CONCORD POINTE COMPOST DISTRIBUTION BROCHURE
CITY of HAVRE de GRACE

Comment [DG1]:

Havre de Grace's compost is made from sewage sludge generated at the City's wastewater treatment plant. Aerobic bacteria are used to decompose the sludge into a stable, humus-like product, which can be used as a soil conditioner and source of plant nutrients. As the sludge decomposed, it becomes heated to a temperature in the general range of 55-80 degrees centigrade (130-190 degrees Fahrenheit) which destroys pathogens (bacteria, viruses, protozoan and helminthes that are harmful to humans) and provides the compost with an earthy odor.

Nutrients are present in the compost at an average concentration of:

Nitrogen	2.00%
Phosphorus	1.00%
Potassium	1.00%

The City's composted sludge is analyzed on a schedule and tested for heavy metals and nutrients and has been found to be within the limits set by the EPA 503 sludge regulations for Class I sludge, Maryland Department of the Environment's limits for beneficial reuse of sludge and the Maryland Department of Agriculture's fertilizer requirements, some of which are:

Metal	limit mg/kg	Concord Pointe Compost mg/kg
Cadmium	12.5	3.0
Chromium	1200	20
Copper	500	90
Iron	over 4% no pasture land use	1.4%
Lead	300	20
Mercury	5	0.3
Nickel	100	14
Selenium	36	0.8
Silver		4
Zinc	1250	150

Nutrients			
Nitrogen	17.0	lbs per ton	Concord Pointe Compost
Phosphorus	57.7	lbs per ton	Concord Pointe Compost
Calcium	12.94 %		
Potash	2.61	lbs per ton	Concord Pointe Compost

Pathogens	MPN/gram limit	MPN/gram in Concord Pointe Compost
	200	36

General Use, Properties and Precautions

The compost can be safely used as a fertilizer or soil conditioner where food chain, root, and leafy vegetable crops are grown. Sludge compost can be utilized advantageously in potting mixes, for agronomic crops, on lawns and as mulch. It can also be used as a topsoil substitute for land reclamation and public works projects, for turfgrass production, for nursery production of trees and ornamental plants, on golf courses and cemeteries, for revegetation of disturbed lands (e.g., from surface mining), and for landscaping of parks and around public buildings.

The application of sludge compost at fertilizer rates (i.e., the nitrogen requirement of the crop) to marginal soils can produce significantly higher yields than commercial fertilizers applied alone at the same nitrogen levels. Higher yields are attributed to an improvement in soil physical properties by the compost. Sludge compost is known to improve soil physical properties, as evidenced by enhanced aggregation, increased soil aeration, lower bulk density, less surface crusting, and increased water infiltration, water content, and water retention. Sludge compost added to sandy soils applied alone at the same nitrogen rate would increase the moisture available to the plant and reduce the need for irrigation. In heavy textured clay soils, the added organic matter will increase the soil's permeability to water and air, increase water infiltration into the profile, and thereby minimize surface runoff. The soil also will have a greater water storage capacity. Addition of sludge compost to clay soils has also been shown to reduce compacting (i.e., lower the bulk density) and to increase root development.

Sludge compost, like composted manure, is hygienically and environmentally safe if it is used properly, but it can become a hazardous nuisance if mismanaged. Do not leave in unprotected piles that might become a play area for children or where pets might wander. Keep it away from all surface water, and do not pile it near wells or other water supplies. It should be washed off all fruits and vegetables before they are consumed.

The compost shall only be transported in accordance with COMAR 26.04.06.09, as this compost is over 35 percent solids it is Dried sludge and may be transported in open boxes, such as dump trucks, which are properly sealed to prevent leakage. The trucks shall be covered with tarps or the equivalent.

The compost shall not be field stockpiled or land applied in a manner that will cause an undue risk to the environment or public health, safety, or welfare as may be determined by the Department, or in a manner that causes or likely to cause a discharge of constituents to the waters of the State.

The compost shall not be filed stockpiled on the receiving site for more than fourteen (14) calendar days unless the receiving site has a separate Sewage Sludge Utilization Permit issued by the Department of the storage of sewage sludge, and the stockpiling is in compliance with other State, federal, and local laws and regulations. The treated compost may only be field stockpiled for a maximum of fourteen (14) calendar days provided that adequate separation from groundwater and storm water is provided to prevent leaching or runoff of constitutes through the use of both a plastic liner and cover at least 6 mils thick, or through equivalent means approved by the Department.

