HOLLY SUGAR'S COMPREHENSIVE COMPUTERIZED AGRICULTURAL INFORMATION SYSTEM

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INTRODUCTION

Holly Sugar's Agricultural Information System was developed to serve three basic needs.

1. Provide positive feedback to the grower on successful production practices used locally to increase beet quality and subsequent returns to the growers.

2. Provide agricultural staff and research personnel with documentation of trends in production methods and resulting yields.

3. Provide information necessary to replace manually produced reports and allow exchange of data with other departments' systems.

HISTORY

Holly's history with computerized record keeping began in 1971. Dr. Donald Dickenson, Director of Agricultural Research, began applying the research done by Albert Ulrich on relationships between nitrogen and beet quality in the field. To handle the massive amounts of data, the MIS Department was involved in developing a mainframe system capable of maintaining a historical database for each growing area and providing statistical analysis. This system is referred to as the Beet Quality Improvement Program (BQIP). At the time all data was keypunched into the mainframe from standard reports typed up at each plant location.

In 1984 work began on a program written in the BASIC language for PC's, which were beginning to come into use in the agricultural department. This program provided automated generation of a petiole graph report comparing individual results from each grower's field against a standard calculated from the BQIP. It also provided direct transfer of data into the mainframe historical database.

Also in 1984, the Joint Grower-Holly Research Committee in Hereford, Texas, began production record keeping with a software package designed for California crop consultants called Crop Data Management System (CDMS). This package allowed tracking of more grower production information; however, there was no easy way to exchange data between Holly's BQIP program, CDMS, and the accounting systems.

In 1986 emphasis was on developing a multi-purpose system which limited duplication of input. During this period the accounting department installed an automated Farmers Ledger System written in Dbase III. To effect an interface with the accounting system, it was clear that Dbase III would be the format for an Agricultural Information System.

AGRICULTURAL INFORMATION SYSTEM

There are three principal sections in the AIS containing information.

Section 1 - Contract Participants

The primary benefactors of AIS information are individuals who actively participate in production decisions. They are the fathers, brothers, sons, and in some cases, farm managers who work with the crop on a daily basis. These individuals, however, are sometimes shadowed behind corporate and partnership entities with whom contracts are actually written. To ensure the involvement of all participants a flexible system was needed.

The AIS system accomplishes this through three related files. The first file is the master containing an I.D. number for each individual and entity name involved in the crop. The second file is a subset of the master file. It contains addresses and telephone numbers of actual individuals involved in an operation. Finally, the third file which is tied to crop year is constructed as contracts are entered. This is called the link file and contains a record for each participant in the contract. By relating these three files it is possible for agricultural staff to involve all participants in sharing of vital information.

This section also contains files for individuals, businesses, and other company addresses which are frequently used by the secretary.

Section 2 - Production Information

The AIS is based on a contractual agreement with the grower; therefore, all information in the system is on a "per contract basis". Whenever practical each field is written as a single contract.

Because contracts are not numbered as they are written, the system assigns a tag number to be used for identification until formal numbering takes place. During input of contractual data, the grower and landlord's I.D. numbers are used to eliminate retyping the name for each contract. The majority of inputs are

done in numerical format for increased speed and fewer errors. One of the few character inputs would be a 25-character field description such as, "North 40 on McCaslins" - or in some cases, a legal description is entered. This greatly aids in communicating information to the grower. After all contracts are entered the system sorts and numbers them based on user defined fields. Generally, these would be by district, grower name, landlord name, and acres contracted. By numbering contracts in this manner all reports are in alphabetical and numerical order when printed.

After all contracts are entered the information needed for payment (on a specific contract) is transferred to the Farmers Ledger System. Weeks of manual entry and checking for errors are eliminated for the accounting department. When Fall arrives the favor is returned as production information collected by accounting is passed on to the AIS. The increased efficiency and accuracy gained more than justifies the investment.

Section II also supplies information for standard agricultural reports showing acres planted, replanted, abandoned and estimated yields. Agriculturists who gather information for input are provided with a customized form generated by the system. These forms are partially filled with data, i.e. contract number, grower's name, field description, and other pertinent details which aid in collecting the information. This saves the agriculturalist hours of seeking contract numbers to identify correct grower fields.

