

Advantages and Disadvantages of Sewage Sludge as a Mulching Material

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Mulching practices, although somewhat disputed in detail, are fairly well recognized in general. Differences of opinion invariably exist on the material to be used. Of the many available materials, this discussion will point to certain guidelines for the use of sludge available at low cost in park and roadside development and maintenance programs across the country. Research has shown that the improper use of such materials can be costly as well as detrimental, whereas proper and judicious use of these materials may reduce costs and visibly improve treated areas.

•MOST people are aware of the magnitude of the National Park Service, having heard how many areas are administered, operated, and maintained. So that this figure does not become repetitious, it may be expressed in another way: there are 7,820 mi of roads, 8,929 mi of trails, 8,728 buildings, and numerous statues, monuments, structures and quarters. These facilities are on a small portion of over 25,000,000 acres with climatic conditions ranging from subtropical to arctic. There are pure wilderness areas as well as formal gardens. In the Washington Metropolitan Area alone there are 738 separate units.

Looking at these totals from a grounds-maintenance standpoint, and considering the amount of seeding, sodding, and planting that must be renewed and cared for each year, in addition to new developments, the totals are somewhat staggering. Mulch materials can run into considerable sums of money.

When talking about mulching and a mulch, it is defined as anything spread over the surface of the soil to protect soil or roots from heat or cold, and/or improve soil conditions. In the broadest sense, mulching materials include numerous kinds of plant and animal products and by-products, various manufactured materials, and a few natural inorganic substances.

This discussion will be limited to the uses of night-soil or more commonly, sludges. Some forms of sludge are potentially available in many communities, in fact, in nearly every community of more than a few thousand. Many probably have no opinion concerning its use. Frankly, this is about how the Park Service felt, but then someone said, "Let's use sludge, it's free." With these sage words, it was decided to try this by-product of a sewage system. In fact, before realizing it, the Service went overboard.

Basically there are two kinds of sludge available, activated and digested. Activated is processed by aerating the sewage and processing it with heavy industrial equipment. It is an expensive operation. Milorganite, produced by the Milwaukee Sewage Commission is an example of activated sludge. It is good, if one likes organic fertilizers and can afford them. However, the use of activated sludge is somewhat analogous to "a champagne appetite on a beer pocketbook" and is not for park or highway department use.

Digested sludges are most commonly available. They are the end-products of a sedimentation system where anaerobic-bacterial digestion is allowed to take place for 10 to 14 days. In Washington, D. C., a rotary-vacuum filter is then used to remove

