

A strategy to evaluate soil suitability in the prairie landscape for application of manure

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”Interpreting resource data base information”

The rapid expansion of the livestock industry in Western Canada in recent years, has focused great attention on our soils and water resources specifically, the potential for adverse environmental impacts related to the management and land application of animal manures. To assist in the planning for sustainable development of this industry, a project was funded under the Hog Environmental Management Strategy, (HEMS) to develop standard methodology(s) to assess landscape suitability for manure applications.

The objective of this project was to optimize the utilization of available expertise and resource information data bases, such as soils, geology, hydrology, climate and management, in a standardized format to facilitate systematic and consistent interpretation from one region to another. The resulting information would be accessible using GIS in a decision support mechanism linking appropriate management options to particular environmental circumstances in the landscape.

The development of standardized databases for soils, landscapes and surficial geology required the classifying, categorizing and grouping of this resource information using terms that soil specialists and agronomists might easily comprehend. Each of the resource databases contains hundreds of thousands of individual pieces of information specifically identifying important properties and characteristics of complex materials. The first step was to standardize data terminology, content and structure to facilitate automated accessibility using geographic information system technology. Selected attributes from these data sets were then utilized to calculate numeric indices for each of three key environmental components. Each of these indices was then further simplified by categorization into three classes of high medium and low. Finally the three key factors were integrated into a number of soil management groups (SMGs). In addition to resource data integration, information about manure characteristics and management was compiled for developing manure management plans for each SMG.

The three key environment components included a **Nutrient Factor**, describing the capacity of the soil to retain and supply nutrients for crop production, a **Surface Water Factor**, describing the physical characteristics of the landscape that influence surface runoff, and a **Groundwater Factor**, describing the physical characteristics of soils and surficial geological deposits that influence the potential for leaching of soluble substances to aquifers. The first 2 factors were derived from the pedological database, while the third factor was derived by combining pedological data with geologic data from standardized drill logs. The resultant SMGs, highlight various resource limitations and thus indicate management requirements for sustainable manure applications.

This methodology **does not** provide ratings of good, or bad, suitable or unsuitable, it is not prescriptive of rates or methods of application, but rather it links resource limitations to available provincial management guidelines. This methodology **does NOT preclude the need for**

site evaluations. It simply indicates resource circumstances that need to be considered for “land” manure management plans.

This methodology (project) is being developed using three pilot study areas across the prairies, and thus involves agronomic, pedologic, geologic, hydrologic and geotechnical resource expertise and includes participants from each of the 3 prairie provinces, PFRA, NRCan, and Research Branch of AAFC. The next steps in the development and adaptation of this methodology will be to undertake additional field-testing to validate and refine the procedure. This will include application to additional databases for many more rural municipalities combined with field evaluations and discussions with local land managers and resource specialist. This will provide an opportunity to gage the utility and acceptability of this approach by provincial specialists in each province.

The approach described above is simply a tool and a systematic approach to be used for screening or assessing the suitability of soils in the prairie landscapes for the application of hog manure taking into consideration the protection of soil, surface water and groundwater quality. The technology described is generic and therefore should facilitate generalized all-purpose planning for various land use issues involving inputs to the environment.

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