The compost shall only be land applied on agricultural land in accordance with a nutrient management plan prepared by a certified and licensed nutrient management consultant or a certified operator in accordance with the Maryland Department of Agricultural requirements in COMAR 15.20.04 and in compliance with COMAR 15.20.07 and 15.20.08.

The compost shall not be stockpiled or land applied within the following minimum buffer zone:

	Surface Applied With no incorporation	Subsurface Injection or applied with Incorporation
(a)Surface waters unless equivalent Best Management Practices are installed	100 feet	50 feet
(b) Field ditches	10 feet	10 feet

Use on Turfgrasses

Composted sewage sludge can be used economically and beneficially in turfgrass production for various areas, including home lawns, parks, institutional grounds, athletic fields, golf courses, and roadsides. It can also be used in the production of cultivated sod. The benefits from utilizing compost are derived from its content of plant nutrients, organic matter, and liming properties. On many soils with poor physical properties, compost used correctly will produce better turfgrass than chemical fertilizers. Organic matter in the compost, approximately 50 percent by weight, improves the physical condition of the soil, which in turn improves plant growth. The use of compost as a source of organic matter takes on added significance as more marginal lands are being used for construction of homes and other developments and as good topsoil becomes increasingly expensive.

The plant nutrient content of composted sludge, especially its nitrogen content, and the rate of mineralization are very important when compost is utilized in turfgrass production. Nitrogen affects the rate of crops, maximum growth or production of vegetative material in turfgrass production is generally undesirable. The desirable rate of growth is one that is sufficient to maintain a healthy, uniform turf during the growing season without excessive production of vegetation.

The chemical composition of composted sludge is variable. The nitrogen, phosphorus, and potassium content generally ranges from 1 to 4, 0.5 to 2.0 and less that 2 percent, respectively. Mineralization is slow with nutrients being released and available for plant growth over a relatively long period. Application rates to supply the nitrogen requirement will also supply sufficient levels of all other essential nutrients for growth of turfgrass, except potassium and phosphorus. Supplemental potash and phosphorus should be added according to soil test results.

Composted sludge can be used in turfgrass production as (1) a soil amendment for the establishment of turfgrass, (2) a fertilizer source for maintenance of established turfgrass, and (3) a soil amendment or growth medium for commercial turfgrass production.

Establishment

Establishment of turfgrass from seed or sod can be significantly increased on many soils by using composted sludge principally as a soil conditioner. When the compost is incorporated with the top 5-6 inches of the soil or is applied as a mulch to the soil surface before or after seeding, seedling establishment is more rapid than with conventional fertilizer practices. Best results for germination, establishment and initial growth rate of turfgrass are obtained with applications of 2,000 to 6,000 pounds per 1,000 square feet (wet weight equivalent to 40 percent moisture). The lower rate is generally used on fertile soils and the higher rate on sandy soils or soils or subsoils low in organic matter. These rates will provide sufficient nitrogen for optimum plant growth. Potassium must be added if the soil is naturally low in this element. The potassium fertility level of a soil can be verified by a soil test. Additions of less than 2,000 pounds per 1,000 square feet are beneficial but should be supplemented with commercial nitrogen and potassium fertilizers. Where compost applications are based on the nutrient requirements of the turfgrass, rather uniform and favorable growth rates can be expected for 5-6 months after seeding or sodding. Excessive growth occurs with additions greater than 6,000 pounds even on infertile soils.

Compost applied a 600-700 pounds per 1,000 square feet to the soil surface as a mulch before or after seeding can markedly increase the rate of establishment of cool-season grasses. The greatest benefits from its use as a mulch have been on late fall or early spring seeding when air temperatures are relatively cool. When used as a mulch with small seeded grasses, such as Kentucky bluegrass and bentgrass, the compost should be applied before seeding. With larger seeded grasses, such as tall fescue, red fescue, and perennial ryegrass, the compost mulch should be applied uniformly after seeding.

Root growth of conventionally produced sod is increased when the sod is laid on soil previously amended with compost. Applications of 2,000-4,000 pounds per 1,000 square feet, depending on the soil and incorporated to a depth of 4-6 inches, will significantly increase root growth and development and provide near optimum growth for 2-4 months after the sod is laid. Root growth is not increased appreciably with higher compost rates; however, excessive grass growth can be expected with higher than 6,000 pounds per 1,000 square feet.