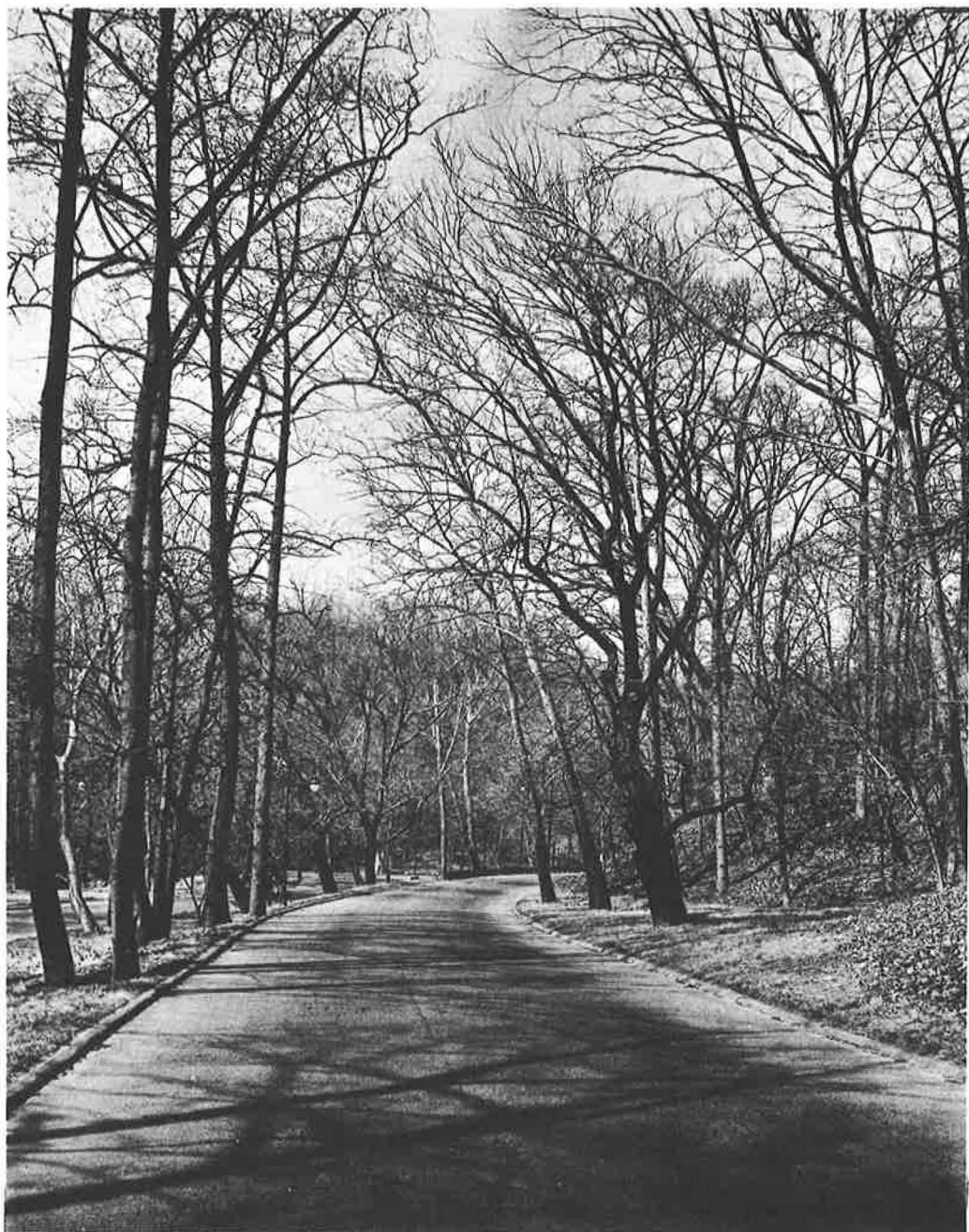


Figure 1. Typical area on Rock Creek Parkway for sludge application.

the moisture. Digested sludge is little better than a low-grade mineral fertilizer, not even on a par with horse manure. It is primarily a soil conditioner. Sometimes it is used as a conditioner for mixed fertilizers, as a mulch for horticultural plants, and on turf areas. The nitrogen content essentially fixes its value as a fertilizer. However, the relatively low-nutrient content of sewage sludge will not permit it to compete with other nitrogen fertilizers.



Figure 2. Typical area on Rock Creek Parkway for sludge application.

After deciding to utilize this free material, it was used in the National Capital Region somewhat indiscriminately. At the same time, it was decided that some kind of an evaluation was necessary. This was a case of a maintenance organization attempting to evaluate a material already in use.

A true research organization would set up methods, materials, and locations, and apply statistical evaluation methods. However, a semblance of a program was set up. The material was primary digested sludge obtained for the cost of hauling it from the treatment plant. The chemical analysis of this material showed 2.06% nitrogen, 1.44% phosphoric acid (P_2O_5) and 0.14% acid soluble potassium (K_2O). The pH reaction was 6.0 and the total ash was 56.2%. The sludge was available as 100% sludge, or 50% sludge and 50% topsoil. The material could be obtained shredded or unshredded.

The five statue mounds in Lafayette Park, and various minor reservations and selected areas of Rock Creek and Potomac Parkway were used for evaluation purposes. Of primary concern were: whether or not the sludge had any beneficial effect on the soil; what reaction it had on growth; what reaction it had on germination; and what reaction it had on longevity of stand.

The sludge was applied on the turf and reconstruction areas at three different rates: $\frac{1}{4}$ to $\frac{1}{2}$ in., 1 in., and 2 to 3 in. deep. It was applied at 3 to 4 in. as a mulch around crepe myrtles on Shoreham Hill along the Rock Creek Parkway. No lime or fertilizer was used with the shrubbery mulch. Approximately 15 to 20 lb of 10-6-4 fertilizer per 1,000 sq ft was applied on one-half the turf areas treated. On one-half of the areas treated, 50% sludge and 50% top soil was applied; on the other half, 100% sludge.

In some areas it was applied as a top-dressing or a mulch, and in the other areas it was worked into the soil. On all areas not planted with shrubs, bluegrass, redtop and creeping fescue seed were sown.



Figure 3. Minor park reservation in the District of Columbia showing tillage practice for sludge incorporated into the soil.

Evaluation was based on visual inspections made at weekly intervals, and by turning a shovelful of the soil for visual and touch examinations. There was no appreciable difference between the sludge-and-topsoil mixture and the 100% sludge.

Where the crepe myrtles were mulched, moisture retention was good and the shrubs bloomed well. However, the weed growth, consisting mostly of tomato plants, was extremely hard to control.

The $\frac{1}{4}$ - to 1-in. mulch on the turf areas was relatively effective. The grasses appeared to increase in growth and in depth of color. On the areas treated with additional fertilizer, the grasses appeared to persist longer and have a longer period of good growth.

The mulches deeper than 1 in., regardless of whether or not fertilizer had been added, eliminated existing grass, and new growth which persisted through the seedling stage was also killed. Apparently, this resulted from nitrogen burn and the ash content of the sludge.

The results were best where the sludge was worked into the soil as a soil conditioner. Grass germinated evenly with good color and was persistent. It was apparent that the lighter the soil, the greater the benefit.

The results show that sludge has value as a light top-dressing for turf areas, and it is valuable as a soil conditioner worked into the soil, or as an ingredient of artificial topsoil.

Does the National Park Service still recommend the use of sludges? The answer, in general, is no. Three reasons are as follows: the tomato plants that grew in the



Figure 4. Lafayette statue in Lafayette Square—an area where sludge was applied.

mulch were expensive to eliminate; the excessive ash in the sludge is deleterious when used as a mulch; and the odor is obnoxious, not only to the workman but also to the public. The last was an important factor that has not been previously mentioned. Public opinion alone was enough for the Service to change its mind. The odor from the sludge damaged public relations to the extent that it nullified any usefulness that the material may have had. The only place sludge could be recommended is as a soil amendment in locations well removed from heavy public use.

If sludge is recommended for use as more than an ingredient of artificial topsoil, it should be remembered that despite its low cost, it may prove to be very expensive from a public relations standpoint.

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