Compaction Risk

This interpretation is designed to predict the susceptibility of soils to compaction from operation of ground-based equipment for harvesting and site preparation activities when soils are moist. Soil compaction reduces porosity and increases bulk density by reducing the interaggregate pore space.

Compacted soils are less favorable for good plant growth because of high soil bulk density and hardness, reduced pore space, and poor aeration and drainage. Root penetration and growth is decreased in compacted soils because the hardness or strength of these soils prevents the expansion of roots. Supplies of air, water, and nutrients that roots need are also less favorable when compaction decreases soil porosity and drainage.

Interpretation ratings are based on soil properties in the upper 12 inches of the profile. Factors considered are soil texture, soil structure, and rock fragment content. Initial ratings are based on the following soil texture groups:

Low compaction potential: loamy sand, loamy fine sand, loamy coarse sand, sand, fine sand, coarse sand

Moderate compaction potential: silty clay, clay, sandy clay, sandy clay loam, sandy loams with less than 15 percent clay

High compaction potential: loam, silt, silt loam, silty clay loam, very fine sandy loam, sandy loams with 15 percent or more clay.

Ratings are reduced by one class, such as from "high" to "moderate" for strong soil structure grade. Ratings are reduced by one class for rock fragment content of 35 to 60 percent by volume, and are reduced by two classes for rock fragment content of greater than 60 percent.

Definitions of the ratings:

Low - The potential for compaction is insignificant. This soil is able to support standard equipment with minimal compaction. The soil is moisture insensitive, exhibiting only small changes in density with changing moisture content.

Medium - The potential for compaction is significant. The growth rate of seedlings may be reduced following compaction. After the initial compaction (i.e., the first equipment pass), this soil is able to support standard equipment with only minimal increases in soil density. The soil is intermediate between moisture insensitive and moisture sensitive.

High - The potential for compaction is significant. The growth rate of seedlings will be reduced following compaction. After initial compaction, this soil is still able to support standard equipment, but will continue to compact with each subsequent pass. The soil is moisture sensitive, exhibiting large changes in density with changing moisture content.

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| --- | --- | --- | --- | --- | --- |
| Soil Property |  | | |  |  |
|  | Low | Moderate | High |  |  |
| Soil Texture | loamy sand, loamy fine sand, loamy coarse sand, sand, fine sand, coarse sand | silty clay, clay, sandy clay, sandy clay loam, sandy loams with less than 15 percent clay | loam, silt, silt loam, silty clay loam, very fine sandy loam, sandy loams with 15 percent or more clay |  |  |
| Strong soil structure |  |  |  | Ratings are reduced by one class, such as from "high" to "moderate" for strong soil structure grade |  |
| Rock fragment content 35 to 60 percent |  |  |  | Ratings are reduced by one class |  |
| Rock fragment content greater than 60 percent |  |  |  | Ratings are reduced by two classes |  |

Criteria Table

References:

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