Maintenance

Composted sewage sludge can be substituted for conventional fertilizer in the maintenance of established turfgrasses. The extent to which compost can be used to supply the total nitrogen requirement depends on the maintenance level desired. For turf under a low-to-moderate level, compost can be used to supply the total nitrogen requirement. For higher maintained or higher quality turf, compost can be used to supply a part of the nitrogen requirement, with the additional nitrogen supplied from other sources.

Sod Production

The greatest potential use of compost in the turfgrass industry is probably in commercial sod production. If compost is managed properly, large quantities could be used on a relatively small land area. It can be used in sod production as a soil amendment, as discussed under establishment of turfgrasses, or as a growth medium.

When used as a soil amendment, 3,000-6,000 wet pounds per 1,000 square feet (approximately 65-130 wet tons per acre) incorporated to a depth of 4-6 inches will provide good plant growth. Incorporating the compost is essential if irrigation is not practiced. Further research is needed to evaluate the optimum usage of compost under different production practices.

Composted sewage sludge is an ideal growth medium for most turfgrasses. The only essential plant nutrient that has to be added is potassium. Kentucky bluegrass-red fescue and tall fescue-Kentucky bluegrass mixtures seeded into a 2 to 6 inch layer (6,000-18,000 wet pounds per 1,000 square feet) of compost on the soil surface can produce a harvestable sod within 7 months after fall seeding compared with 12-18 months normally required when compost is not used. When seeding into a layer of compost on the soil surface, irrigate to leach salts an prevent drying of the upper part. Although frequent mowing is required, the total number of mowings would be about the same as with conventional sod production because the sod can be harvested sooner. Other advantages of surface applications are that little or no herbicides and commercial fertilizers are required. Moreover, compost sod weighs about 30-40 percent less than mineral soil sod.

Use on Vegetable Crops

Compost can be used in vegetable gardens as a fertilizer and a soil conditioner. Because the high temperatures achieved during composting destroy enteric pathogens, vegetables eaten uncooked may be grown the same year that compost is applied. Also, since the composition of the distributed product is monitored to meet State and Federal regulations, all types of crops may be grown safely for human consumption. As in other vegetable gardens leafy vegetables should be washed to remove soil and any pesticide residues.

Compost should be applied at rates to supply the nitrogen required by the plants to be grown. Information on specific crop fertilizer requirements for gardens can be obtained through the local cooperative extension agent. If the compost contains 2.5 percent nitrogen, a ½ inch layer of compost of 1,500 pounds per 1,000 square feet of compost will supply approximately 85 pounds of nitrogen. After application, the compost should be thoroughly mixed with the top 4-6 inches of soil. Compost should be applied 1-2 weeks before planting any vegetable to prevent injury from soluble salts. An inch of compost or 3,000 pounds per 1,000 square feet tilled into most gardens will supply enough nitrogen for nearly any crop; excessive nitrogen from any source can delay and reduce the fruiting of tomato and other crops. Compost contains organic nitrogen that becomes available over a period of time and acts much like a slow release nitrogen fertilizer. Thus, the compost application should be reduced to one-half inch in subsequent gardening years since some residual nitrogen is supplied from previous compost applications.

Compost usually provides all the nitrogen and phosphorous that crops generally need. However, since many gardens are low in potassium (potash), supplementing compost with a potash fertilizer may increase the yield of fruit and root crops. If soil tests show the pH to be below 6.5 - 7.0 after applying the compost, some limestone should be applied. Soil testing can identify the need for

supplemental potash and will specify the amount of lime to apply. Contact the County Cooperative Extension Service for infor mation on obtaining a soil test. After several years of compost use, the benefits of additional organic matter are small, and regular fertilizers can be used since they are as effective as additions of compost for supplying nutrients.

