Water – The Boondoggle for Native Soil Sports Fields

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Every year, every field seems to be plagued with too little and/or too much water. It takes great field management, with irrigation and cooperating weather, to have just the right amount of water. With plenty of resources, one can use rain tarps and a sand base to keep a field from getting too wet and can use managed irrigation to keep it from getting too dry. But even with expert management and sand based construction, other serious problems plague fields. Certainly native soil fields are much easier and cheaper to maintain than sand based fields.

TOO LITTLE WATER - It is unlikely that we can ever develop quality fields without irrigation. Just during establishment, it is necessary to get new seed established quickly in order to get ahead of weeds and to get quick maturity. Without irrigation, during drought years like 2007, it is impossible to grow enough verdure (sod density, organic matter) to be able to withstand heavy fall usage. This lack of irrigation is probably the main reason that we most often have very poor practice fields in Kentucky.

Bermuda is our most moisture efficient grass and in some years, almost no irrigation is necessary for maintenance. However, bermuda sprigging and seeding are normally done in May and June, a time when the weather is hot and rainfall not dependable. If you must sprig a vegetative bermuda, a soaking irrigation is absolutely necessary for sprig survival and grow-in; usually requiring about 2 weeks of daily irrigation and 6 weeks of bi-weekly irrigation for complete establishment. Seeded bermuda also requires water for germination but sometimes rainfall is sufficient. However, if the weather is hot and the seedling dries out 2 or more times, the seed may perish. Also, without frequent irrigation young seedlings may wilt and ultimately die during very hot weather.

Solution: Irrigation sufficient for quick coverage of all seeded areas. This is most often accomplished with an automatic system that can be installed for a cost of approximately $7000+ or a traveler system. Travelers usually cost just as much as an automatic system and travelers are not automatic, i.e. they require watchful management while irrigating. Travelers can be used on more than one field and do not have troublesome valves or sprinkler heads installed within the field.

TOO MUCH WATER – the major problem on native soil sports fields. Traffic on wet soil causes surface soil compaction; destruction of soil structure which eliminates internal water drainage and soil aeration. Without soil air, roots will not grow and turf density is impaired. Compaction is mainly caused by mowing equipment and athletic activity, and it only takes a minimum of either to create a downhill spiral toward pour turf cover, little verdure, root destruction, and surface disruption. Always, in heavy traffic areas, depressions turn into pot-holes that hold water like a wash tub. These pot holes grow in depth and circumference until areas in the middle of the field, in the bench areas, or in goal mouths self-destruct. Recovery, even with annual seeding, is seldom successful

because the soil dies, i.e. there is no organic matter to encourage microbial or earthworm activity that helps aerify the soil for root development.

Solution –proactive maintenance and management:

(1) The best solution is to **not traffic wet soils**, i.e. :

--do not mow or perform other maintenance practices when soil is near water saturation. This is very difficult because mowing is often necessary, during seasonal wet periods, in order to maintain playing quality and turf density, especially for sports fields that depend upon ball-roll. However most mowing ruts and compaction are made when the operator doesn't appreciate the possible destruction it causes.

--postpone games or practices. Practices should always be altered to prevent such compaction but regardless of how important it may be, almost never - never will games be postponed. Few coaches or athletic directors appreciate the turf destruction it causes and the actual cost in dollars that an individual wet-game may incur.

(2) **Core aerification**. Although more like a band-aid for serious drainage issues, aerification certainly can be considered a necessary pro-active measure to minimize future drainage problems. Making ¾ inch holes, on 2 to 3 inch centers and re-depositing that soil back on the surface is the only cultivation that a perennial grass field will get. Surface compaction is relieved an turfgrass roots have a place to grow and absorb moisture, nutrients and air. The field is also topdressed with biologically active soil cores, which improves surface smoothness and increases organic matter decomposition. Aerification two or three times per year is extremely important, even if you only aerify the heavy traffic areas and areas that need some annual renovation.

(3) **Grow grass** roots and as much surface foliage as possible. A viable root system increases soil organic matter and helps soil resist compaction. Lots of surface verdure (grass foliage, stolons, rhizomes and roots) protects the soil from compaction. Timely irrigation, fertilizations, weed control and mowing are tremendously important.

