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Standard Specification for Seed Starter Mix[1]

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1. Scope

1.1 This specification covers the material characteristics, physical requirements, and sampling appropriate to the designation of a soil or soil-like material for seed starting purposes. This would consist of the duration of germination ending after the cotyledon stage (at the opening of the first true leaves).

1.2 Seed starter mix may include natural soils and artificial mixtures of natural or artificial materials used for the initial germination of seeds to the cotyledon stage.

2. Referenced Documents

2.1 *ASTM Standards:*

C 330 Specification for Lightweight Aggregates for Structural Concrete[2]

C 331 Specification for Lightweight Aggregates for Concrete Masonry Units[2]

D 653 Terminology Relating to Soil, Rock, and Contained Fluids[3]

D 2607 Classification of Peats, Mosses, Humus, and Related Products[4]

D 4531 Test Methods for Bulk Density of Peat and Peat Products[3]

E 11 Specification for Wire-Cloth Sieves for Testing Purposes[2]

3. Material and Manufacture

3.1 The success of a seed starter mix is measured in its ability to provide a germinating seed with certain basic needs, that are outlined as follows. A variety of materials, both natural and artificial, can be employed to provide the characteristics that will fill the need.

3.2 *Function*—A seed starter media provides a seed (seedling) with four basic needs:

3.2.1 Aeration to permit an exchange of gases between the emerging roots and the surrounding medium,

3.2.2 Adequate seed (seedling) to starter media contact to permit water to flow to the seed and seedling root. This function also relates to the media having a sufficient amount of water retention to maintain the amount of moisture needed for plant use,

3.2.3 A surface that does not inhibit emergence. This relates to the media's ability to resist surface crusting, and

3.2.4 A bulk density that does not inhibit root elongation and proliferation.

3.3 *Material*—While one material may be able to provide all of the needs of a seed (seedling), a mixture of varying percentage of at least two of these materials has been found in practice to yield more consistent results over a wide range of management practices. Therefore, seed starters are generally mixtures of materials. The following is a list of materials that have been used as or in seed starter mixes:

3.3.1 *Vermiculite*—This is a natural mineral that has been treated with heat until it becomes porous. This material has the ability to hold a significant amount of water and still allow for excellent drainage. However, it does not provide for good seed-media contact.

3.3.2 *Sphagnum Peat Moss*—This is a natural accumulation of plant material decayed and decaying under anaerobic conditions, and meeting the specifications outlined in Classification D 2607. Industry-wide, this seems to be the one material that has no substitute.

3.3.3 *Perlite*—This is a volcanic ash that looks like small beads of plastic. Similar to vermiculite, it holds less water but provides more seed-media contact.

3.3.4 *Coarse Sand*—This is mineral soil material that passes through a No. 10 sieve but is retained on a No. 40 sieve. It provides good drainage and maintains friability.

3.3.5 *Expanded Shale, Clay, or Slate*— These are engineered materials that are structural grade, inert, porous lightweight aggregates with properties meeting the requirements of Specification C 330 and C 331. Because of their particle strength these aggregates do not consolidate after initial compaction and are thus free draining.

3.3.6 *Peat Humus and Other Peat Products*— This material is more highly decomposed than the sphagnum variety. It meets the specifications outlined in Classification D 2607. While it may be used in the mixture, it tends to compact easily.

3.3.7 *Composted Organic Materials*—This material has desirable nutrient qualities if the seedling is not to be transplanted; however, it has the same drawbacks as the peat humus. Other properties of this material may or may not be desirable depending on the organic parent material and the manner of composting.

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[1] This specification is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.22 on Soil as a Medium for Plant Growth.

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[2] *Annual Book of ASTM Standards*, Vol 04.02.

[3] *Annual Book of ASTM Standards*, Vol 04.08.

[4] Discontinued; see *1992 Annual Book of ASTM Standards*, Vol. 04.08.

3.3.8 *Other Organic Materials*—While raw organic matter may be tempting from the standpoint of increased friability, it may lead to nitrogen depletion and pest (disease and insect) problems. Also, some wood products contain natural and artificial toxins which are lethal to plants. As such, each material would have to be evaluated on its own merit.

3.3.9 *Other Inorganic Materials*—This category includes cinders, ashes, and a variety of artificial inert soil-like material. Each of these materials would have to be evaluated based on its ability to hold moisture, soluble salt content, resistance to compaction, and pH.

3.4 *Density*—The bulk density of the media must be such that it does not inhibit plant emergence or root elongation. A bulk density less than 1.3 g/cm^3(on an oven dry basis) has been found in practice to provide adequate results. This measurement is made using Test Method D 4531 for the dry density of the media.

3.5 *pH*—The optimum pH for a seed starter media varies by the species of the plant being grown. Thus, a specific optimum range of pH is not appropriate for this specification. However, the pH must not be extremely acidic or basic.

3.6 *Soluble Salts*—The concentration of soluble salts must be such that it will result in a conductivity less than 3.5 mmhos (0.35 S/m).[5] Also the portion of the concentration of salts attributable to sodium (Na) or chloride (Cl) must not exceed 10 % of the total salt concentration. Conductivity measurements are made by method 10-3.3 in *Agronomy No. 9, Part 2*.[6]

3.7 *Nutrients*—Since seeds contain their own food supply, the nutrient content of the growth media is not an issue. Over the germination period covered by this specification, seeds will sprout and form healthy seedlings in a mixture totally devoid of nutrients. However, low concentrations of nutrients in the mixture pose no drawbacks in the stage of seedling growth covered by this specification and may yield certain advantages. Nutrients in a starter mix also allows a seedling to remain in the same media further into its life, reducing the need for transplanting. Since nutrients pose no harm and are beneficial to the plant in later seedling growth stages, the issue of plant nutrients in the seed starter mix is left to the individual manufacturer or user.

3.8 *Sanitation*—Germinating seedlings are extremely vulnerable to insects and diseases. To protect the seedling through this period, handling of the media must be as sanitary as practical to reduce the amount of harmful insect eggs and larvae, nematodes, viruses, and microbes. Further sterilization techniques can be used, if desired.

4. Rejection

4.1 The mixture cannot be labeled as a seed starter mix if it fails to conform to any of the requirements of this specification.

5. Packaging and Package Marking

5.1 Unless otherwise specified in the purchase contract or by the purchaser, the prepared mix is packaged in various quantities. Bales and bulk sales are also allowed.

5.2 Unless otherwise specified in the purchase contract or by the purchaser, the name of the manufacturer, name of product, net volume, and a statement denoting compliance with this specification shall be legibly marked on each package.

6. Keywords

6.1 horticulture; peat; seed starter; seedings; soil

[5] A conductivity of 3.6 mmhos (0.35 S/m) is safe for most plants; however, some salt sensitive plant species can be damaged by a conductivity of 3.5 mmhos.

[6] "Methods of Soil Analysis," Method 10-3.3, *Agronomy No. 9, Part 2*, American Society of Agronomy, Madison, WI 1982.