USE ON FIELD CROPS

When sewage sludge compost is used as a fertilizer as well as a soil conditioner for agronomic row crops or pasture, yearly compost applications rates should be determined by the nitrogen or phosphorus requirement of the specific crop to be grown. This information can be obtained from a local cooperati ve extension agent. For example, an oat variety requiring only 40 pounds of nitrogen per acre would need 1,000 pounds per 1,000 square feet (21.5 tons per acre) of sludge compost as the soil amendment. A corn variety requiring 150 pounds of nitrogen per acre would need 3,800 pounds per 1,000 square feet (83 tons per acre) of sludge compost. A general rule of thumb to calculate the nitrogen supplying power of sludge compost containing 2.5 percent nitrogen is that 1 ton of compost contains about 1.9 pounds of available nitrogen on a wet weight basis. This assumes that 10 percent of the nitrogen in the compost is available to the crop the first year. Compost application rates for field crops are given in **Table 1.** It is not considered a good practice to plant legumes the same year the compost is applied, because the nitrogen released from the compost will initially reduce the quantity supplied by the legume. Moreover, since most legumes do not need nitrogen fertilizer, it is an inefficient use of a calibrated manure spreader.

Because the compost also contains less than 1 percent phosphorus, supplemental phosphorus fertilization may be necessary when compost is applied according t o the nitrogen requirement of the crop. Since the compost contains 1.0 percent potassium, it may be necessary to apply supplementa l potash to such crops as corn.

In general, the best management practice is to maintain soil pH at 6.5 - 7.0. Periodic soil testing and pH monitoring are advisable to insure proper soil fertility. These services can be obtained through the Cooperative Extension Service.

USE ON FORAGE GRASSES

Compost can be used successfully to establish and maintain forage grasses. For establishment, 4,000 to 7,000 pounds per 1,00 0 square feet should be thoroughly incorporated with the top six inches of soil. The lower rate should be used on rather fertile or already productive soils and the higher rates on unproductive soils. Additions of c ompost at the preceding rates should produce a rapid rate of growth. Later applications of one-half pound per 1,000 square feet (25 pounds per acre) of a soluble nitrogen fertilizer will be needed to maintain a high rate of growth.

To maintain the pasture after the first year, apply compost after the grass is mowed or cut. A rate of 1,000 to 1,300 pounds per 1,000 square feet should be sufficient to maintain and produce quality forage. Animals can be allowed to graze after regrowth has occurred. After repeated applications of sludge compost (5-10 years), a substantial amount of compost probably will have accumulated on the surface from top dressing. If so, the pasture should be renovated by tilling the compost into the soil. Tilling and replanting best utilize the soul conditioning properties of the compost and minimize ingestion of the compost by the animals while grazing.

USE ON NURSERY CROPS AND ORNAMENTALS

Mixing compost in nursery soils and soils where plantings of trees and shrubs are to be made can improve soil fertility, pH, soil structure, and the water holding capacity. Compost can be used very effectively for growing many nursery crops and ornamentals with the applications of 1,900 to 7,000 pounds per 1,000 square feet incorporated with the s urface 6-9 inches of soil.

Compost used at rates of over 2,000 pounds per 1,000 square feet may temporarily injure plants and slow seed germination due to high soluble salt concentrations, if the soil is not thoroughly watered before planting or seeding.

USE IN POTTING MIXES

Sludge compost can be used effectively in preparing potting mixes to grow transplants for ornamental, garden , or commercial purposes. Here, too, compost supplies organic matter, calcium, magnesium. phosphorus, potassium, and slow release nitrogen as well as fertilizer levels of micro elements (boron, c opper, iron, manganese, molybdenum, and zinc) for plants. Effective potting mixes have been prepared, by volume, from sludge compost + peat moss + vermiculite (1:1:1), and compost + infertile loamy sub soil (1:1).

USE FOR RECLAMATION OF DISTURBED AND MARGINAL LANDS

Applying composted sludge can aid significantly in the revegetation and reclamation of lands disturbed by surface mining, removal of topsoil, and excavation of gravel deposits. On these lands the establishment and growth of plants are difficult because of (1) extremely low pH, (2) extreme droughtness fro m lack of organic matter, (3) very high surface temperatures, (4) lack of nutrients, and (5) very poor soil conditions. Research by the Department of Agriculture has shown that through the proper use of sludge compost and dolomitic limestone, a wide variety of agronomic crops can be grown on such lands. With proper management, disturbed lands can be reclaimed in a surprisingly short time. Often in reclam ation, the use of comost is cheaper and plant growth better than with commercial fertilizers.