Solution – proactive surface modifications:

(4) **Maintain the crown** – fill depressions before they grow into small ponds. For all fields, every year, following the last game:

(a) depressions should be core aerified and filled with a sandy or silt loam soil or

(b) fill depressions with an inch of sand and an inch of organic matter (like peat moss or compost); then roto-till the amendments into the top inch or two of the compacted soil. Before filling the depression, always core aerify on 2 – 3 inch centers to help recovery of any existing live plants and help the amendment to intermix with the compacted soil. The larger the depression, the more difficult this is to do because you tend to move the depression rather than totally eliminate it.

If low areas can be filled before they get big, preferably starting the first year after establishment, minimum hole-filling will be required at any one time. With only a 10 to 18 inch crown, depressions rapidly form in areas receiving concentrated traffic or in areas that settle-out soon after initial establishment. If the field is not properly settled prior to establishment, complete field reshaping is often required within a couple or three years.

(5) **Replace the crown** – if the field crown flattens out and the entire area between hash marks is potmarked with lots of depressions, then filling with good topsoil or tilling sand and organic matter into the surface may be necessary. This is especially true in heavily used bench areas that receive constant abuse. Most often, it is easier and cheaper to haul several loads of a good sandy loam topsoil than trying to mix sand and organic matter into the surface. After heavy core aerification, spread the topsoil evenly over the seriously worn areas; making sure that the surface crown is renewed. Caution – when roto-tilling be careful to drag soil toward the center of the crown. Typically soil will move down slope and the field will become flatter than ever. With this method, it is very difficult to match the center to untilled sides without having some serious grade changes or humps running the length of the field.

Solution – add drains:

(6) **Install tile drainage** from individual **low areas** down slope to sideline drains. This requires trenching, approximately 12 inches deep, adding perforated tile with one end surfacing within the low area and the other end fitted into a sideline drain. If non-perforated drain tile is used, a plastic 4 inch plastic grate can be placed over the end that is on the field. If the drain tile is perforated, gravel should be added to the bottom of the trench. Then after the tile is installed, the gravel can be brought to the surface for maximum drainage for the entire length of the drain tile. Sometimes if the gravel is large, then the surface inch or two can be filled with course sand. Tall fescue and ryegrass will cover a six inch wide drain in a couple of years or can be seeded directly into a coarse sand layer. This strip can also be sodded, being careful to not plug the drain with excessive soil. It only takes a fraction of an inch of soil placed over a drain to make it ineffective in removing surface water. Because bermudagrass quickly spreads laterally during summer, the tile lines will quickly cover and work efficiently for several years.

(7) **Install tile drainage over entire field**, especially over the center of the field. Some sports turf, custom companies have equipment that will trench, extract the soil into a trailer, add tile drains, and then add the gravel or sand back to the surface. This makes the job relatively quick, very clean and available for use quickly. By putting these drains every 10 – 20 feet apart and by bringing the gravel/sand to the surface, these drains will do an excellent job. If they ever quit working because the surface gets plugged with soil, then one can remove the top couple inches and replace with a gravel or sand as before.

(8) If a **conventional seedbed** can be prepared after surface modification (such as the goal mouth for soccer) then **sodding** with compatible sod is the quickest way to get

back on the field. However, new sod will not survive more than a playing season if the underlying drainage problem is not solved with one of the methods mentioned above. If the sod is cut thick, at about ½ inch thick, then you are assured of raising the depression and adding some good topsoil. If sand and organic matter can be tilled into the depression prior to sodding, that is even better for the long term.

In summary, all methods that reduce surface water saturation require the field to be taken out of play for a couple of seasons, usually spring and fall. Especially when you till soil, it takes several months for the soil to settle and become firm enough to withstand traffic. Sod used in establishment will certainly reduce that time.

Remember – turfgrass roots cannot swim nor can they grow into rock-hard soil that has no organic matter and no earthworms. Water movement into or through such soil is negligible and water drainage after saturation is minimal. This is most obvious when you consider baseball skinned areas where water must drain off the surface. Obviously the skin areas are also ‘dead ’soil that will not grow turf and only a few weeds.