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Standard Terminology Relating to Soil and Turfgrass Characteristics of Natural Playing Surfaces[1]

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1. Scope

1.1 This terminology defines characteristics of soils and turfgrass for use in the development of standards and specifications for natural playing surfaces. This standard includes terms that pertain to natural playing surfaces used for sports and may include those surfaces supporting the growth of turfgrass or unvegetated (bare soil) playing surfaces that are constructed with natural materials.

1.2 The terms defined in this terminology standard are appropriate for use by sports field development professionals, owners and institutions, installers and contractors and other practitioners in matters concerning natural surfaces evaluations, test methods, specifications, maintenance and construction.

2. Terminology

aeration, *n*—condition and sum of all processes affecting soil pore-space gaseous composition, particularly with respect to the amount and availability of oxygen for use by soil biota or soil chemical oxidation reactions, or both.

aeration, *v*—practice to mechanically restore a soil to a condition where gas and water permeability rates are improved and bulk density is lowered (decompaction) by the use of devices (spikes, cores, tines, air-jets, water-jets) which penetrate into the soil profile. See also **aerification, soil** and **cultivation, turf**.

aerification, soil, *n*—mechanical process to relieve soil compaction. This term is often used synonymously with aeration, v (that is, mechanical aeration). See also **aeration, v**.

bulk density, *n*—mass of dry soil per unit bulk volume. The value is expressed as Mg per cubic metre (Mg m^{-3}) or gram per cubic centimetre (g cm^{-3}).

clay, *n*—can be defined in terms of a particular size fraction of a soil, a soil textural class, a soil particle size class, a soil textural group, soil mineralogy, or, in engineering terms, as materials that exhibit plastic soil properties when at appropriate water contents.

DISCUSSION—Ideally, the term "clay" should be appropriately defined when used to describe soils or materials for rootzones. For example, a 90 % sand/10 % clay mixture could imply either 90 % sand/10 % clayey soil (or other soils with textures containing enough clay (<0.002 mm) to exhibit plasticity) or 90 % sand (2 to 0.05 mm)/10 % clay (<0.002 mm).

clay, as a particular size fraction of a soil, n—soil separate consisting of particles <0.002 mm (fine earth fraction) in equivalent diameter.

clay, as a textural class, n—soil material that contains 40 % or more clay, <45 % sand, and <40 % silt.

clay, as a soil particle size class, n—soil material that contains 35 % or more clay (clayey soils).

clay, as a soil textural group, n—soil material that falls within the textural classes of "sandy clay," "silty clay," and "clay (clayey soils)."

clay, in terms of mineralogy, n—soil particulates that are commonly occurring but not restricted to the <0.002 mm fraction (clay minerals). Commonly occurring in soil mineralogy classes as smectitic, kaolinitic, illitic (micaceous), gibbsitic, ferritic, or mixed.

DISCUSSION—Soil mineralogy classes are defined predominantly by the type of soil mineral dominating (40 % or more) the fine earth fraction.

clay, in engineering terms, n—soils containing enough soil material in the less than 0.4 mm fractions such that when moist they exhibit consistence characteristics of "moderately plastic" or "very plastic" forming a roll 4 cm or longer and 4 mm or thinner that supports its own weight.

coefficient of uniformity, CU_{Irr}, irrigation, *n*—measure of the efficiency of irrigation application (expressed as a percent) which was originally described by J.E. Christiansen.

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DISCUSSION—The original Christiansen's CU was a computation which could be determined without statistical analysis. In more precise statistical terms, it can now be defined as the value obtained from subtracting the statistical coefficient of variability (CV) value from 1 (or 100 when expressed as a percentage): $CU_{Irr} = 1 - CV$.

coefficient of uniformity, $C_u(D)$, particle size, *n*—in describing granular materials, it is a measure of the particle size range of the granules.

DISCUSSION—Uniformity coefficients must be described as to the particle size range for which it is describing the uniformity. For example, a C_u value which describes the particle size range between the particle size for the D_{60} to D_{10} (D_{60}/D_{10}) will produce a different number than the C_u which describes the particle size range between D_{85} and D_{15} (D_{85}/D_{15}). Traditionally, the C_u value used in engineering and soil mechanics has been the D_{60}/D_{10} relationship which is also sometimes termed as the 'Hazen Coefficient.'

coefficient of variability (CV), *n*—ratio of the sample standard deviation to the sample mean ($s / \bar{x}$).

