
RANSOMES
BOB-CAT

Blended vs. homogenous granular fertilizers

by Keith J. Karnok, Ph.D., University of Georgia

In recent years there has been considerable discussion in the turfgrass industry regarding blended granular fertilizers versus homogenous granular fertilizers.

"Blended" describes the formulation process where the major fertilizer components, usually N, P and K, occur in separate particles, which are then mechanically mixed or blended together to form the desired N-P-K ratio.

"Homogenous" describes the formulation process where the N, P and K components are combined to form a single particle. Each particle would therefore contain the desired N-P-K ratio.

The uniformity debate

The point of discussion has centered primarily on the relative uniformity of application of these two basic types of fertilizers. It is believed that particles of blended fertilizers will segregate from one another when delivered from a rotary spreader, resulting in non-uniform fertilization. Conversely, segregation will be avoided by using homogenous fertilizers, thus resulting in uniform coverage.

The above situation is of primary concern when the materials are delivered from a rotary spreader. Rotary spreaders are commonly used by professional turfgrass managers because they afford ease of operation, wide swath, and relatively uniform distribution patterns.

A study was conducted at the University of Georgia in which the particle distribution of several commonly-used turfgrass fertilizers delivered from a rotary spreader was examined.

The study begins

In this study, the Scott's R-X7 rotary spreader was used to deliver the fertilizer materials. The test procedure involved passing the spreader, which contained a specified fertilizer, over a series of specially-designed collection trays. Spreader speed was maintained at approximately three miles per hour.

Seven complete fertilizer materials were tested: three homogenous formulations, two fertilizer/pesticide combination products (BFC) and two blended fertilizers without pesticide (BF).

After passing the spreader over the collection trays, a small sample of fertilizer was taken from each tray for chemical analysis.

In addition to a chemical analysis, a physical analysis was also conducted. The physical analysis consisted of passing the fertilizer material from each collection tray through a series of wire mesh screens ranging from 2.00 to 0.25 mm.

The results of this study showed that with any given fertilizer, larger particles in the 1-2 to > 2 mm size range disperse relatively uniformly across the effective spreader swath. Materials do not accumulate at the perimeter or at the midpoint or center line of the swath.

Small particle dispersion

However, at particle sizes smaller than 1 mm, a much less uniform distri-

PARTICLE SIZE RANGE OF SEVEN GRANULAR FERTILIZERS AND RELATIVE RANKING OF UNIFORMITY OF DELIVERY.

Fertilizer type	Particle Size (mm) <0.25	>0.25–<0.5	>0.5–<1	>1–<2	>2
HF_1	58.2	41.0	0.5	0.2	0.1
BF_2	9.1	64.0	20.1	6.2	0.6
BF_3	28.8	47.9	19.6	2.9	0.8
HFC_4	0.7	26.6	52.6	15.6	4.5
HFC_5	4.2	42.8	40.2	10.4	2.4
BFC_6	15.0	36.0	34.0	11.0	4.0
BFC_7	11.0	57.0	22.0	8.0	2.0

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To better understand this relationship, the particle size range of each material was determined (see table). In general, those fertilizers that spread the most uniformly also showed the smallest range in particle size. However, it is important to note that not all the blended fertilizers had non-uniform delivery. For example, BF2 was quite uniform; in fact, it was comparable to HF1. More than 84 percent of fertilizer fell in two size ranges (1-2 to > 2 mm). This explains its overall relatively uniform delivery. Only HF1, which had a narrower particle size range, showed slightly more uniformity.

N remains even

Although some fertilizers had non-uniform delivery, it was often difficult to observe growth or color variation in areas fertilized with these materials.

There may be several reasons for this. Our data showed that of the three nutrients, nitrogen exhibited the least variation across the spreader swath.

Of the three nutrients, turfgrasses exhibit the most dramatic growth and color response to nitrogen in either excess or deficient amounts. Therefore, since nitrogen showed relatively good distribution across the spreader swath, it would be rare to see growth or color variations in the field when using any of the materials tested in this study.

Our results did show phosphorus and potassium as having more variation in distribution than nitrogen. However, neither one of these nutrients in excess or deficient amounts would be expected to cause an obvious growth or color response in turfgrasses. Therefore, non-uniform delivery of these nutrients over a turfgrass area would be difficult to detect.

