

Avoiding problems

Analyzing soil- and sand-based fields

Managers of both soil- and sand-based fields face a variety of challenges during and after field construction. *SPORTSTURF* recently spoke with Dr. Norman Hummel, president and owner of Hummel & Co. Inc., a professional consulting service and soil physical testing laboratory, about those challenges and the benefits of soil physical testing.

ST: What do you see as the overall benefits of soil testing?

Hummel: During field construction, soil testing can be used to evaluate sand-based mixes or soils to reduce the risk of problems after construction, and to make sure that the sand-based mix or soil conforms to a specification or standard. Once the field is built, if there are any problems, soil testing can be used for diagnostic purposes to try to evaluate what the problems might be. For routine maintenance, soil testing to determine nutrient status of the soil and determine fertilizer requirements is valuable for setting up fertilizer programs.

ST: What are the most common tests that you conduct, and what do they entail?

Hummel: Probably the most common tests that we run are mix designs or complete physical analysis. These are tests that we perform during the construction phase—usually on sand-based fields—to make sure that the sand-based mix has a particle size distribution that conforms to either a specification or industry standards. The physical properties are determined to make sure the sand-based mix drains adequately and has adequate amounts of air-filled pore space and water-filled pore space.

We're testing a lot more topsoil samples or modified soil samples. There are still a lot of fields being built made of soils. In those cases we perform a particle size analysis to determine the percentages of sand, silt and clay as well as the sand size and organic matter content. Once we have this information

we can make recommendations to the client for any amendments, whether it is a sand amendment or an organic

amendment or both. If they want to take it a step further with topsoil fields, we can do compaction testing on the samples to determine maximum levels of compaction of the soil. Then we can run physical properties on the soils at density levels that correspond to what the soil should be compacted to in the field during construction. This way they can get an idea if whether an amendment is improving the soil physical properties or not. We would test the soil before and after the amendment to see what benefit, if any, the amendment is providing. That would be a complete physical analysis, with a Proctor test.

ST: Do you typically recommend a particular type of amendment, or does it depend on each particular case?

Hummel: The most common amendments that are used are sand. We like to help people out when selecting the sand amendment, because there are some guidelines for selecting the sand amendment and the quantity. This is important, because adding too much or too little sand as well as improperly sized sand often results in a soil that is worse than what they started with. The other type of amendment that is commonly used is organic matter. More for economic reasons than anything else, composts tend to be the organic amendment of choice, for soils anyway. For sand-based mixes it's more along the line of good-quality peat.

ST: In terms of the tests you perform on existing fields, when and how often should the field manager have the soil tests done?

Hummel: Soil physical properties are normally performed on existing fields when there are suspected problems. Density is a real important parameter to measure, especially on topsoil fields, because it has a big influence on all the other properties. Density refers to the level the soil, or sand-based mix, is compacted to. To do it properly requires taking undisturbed samples. We have samplers that pull out 12-inch-long sleeves of samples and leave the soil pretty much in tact. Some grounds managers or superintendents will drive 2-inch PVC into the ground to extract a sample. If they're conscientious about how they take the sample and pack it right, they can pull a pretty good sample. When this is done we can determine physical properties, which is a pretty good diagnostic tool to assess whether there are any physical problems. The nutrient test is something that should be done every year on a sand-based field and once every 3-4 years on a soil-based field just to determine the nutrient status. Proper sampling

involves taking numerous samples with a soil tube off the field in random locations, getting a composite sample, mixing them together and sending them off to the lab.

ST: How quick is the turn-around on the tests?

Hummel: The turn-around varies with the type of testing to be done. Most tests are done within 3-4 working days. Some of the more comprehensive tests with the soils could take up to 2 weeks.

ST: What is the most common problem you see with sports fields?

Hummel: The most common problems we see on soil-based fields—in particular, newer soil-based fields—are a result of poor design. It seems that there are few people who know how to design a soil-based field. In their defense, though, there really aren't any good industry standards on topsoil fields. Many times these fields are over-engineered to the point that they are worse than older fields adjacent to these where the soil was just hauled in and pushed up. Compaction issues are probably the number one problem on newer fields. There often is no control during construction on the placement and grading of the soil. There are people out there with road graders and vibratory rollers trying to achieve the perfect grade. You can take very good topsoil and really build a lousy field by over-compacting the soil.

The common problem with sand-based fields, at least initially, is quality control during construction. If somebody is experiencing problems on a newer sand-based field typically it's due to a lack of quality control during construction and the materials that were brought in are not what they were supposed to be. But those are relatively few; we don't really have too many problems with sand-based fields.

ST: When someone is looking to have test done on a soil-based field, do you recommend which tests should be conducted?

Hummel: Yes, and what I typically recommend is what we call a topsoil quality test, which includes particle size analysis, organic matter content, and the nutrient test.

From this testing we will recommend any amendments, if needed, to the soil. I would like people to do the complete physical analysis for topsoils in which we do the Proctor testing and then look at physical properties under various compaction levels. That gives them a lot more information, especially in terms of evaluating

whether an amendment is doing any good, and what proportions are needed for the amendment to work properly. This testing is more expensive, requires more material and more time. All of this testing is done to reduce the risks down the road, and this more comprehensive testing just gives us more information.

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