DISCUSSION—The coefficient of variation measures the spread of a set of data as a proportion to its mean. It is often expressed as a percentage.

cool season turfgrasses, *n*—grass species widely adapted to cool climates.

DISCUSSION—Some species persist and are used in warm temperate climates either for the specific turf qualities or to provide an actively growing turf system during a period when warm season turfgrasses exhibit winter dormancy.

cultivation, turf, *n*—practice of disrupting the soil by mechanical means without turning or excessively disrupting the sod.

DISCUSSION—This may include such practices as spiking or solid-tine aeration, coring or hollow-tine aeration, grooving or slicing, or drilling. It might also include methods to inject water or air into the soil to create channels, holes, or fissures or break up the soil structure, or a combination thereof.

coring, n—process in which a hollow spike (pipe) tine is inserted more or less vertically into the soil using a mechanical aerator machine.

DISCUSSION—Hollow tines are normally cylindrical and have a sidewall cutout which allows for the soil core to eject the previous soil core in a continuous process as the core is pushed into the soil. The end result is that the turf surface is littered with soil cores having a plug of turf attached to the one end. These cores can be removed or left to dry and then broken up using some type of drag. A subsequent mowing may also break up the cores but caution should be used to limit the hazard from flying debris.

drilling, n—practice which combines principles of both spiking and coring. Instead of pushing a solid or hollow tine into the soil a specially modified drill bit is drilled into the soil to create a hole and also to remove the soil from the rootzone in the process.

DISCUSSION—Drilling is sometimes used to eliminate the propensity to create a somewhat compacted layer at the bottom of the tine penetration depth or to reach greater soil profile depths than is typically possible with standard-tine aeration machines.

grooving, n—see **slicing**.

punching, n—see **spiking**.

slicing, n—process which uses mechanically driven blades to slice vertically into the soil which will create a series of grooves or channels.

DISCUSSION—Historically, slicing practices cut through the sod layer to limited shallow depths in the soil and created little soil disturbance other than the actual creating of the groove and were not very effective at compaction relief or improving soil aeration. More modern slicing techniques using updated equipment (so called "vertical," "shattertine," or "quaking" aerators) slice through the soil with offset knives which create a wobbling or quaking effect which has shown to have better results for compaction relief due to this soil-shattering action.

spiking, n—process in which a solid spike (solid tine) is inserted more or less vertically into the soil. Solid tines can include round bar stock, knives, or bayonets.

D number, *n*—on a logarithmic cumulative percent (%) passing particle size distribution curve, the D number (D_X or DX) is the particle size that correlates with point on the curve in which X % of the particles pass or are finer.

DISCUSSION—For example, a D_{60} (D60) value is the point on the curve in which 60 % of the particles are finer than that diameter. A D_{20} (D20) value can be viewed as a particle size diameter where 20 % of the sand would be less than and 80 % would be greater than that size.

dethatching, *n*—mechanical process used to remove and reduce the amount of thatch in a turfgrass installation. This could include a mechanical "verticutter," power rake, spike drag, or even shallow-depth core cultivation. See also **verticutting**.

gravel, *n*—commonly used to denote spherical, cube-like, or equiaxial aggregate materials with an equivalent diameter > 2.0 mm and < 7.6 mm. More correctly used, this classification refers to "rock fragments" classed as pebbles in the Glossary of Soil Science Terms (1997).

matric potential (soil water potential, or pressure, head), *n*—amount of work that must be done per unit of a specified quantity of pure water in order to transport reversibly and isothermally an infinitesimal quantity of water from a specified source to a specified destination.

DISCUSSION—If the specified quantity is volume, the potential is referred to as pressure (Pa). If the specified quantity is weight, the potential is referred to as head (m). If the specified quantity is mass, the energy potential is the term used ($J\ kg^{-1}$).

overseeding, *n*—practice of seeding a turfgrass into a turf area that has an established turfgrass.

DISCUSSION—Overseeding is normally practiced to increase plant density of a pre-established turfgrass stand or to seed a cool season turfgrass into a warm season turfgrass for the purpose of providing green color or an actively growing turfgrass, or both, during a winter dormancy period.

particle density, *n*—density of the soil particles, the dry mass of the particles being divided by the solid (not bulk) volume of the particles, in contrast with bulk density. Units are $Mg\ m^{-3}$ or $g\ cm^{-3}$.