In conclusion, in terms of uniformity of application, is there a real difference between homogenous and blended granular fertilizers? Our study showed that there can be. However, when considering uniformity of fertilizer dispersion from a rotary spreader, a uniform or narrow particle size range is more important than whether the fertilizer is blended or homogenous.

In general, our study showed that the more uniform the particle size for a particular fertilizer, the more uniform was its delivery from a rotary spreader, regardless of whether it was homogenous or blended.

Label is no help

Finally, it should be noted that information pertaining to the particle size of a fertilizer is not usually included on the product label. However, consider the other factors that are just as important when determining the potential effectiveness of a particular fertilizer.

Two important considerations would be the N, P and K analysis and the specific nitrogen carrier. Some important characteristics of the nitrogen carrier include: rate of N release, burn potential, acidifying effects, water solubility and cost per unit of N. In addition, keep in mind that the condition of the spreader, calibration, operation and terrain may also cause variation in the uniformity of fertilizer delivery.

If the wrong fertilizer is selected in regard to analysis and/or nitrogen carrier, and/or particular attention is not paid to the care of the spreader and the spreader's operation, it will probably make little difference whether the fertilizer material is homogenous or blended. **LM**

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LM

Growing sod over plastic: turf in five weeks

by Henry F. Decker, Ph.D., Ohio Wesleyan University

The availability of composted sludge and the arrival of tall fescues make the concept of growing sod over an impermeable base more feasible.

Interest in growing grasses in various media over plastic sheeting has grown recently.

Turf grown by O.M. Scott & Sons in 1965 proved that, given appropriate care, you can maintain a grass sod on concrete or any impermeable base as long as you have sufficient water and nutrients.

The basic idea is compelling: by placing a suitable growing medium and seed over plastic sheeting (in our case, 1- to 6-mm polyethylene sheeting), and irrigating it carefully, a tall fescue sod, for example, can be formed in as little as five weeks. The entire primary root system remains intact: unable to penetrate the plastic sheeting, the roots run laterally. They rapidly form a fibrous root mass that binds and knits the sod so that it can be harvested and handled in just a few weeks rather than the typical one to two years.

The new sod can be harvested by simply rolling it off the polyethylene sheeting which is left in place to be used again for subsequent sod crops. Since the sod is harvested with the root system intact, rather than being severed by a sod cutter, the sod binds and roots rapidly to a new site.

Good news, bad news

There are several other significant advantages to the process:

- Since the sod is grown in only a few weeks, much less water, fertilizer, and mowing are needed.
- Depending on the growing medium, the sod can be produced lighter than even a peat sod.
- The sod can be harvested and laid in large rolls (5 by 45 feet to give sod rolls of 25 square yards or more) which can eliminate a great deal of manual labor.

Despite the obvious advantages, several difficult problems have been encountered. First has been the availability of a plentiful, inexpensive, growing medium. Hundreds of materials appear to work in a greenhouse only to be quickly eliminated when considered on a field scale.

Second, the amount of growing material required to cover an acre sheet of plastic one inch deep translates into more than 130 cubic yards. That is too many dump truck loads to be competitive with the conventional sod on soil process.

Third, placing an exact amount of growing material in a thin layer evenly over acres of plastic film without distortion is a challenge. Rainfall — whether it be a drizzle or a downpour — compounds the problem.

Conventional sodding is very labor intensive. Significantly reducing the amount of hard labor involved has to be a prime attribute of any alternative sodding system.

Positive developments

Starting in the 1980s, several things helped make an alternative sodding system more feasible:

- The Beltsville system of composting sewage sludge began to catch on. Suddenly, at least in Ohio, an inexpensive growing material became available that is charged naturally with the right nutrients for grass culture.
- Techniques were developed to spread the growing medium evenly, to protect it from distortion in thunderstorms, and to reduce the quantity required to affect a sod.
- Turf-type tall fescues have been introduced. These new turf cultivars have several apparent advantages over bluegrass: they are more drought tolerant, possibly more shade tolerant, disease- and insect-resistant. They are more durable on playing fields, germinate and root more quickly and are more vigorous than bluegrass.