Compost applications for marginal lands should be based on soil characteristics and the cover crop to be grown. For disturbed soils, up to 9,200 pounds per 1,000 square feet (200 wet tons per acre) could be applied, with even higher rates where compost is mixed with more than six inches of surface soil and where ground water contamination is not a potential problem (e.g.., if the watershed has essentially no other nitrogen inputs and any resulting contamination would be samll, temporary or both). Since compost functions as a slow release nitrogen fertilizer, a heavy single application of compost could supply the fertilizer requirements for several seasons. Reserach has shown that on very drought y or acid soils, the deeper the compost is incorporated with the soil, the better are the crop yields. Special equipment may be required for deep placement of the compost.

In general the establishment of grasses on disturbed or marginal lands have been best with a fall application of sludge compo st and subsequent seeding. For both grassland and agronomic crops, the compost should be thoroughly plowed and disked into the soil before the crop is planted. On acid soils, with crops requiring less than 1,600 pounds per 1,000 square feet (35 wet tons per acre) of sludge compost for their nitrogen requirement, 1-2 tons per acre of dolomitic limestone may be needed. On soil where the pH is lower than 4.5, more lime may be necessary for maximum crop yields.

Table 1. —Various uses and application rates of sewage sludge compost to achieve fertilizer benefits and soil improvement.

Application	Pounds to use Compost per 1000 sq ft[i]	Remarks
Turfgrass establishment:		
soil incorporated	2,000 to 6,000	Incorporate with top 4-6 inches of soil. Use lower rate on relatively fertile soil and higher rate on relatively infertile soil.
Surface mulch	600-700	Broadcast uniformly on surface before seeding species (bluegrass) or after seeding large seeded species (fescue).[ii]
Maintenance	400-800	Broadcast uniformly on surface. On cool season grasses apply higher rate in fall or lower rate in fall and again in spring.Sod
Production when	3,000-6,000	Incorporate with top 4-6 inches of soil.
Vegetable crops:		
establishment	1,000-3,000	Till into surface 1-2 weeks before planting or in previous fall. Do not exceed recommended crop nitrogen rate.
Maintenance	1,000	Rate is for years after initial garden establishment. Till into surface 1-2 weeks before planting or in previous fall.
Field Crops:		
barley, oats, rye, wheat	1,000-3,000	Incorporate into soil 1-2 weeks before planting or in previous fall.
Corn	3,000-3,80	Incorporate into soil 1-2 weeks before planting. Supplemental potash may be required depending on soil test.
Legumes	[iii]	Legumes can be grown in rotation with corn, oats or other nitrogen requiring crops.
Forage Grasses:		
establishment	4,000-7,000	Incorporate with top 4-6 inches of soil. Use lower rate on relatively fertile soil and higher rate on infertile soil. Supplement during first year's growth with ½ pound per 1,000 ft2 (25 pounds per acre) of soluble nitrogen when needed.
Maintenance	1,000-1,300	Broadcast uniformly on surface in fall or early spring 1 year after incorporated application.
Nursery crops and ornamentals (shrubs and trees):		
establishment	1,900-7,000	Incorporate with top 6-8 inches of soil. Do not use where acid soil plants (azalea, rhododendron, etc.) are to be grown.
Maintenance	200-500	Broadcast uniformly on surface soil. Can be worked into soil or used as a mulch.
Potting mixes	equal ratio	Thoroughly water and drain mixes several times before planting to prevent salt injury to plants.
Reclamation:		
Conservation Planting	up to 9,200	Incorporate with top 6 inches of soil. Use maximum rate only where excessive growth for several months following establishment is desirable. For each inch beyond 6 inches of incorporation, add 1,000 pounds per 1,000 ft2 on soils where ground water nitrogen will not be increased.

IT MUST BE NOTED THAT HAVRE DE GRACE'S CONCENTRATIONS OF NITROGEN, PHOSPHORUS AND POTASSIUM ARE AVERAGES USED FOR APPLICATION RATES. **Specific analysis results are available upon request.** This brochure has been adapted from the U. S. Department of Agriculture Bulletin 464, Use of Sewage Sludge Compost for Soil Improvement and Plant Growth.

[i] 1,500 pounds per 1,000 ft2 is equal to ½ inch of compost per 1,000 ft2 or 33 wet tons per acre based on 40 percent moisture c ontent and ½ inch mesh-screened material.

[ii] See Sod Production

[iii] Legumes, such as alfalfa and soybeans, do not need all the nitrogen fertilizer supplied by the compost. Maximum benefit of compost can be realized by growing legumes in rotation.