Municipal Biosolids Application Using 4 R's Nutrient Management Stewardship

by Mark Janiec, *CCA-ON*

4R Nutrient Management Stewardship is a combination of economic, social and environmentally responsible application of nutrients using the 4R's approach*. Are municipal biosolids and other Non-Agricultural Source Materials (NASM) land applied with a NASM Plan being managed keeping these principles in mind and can the industry make improvements?

What are the 4R's?

The 4R's is a scientific based concept which embrace the following nutrient management principles: using the right source of nutrient, applied at the right rate, used at the right time and applied in the right place. This concept or philosophy includes environmental, economical and social aspects when applying nutrients to agricultural soils and is site specific**.

Nutrient Management Regulation: Ontario Regulation 267/03

Ontario's Nutrient Management Regulation (NMReg's) includes many of the 4R concepts. Some of the land application standards which must be followed and that affect nutrient application are:

- Minimum depth to ground water
- Separation distance to surface water and wells
- Tracking of all land applied nutrients and metals
- Reduction in application volume based on season, hydrologic soil group, slope and proximity to water
- No application when the soil is frozen or snow covered
- Application volume adjusted for top spreading or injection of material
- Odour classification of nutrients and increased setbacks to minimize neighbour conflicts

When applying liquid material within 150 meters of a watercourse, application rates may need to be adjusted based on time of year, hydrologic soil group and slope. Example: a fine textured soil (clay) on a 9% slope in mid-May will have a 42% reduction in application rate in this zone due to higher runoff potential compared to application to the same field in July.

Also, the NMReg's allows municipal biosolids to only be land applied in Ontario from April 1-November 30. December to the end of March is defined as the "restricted period" (winter) and biosolids cannot be applied during this time.

NMAN/AgriSuite Computer Program

Ontario Ministry of Agriculture, Food and Rural Affair's (OMAFRA), NMAN computer program is an excellent planning tool that is used by Certified NASM Plan Developers that tracks and accounts for all sources of nutrients applied to a farmer's field. NMAN creates a realistic nutrient budget, recording the addition of nitrogen, phosphorous and metals (many of which are considered beneficial micronutrients, i.e. zinc) to the soil based on the most recent 4 month nutrient analyses of the material. The nutrient budget is based on the farmer's realistic yield potential and most recent soil analysis from an OMAFRA accredited laboratory.

NMAN will indicate to the user, both regulatory and BMP "Stop Signs" if nutrient management sound practices or legislation is not being followed. In some cases, multiple applications and sources of nutrients, which include commercial fertilizer, manure, municipal biosolids and other organic amendments can be applied over 5 years. The NMAN program will track the solids, nutrient and metal additions to ensure that the 5-year legislative limit is not exceeded.

Industry Challenges

Some of the challenges facing the industry include:

- Farmers ability to and follow the NASM Plan?
- Farmer reporting changes in the fertilizer program to the NASM Plan Developer?
- Most municipal biosolids are applied in the late summer, early fall. Is this the best timing?
- Do the industry and contractors always follow 4R BMP's?
- Recognizing the need for site specific, variable rate application of municipal nutrients which is not permitted under the NMReg's
- Providing the farmer with the best available nutrients for the crop, i.e. cake vs liquid biosolids vs municipal compost

Summary

The right source-rate-time-place concept is incorporated into many aspects of the land application process when applying municipal nutrients. The NMAN computer program is an excellent tool in creating a nutrient budget and determining an acceptable application rate. Following the 4R principles includes the responsible use of all nutrient sources as well as providing a sustainable agriculture and food production system.

**Ontario 4R Nutrient Management Stewardship Guide, April 2016*
***4R Plant Nutrition, A Manual for Improving the Management of Plant Nutrition, North American Version*

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There are over 500 Certified Crop Advisers (CCA) in Ontario. Each CCA has demonstrated their knowledge about Ontario crop production by passing the required exams. In addition, they have the crop advisory experience, the education, the commitment to continuing education and have signed a comprehensive code of ethics, which places the grower's interests first.

This industry driven program helps ensure that Ontario crop producers are well served by those providing their crop production advice. This article was written by one of those CCA's.