On the other hand, the tall fescues do not produce rhizomes and stolons. Hence, they do not lend themselves easily to conventional sod production. In practice, these drawbacks are compensated for by growing the sod for a longer than usual period, by including sod netting, and/or by adding bluegrass to the tall fescue seeding.

Thanks, tall fescue

These apparent disadvantages to growing a tall fescue sod in a conventional manner turn out to be strengths when tall fescue is considered as the main ingredient of an alternative sod grown on a solid base. The vigorous and rapid primary rooting gives the tall fescue cultivars a distinct advantage over the less vigorous bluegrasses.

With sod netting, we can easily grow in five weeks a bona fide tall fescue sod that expert grass men judge to be of comparable, even better, quality than conventional, soil-grown tall fescue sod.

In 1988 experiments supported by the National Science Foundation, we tested four different readily-available waste materials: composted sewage sludges from Columbus ("Com-Til") and from Akron ("Organix"); a spent mushroom soil from the Campbell Soup mushroom production facility in Jackson, Ohio; and composted feed lot waste from stockyards in South Charleston, Ohio.

Controls consisted of a typical Ohio clay loam field soil and a mix of one-half field soil and one-half Com-Til. These were tested simultaneously in irrigated, 2,000 square foot test beds and in greenhouse pots at Ohio Wesleyan University. Selected turf cultivars were the bluegrasses Midnight, Adelphi, Banff, Mo-

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nopoly, America, and Nassau; and the tall fescues Jaguar and Rebel II.

Good results

The tall fescues reached an average height of 27 cm four weeks after planting on the waste materials as on the controls. They grew at least twice as fast as the bluegrasses on all waste materials. The bluegrasses averaged heights of 15 cm on the controls, 11 cm on the composted sludges and feed lot wastes, and only 6 cm in four weeks on the mushroom soil.

The sewage sludges had to be "leached out" prior to seed germination with the seedling root growth proportional to the amount of leaching. In the field this translated into intense irrigation (four inches of water per week) for the first two weeks of planting.

Despite a record drought over the 1988 summer, we were able to prove conclusively that it was possible to substitute waste materials for topsoil and to produce consistently high quality tall fescue sods in short periods.

With certain pre-conditions, it would not be unreasonable to assume that a perfectly serviceable tall fescue sod could be produced in as little as a month.

Saving time, space

Surprisingly, because of the drought, after the first two weeks of initial growth the tall fescue sods grown on plastic needed less water to maintain in prime condition than our conventional bluegrass sods on soil. And acceptable tall fescue sods were being produced with as little as 20 cubic yards of waste material per acre. The optimum was in the range of 40 to 50 cubic yards per acre. No pesticides or adjuvants were needed.

Bluegrass sods are much more difficult to produce than tall fescue sods. (A hot summer on plastic is probably asking too much of bluegrasses.)

In 1989 summer experiments, we hope to be able to study the effects on bluegrass seedings of intermittent, cool, deep, well water and to look for bluegrass cultivars that have greater drought tolerance and other favorable characteristics.

Smart waste disposal

Another attractive feature of this innovative growing process is its broad application on a national scale. Since the growing medium is contrived or constructed from waste materials—such as composted sewage sludge—substantial amounts of topsoil would be saved. And an obviously troublesome, ever-expanding waste material would be handled effectively, efficiently, and disposed of safely.

It has been estimated that only five percent of the U.S. annual cultivated sod production (estimated at 250,000 acres a year) devoted to this growing process using sewage sludge as the main ingredient of the growing mix in place of topsoil, production would be the equivalent of using the total dry sludge production of Boston, New York, Philadelphia, Washington, and Chicago combined.

When the capacity of the new sod growing system to produce four to eight crops per year is factored in, then it can be calculated that only about 1,500 to 3,000 acres of growing surface would be needed for all of these cities.

If the technology of the earlier research can be refined and adapted to cost effective production on a large scale then an entirely new avenue of resource recovery will be introduced into the handling and disposition of otherwise troublesome waste materials. In addition, a better and more economical method of growing grass sods, which also conserves topsoil, will be introduced. **LM**