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# Farmer Friendly Nutrient Management with MARC 2000: Manure Application Rate Calculator

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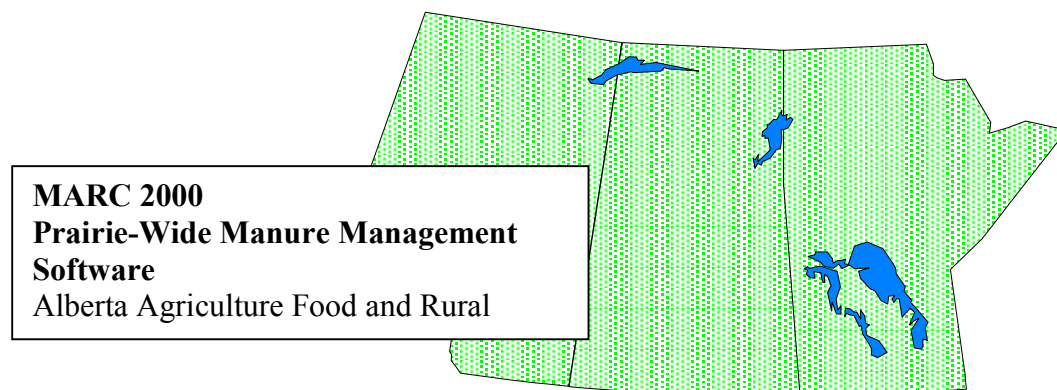
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## Objectives of the Proposal

- A user friendly decision support tool to promote the sustainable use of manure as fertilizer on an annual basis and provide a mechanism for annual record keeping
- A Software application that has the flexibility to store and manage large amounts of data from a variety of livestock operations
- A software application that potentially allows for the electronic exchange of data and use within a Geographic Information Systems (GIS) environment.

## Project Background

MARC 2000 is a nutrient management program that was designed to encourage and educate livestock producers and grain farmers about the value of manure as a fertilizer. The result of a cooperative effort between the prairie provinces of Saskatchewan, Manitoba and Alberta, MARC 2000 is user friendly and allows a producer to plan his nutrient application field by field on an annual basis. Farmers with multiple operations can do a plan for each type of livestock facility. Custom applicators can track land applications of manure for an infinite number of clients.



MARC 2000 has been created in Microsoft Access. The intent was to make use of the database facilities in Access to allow the user to record and track nutrient applications and manage nutrient budgets. Data entered into the application may be used to generate reports that assist clients in decision making and fulfill certain regulatory requirements. The database format also allows for the possibility of electronic submission of data and the option of incorporating the information in a GIS environment. MARC 2000 includes record keeping for detailed soil and manure analysis and a net economic return calculation.

A series of evaluations have taken place over the past six months (Table 1) to determine the producer response to this type of decision support tool. Overall, farmers that participated in the evaluation process found the software to be user friendly, practical and quick. Agronomy professionals felt that there was some merit in expanding the information and ability of MARC, but see the value in maintaining the program's simplicity.

