. The analysis is incomplete at this time, but the basic groundwork has been laid, and we hope to have the opportunity to finalize the project so that a software developer can produce a farm planning system useful to CSA and other diversified market farms. In the course of our investigations, we heard from several people who are either already working on similar software or interested in developing the software from the specifications.