In areas where harvest is completed by pools of custom harvesters, the AIS provides the paperwork necessary to organize and track the pool's progress through harvest. A report listing the pool's specific contracts with field description and acres is provided to operators to ensure delivery on the correct contract number.

Section 3 - Grower Practices Data

This section contains data pertaining to fertility, crop rotation, variety, irrigation, pesticide, and petiole analysis. The input is divided into two areas - petiole analysis and grower practices.

Petiole analyses are conducted every 30 days beginning when newly matured petioles reach collectable length and ending prior to harvest. The program handles up to six results per contract inputting contract number, specific petiole data and the results once they're released from the lab.

Grower petiole analysis reports, in graph and text format, are generated showing the contract as compared to the BQIP standard. The information is passed to the mainframe BQIP

program for maintenance of history of sugarbeet quality in a specific area and for running of the multi-year statistical analysis.

Grower practices information is largely inputted using codes which are assigned by the agricultural staff. This allows flexibility of the system in meeting local needs and specific conditions. Because of differences in recorded data from one location to the next the input screens are adaptable. They can be manipulated to match previously recorded data and bypass input not pertinent to a specific growing area. Additional fields may be displayed to capture information unique to particular crop. This allows the user to design a report specifically based on this information.

In Section 3, Field Data Summary Sheets for each contract are printed. This report contains yield data that has been compared to district and factory averages. It details past year's production practices for growers reference and comparison. Summary results of different production methods are furnished by agricultural staff in informational meetings and newsletters.

The AIS has an ancillary version which was developed to provide greater access to data and allow an alternative to inputting directly by the secretary's computer. The main AIS version is referred to as the Secretary's Version (SV), while the supplementary version is known as the (AV) Aggie Version.

When all contracts are entered and the agriculturalist is ready to begin input a download is performed from the SV to a floppy disk. The disk is taken to an alternate desktop or (laptop) computer containing AV and an upload is performed. The agriculturalist now has duplicated information. He is free in AV to input grower practices data for his district and can subsequently run reports. When in position to update the SV, he merely exports his data to floppy and passes it to the secretary. During update only records from a specific district are changed protecting other agriculturalists' data from possible corruption.

INTERFACE

The system is designed to incorporate user changeable screen definitions for browsing with unlimited flexibility in viewing data in any order. The report menus are selectable for display to view customized reports pertinent to particular areas.

Several alternatives are provided for the user in satisfying informational needs. The reporting system can incorporate user designed reports which are written utilizing "R&R Relational Report Writer", by Concentric Data Systems. This program's "Lotus-like" menu structure accommodates those accustomed to working in Lotus 1-2-3. Once familiar with finding information

from generically named data files, professional quality reports can be written quickly without concern for corruption of databases. Because generic file names are alike for all plants, reports which are designed at one location may be easily transferred and run at another facility. For those preferring to use other programs, user selected information can be directly transferred to Lotus 1-2-3, Dbase, or the ASCII file format.

SYSTEM STATISTICS

The AIS is written in a Dbase III Plus compatible language. Reports are typically generated using R&R Relational Report Writer's runtime capabilities. It can be installed on any IBM compatible computer running under DOS 3.00 (or higher), and is capable of adapting a Virtual Memory Disk to speed reporting.

An archiving feature is included in the program. Currently, storage of just over 1,000 contracts from a single crop year can be done on a 1.2 megabyte floppy disk. This is the maximum number of contracts tested in a single crop year and location at this time. Contract records contain over 120 fields of data with 28 additional fields available for each contract participant. The Dbase language is capable of handling over 1 million records.

The database file name "format" used in the AIS allows coexistence of 676 different locations and 99 years of information with up to 26 seasonal areas for each year (i.e. California's Spring and Fall crop) on a single computer system. Naturally, the limiting factor here is disk space. The system itself requires approximately 4.5 megabytes including the R&R Relational Report Writer system files. One year's data, including accounting information, takes up 1 to 2 megabytes for each facility. Therefore, it is possible to store over 12 years of data from a single location on a 30 megabyte drive.

CONCLUSION

The Agricultural Information System has been successfully incorporated into each of Holly Sugar's eight unique production areas. It has eliminated nearly all duplication of input and manual reporting. The information the system provides is now affecting decisions that begin with the planted seed and culminate with sugar for our consumers. People on the front lines are part of an informed team keeping sugarbeets a viable crop for grower and processor in the future.