TABLE 1 – Producer response to MARC

<p><b>What did producers like about MARC98?</b> A summary of the Banff Pork Symposium Evaluations</p>	<p>Suggestions for improvements to <b>MARC98</b></p>	<p><b>MARC 2000 – Here is how we responded</b></p>
<ul style="list-style-type: none"> <li>◆ EASY TO USE</li> <li>◆ PRACTICAL</li> <li>◆ LIKED THE SCANNED MAP</li> <li>◆ LIKED BEING ABLE TO COMPARE THE VALUE OF MANURE TO COMMERCIAL FERTILIZER</li> <li>◆ LIKED HAVING THE AVERAGE VALUES FOR MANURE NUTRIENTS AND CROP REQUIREMENTS</li> <li>◆ THINK THE PROGRAM HAS APPLICATION ACROSS THE PRAIRIES</li> <li>◆ CLIMATE DATA USEFUL</li> <li>◆ LIKED BEING ABLE TO SELECT AN APPLICATION RATE OR MEET NITROGEN OR PHOSPHORUS REQUIREMENTS</li> </ul>	<ul style="list-style-type: none"> <li>◆ WOULD LIKE TO BE ABLE TO INPUT MORE THAN ONE OPERATION FOR A LANDOWNER</li> <li>◆ WOULD LIKE TO BE ABLE TO SAVE AND RETRIEVE HISTORICAL DATA ON SOILS AND MANURE NUTRIENTS FROM MY OPERATION</li> <li>◆ ENSURE INPUT VALUES ARE CONSISTENT WITH LABORATORY REPORTS</li> <li>◆ LIKE TO KNOW THE \$ RETURN WHEN I USE MANURE FERTILIZER</li> </ul>	<ul style="list-style-type: none"> <li>◆ STILL USER FRIENDLY</li> <li>◆ FARMERS WITH MULTIPLE OPERATIONS CAN DO A PLAN FOR EACH TYPE OF LIVESTOCK FACILITY</li> <li>◆ PRODUCER OR CUSTOM APPLICATORS CAN PLAN NUTRIENT APPLICATION FIELD BY FIELD ON AN ANNUAL BASIS</li> <li>◆ DISPLAY OF NUTRIENT BUDGET FOR EACH FIELD</li> <li>◆ RECORD KEEPING FOR DETAILED SOIL AND MANURE ANALYSIS</li> <li>◆ NET ECONOMIC RETURN CALCULATOR</li> </ul>

### Project Activities

The MARC project involved the translation of MARC98: Manure Application Rate Calculator software into Microsoft Access. The intent is to make use of the database facilities in Access to provide improved data management related to the application of manure in the future.

The project involved obtaining a copy of the latest Visual Basic code for MARC98 from Manitoba Food and Agriculture and translating the code to utilize the Access 97 database format for managing entered data. The new software allows greater flexibility in the management of entered data and the generation of reports. Data entered into the application may be used to generate reports which may be submitted to the respective Agriculture departments. The database format also allows for the possibility of electronic submission of data in the future.

A modular design is incorporated into the proposed new software. This means that the application will be separate from both project/farm/field data and coefficient data. The modular design allows for the following benefits:

- ◆ Updates to the application may be distributed to end-users without affecting data entered into a database.
- ◆ Coefficients used in calculations are stored in a separate database. These coefficients are tagged by date and by province to allow changes to coefficients specific to each province.
- ◆ The overall "look and feel" of MARC98 is preserved to minimize the amount of time required to develop a suitable user's manual for the software.
- ◆ The application may be attached to Access 97 databases placed on a network and used in a multi-user setting. This is useful for developing a centralized database of manure management entries.
- ◆ The Access 97 database format was developed with a normalized table structure. The field names are consistent with the format required for SQL
- ◆ Server and will, therefore, allow simple translation of the database structure to SQL Server should the need arise.

A number of improvements were added to the MARC98 software to allow greater flexibility in the calculation process. These improvements were the result of combined suggestions of Alberta, Saskatchewan, and Manitoba.

Reporting was implemented in a manner similar to MARC98. The report creation capability in MS Access allows greater flexibility in the creation of additional reports in the future.

Significant research went into the development of an installation procedure that will facilitate easy installation on Windows 95/98/NT and 2000. The resulting disk images install properly with minimal installation issues.

## **Results and Conclusions**

The project has concluded successfully and following some final beta-testing it is anticipated that the software will be in use by fall 2000. The three provinces have agreed to work with this version of MARC and in 2001 will evaluate the software and its usefulness at the farm level. This discussion may result in some additional enhancements.

## **Indications for Further Development**

Future additions to the software might include the following:

- Streamlining the electronic submission of data.
- Compatibility with SQL Server.
- Increased reporting capabilities.
- Incorporation of livestock operation calculations.