Sewage Biosolids: a Renewable Resource High in Phosphorous

by Mark Janiec, *CCA, P.Ag.*

Nitrogen, phosphorous and potassium (N,P and K) are the three primary nutrients applied to agricultural field crops in southern Ontario and their addition to soils is crucial to achieve optimum crop productivity. Nitrogen can be produced from various sources such as natural gas, while phosphorous and potassium are mined from rock. Phosphorous is considered to be a finite resource. Non Agricultural Source Materials (NASM's) such as sewage biosolids are typically low in potassium but can provide significant quantities of plant available nitrogen and phosphorous at low or no cost to the agricultural community.

World Phosphorous Reserves

The world's phosphate rock reserves are considered to be finite with Morocco holding approximately 85% of the high quality global reserves followed by China at about 12%. The United States production of known high quality phosphorous reserves are expected to be depleted within 25 years, while Canada has no significant high quality reserves and is dependent on foreign supplies to meet agronomic requirements. The world's phosphate rock reserves are estimated to be somewhere between 90 and 400 years but this number is up for debate with a lot of variables affecting the total potential supply (Cho 2013).

Sewage Biosolids as a Renewable Resource?

The land application of Sewage Biosolids as a NASM is an excellent, low or no- cost source of nutrients available to the agricultural community. The phosphorous in sewage biosolids can be captured as part of the municipal waste water treatment process and recycled on agricultural land. One of the main functions of a municipal waste water treatment plant is to reduce the amount of phosphorous in the effluent that is discharged back into the local river or lake. This is good for the environment by lowering the phosphorous load and preventing potential algae blooms in our water courses, but also beneficial to the farmer as the retained phosphorous is available through municipal land application recycling programs. NASM's such as sewage biosolids can provide as much as 6% total nitrogen (organic and available), very little to zero potassium, unless added to the material during processing, while phosphorus is typically in the 3-5% range depending on the source. At today's fertilizer prices, a typical application of sewage biosolids could add $150/acre of total nitrogen and $200/acre of phosphorus as P2O5.

NMan3

The Ministry of Agriculture and Food has developed a computer program, NMan3, which is an excellent tool used by NASM Plan Developers and accounts for all sources of nutrients applied to a farmer's field when using a NASM plan. NMan3 creates a nutrient budget, based on a specific yield goal, determining how much N, P and K are required to grow a crop with the addition of a NASM. There is a great opportunity for the farmer to reduce the amount of fertilizer used by increasing the volume of NASM to achieve the desired yield goal. NMan3 determines how much of the NASM is required to meet agronomic requirements and can be safely applied based on the specific N, P and K and metal analysis of the material and significant fertilizer savings can be realized by following the NASM plan. NMan3 tracks the addition of nutrients, specifically phosphorous, to the field for the life of the NASM plan which can be as long as 5 years. There is an opportunity to apply NASM to the same field multiple times in 5 years and this is dependent on the farmer's crop rotation, soil fertility levels, fertilizer use and whether any agricultural source materials are used such as manure.

Summary

The land application of NASM is an excellent way to recycle nutrients to Ontario soils. As fertilizer prices continue to increase over time, significant cost savings can be realized by using NASM materials as an alternative to commercial fertilizer. While phosphorous reserves world wide continue to decrease, sewage biosolids should be considered as a renewable resource that needs to be managed using a NASM plan in order to provide a safe, sustainable phosphorous supply in the future.

Cho, Renee. 1 Apr. 2013. "Phosphorus: Essential to Life-Are We Running Out?" *State of the Planet Columbia University*. Retrieved 6 Mar. 2014 from http://blogs.ei.columbia.edu/2013/04/01/phosphorus-essential-to-life-are-we-running-out/

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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.