



**VOLUNTARY UNIFORM PRODUCT
GUIDELINES FOR HORTICULTURAL MULCHES,
GROWING MEDIA AND LANDSCAPE SOILS**

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Mulch & Soil Council Uniform Product Guidelines

These Uniform Product Guidelines (UPG) are voluntary product standards and definitions. MSC members are expected to subscribe to these guidelines in principle. However, companies enrolled in the MSC Product Certification Program must adopt these guidelines as mandatory standards as part of the program registration and licensing requirements.

Part I. Purpose and History

The purpose of these voluntary Uniform Product Guidelines is to promote:

- 1 uniform terminology and labeling that enables industry, consumers, buyers, and regulators to achieve a common understanding of mulch and soil products and product ingredients
- 2 fair and open competition in the mulch and soil industry
- 3 standards for product performance that enable individuals to understand and choose the best product for their application.

Part II. Product Categories

Subject to the labeling requirements defined in Part III and product terms and definitions described in the Glossary of Terms (Part IV), mulch and soil products are divided into one of the following product categories:

MULCH

Any product or material except peat or peat moss, that is advertised, offered for sale, or sold for primary use as a horticultural, above-ground dressing.

HORTICULTURAL GROWING MEDIA

Any product or material advertised, offered for sale or sold for primary use as an in-container growing media with minimum product suitability determined by the test procedures defined in Appendices A & B of this document.

LANDSCAPE SOIL & SOIL AMENDMENTS

Any product or material advertised, offered for sale or sold for primary use as an in-ground soil amendment, conditioner or replacement. Landscape soils and soil amendments may be generally characterized in terms of pH and EC, but suitability for use is determined by the test procedure defined in Appendix C of this document.

Part: III: General Product Labeling

The MSC recognizes the following labeling requirements for all mulches, horticultural growing media, and landscape soils/amendments. The source of these requirements is specified.

- 1) All products must have a label that declares the product identity. (AAPFCO¹, NIST²)
- 2) Product names, ingredient names, soil characteristics, and label terminology must conform to the product definitions of this guideline. (MSC³)
- 3) Product names that incorporate or refer to a single specific material must be comprised of 100% of that material. (MSC³)
- 4) Product names that list a specific material as “first-mentioned” among other materials must be comprised of more than 50% of that product. (AAPFCO¹)
- 5) Product names that list a component material or materials on other than a first-mentioned basis must be comprised of at least 10% of the named material(s) and such materials shall be listed in the name in the declining order of their volume content. (AAPFCO¹, MSC³)
- 6) Product names which indicate a specific animal manure by picture, graphic, drawing, or any means other than by name (i.e., cow, sheep, poultry, etc.) shall contain more than 50% of that specific animal manure as part of its total manure content by volume. (AAPFCO¹)
7. A product label shall appear on each product bag. Product labels shall contain an ingredient statement that lists the individual ingredients in declining order by percent of volume or weight as determined by the quantity statement. Individual ingredients must comply with accepted terms in Part IV (Glossary of Terms) of these guidelines. Materials that are less than 3% of total product volume, individually, may be grouped together under the category “other materials”. The specific percentage of product

volume/weight of each listed material need not be given on the product label. (MSC)

- 8) All product packaging and labeling shall conform to requirements of NIST Handbook 133.
- 9) All products shall conform to AAPFCO Handbook 52 and each successive edition as well as the standards and guidelines of the MSC, and all product claims made must be verifiable using repeatable independent scientific methods.
- 10) Colorized Products must conform to the definitions and guidelines for the product name claimed.
- 11) Mulch or soil products shall not contain Chromated Copper Arsenate-treated (CCA) wood or any ingredients whose original manufacturer recommends against grinding or mulching. .

Part IV: Glossary of Terms

Aged: Exposed to weathering and/or natural decay.

Bark: The corky exterior covering of trees, including the cambium, with a maximum wood content (interior xylem) of 15%.

Brand or Product Name: A specific designation applied to an individual product.

Canadian Sphagnum Peat Moss: Sphagnum Peat Moss harvested or mined in Canada.

Cedar Mulch: Products derived 100% from trees of the genus Thuja or juniperus.

Coir Pith: The processed pith found between fibers of coconut husks generally used to improve water, air, and nutrient retention in horticultural mixes. It generally appears reddish-tan and granular to fibrous, has a slightly acidic pH, and is available in different size gradations.

Coir Fibre: Fiber from the outer husk of the coconut (*Cocos nucifera*), one widely used in planting beds and as a rooting medium.

Compost: Soil amendment, landscape soil or horticultural growing media derived from the biological decomposition of organic matter accomplished

by mixing and piling in such a way to promote aerobic and/or anaerobic decay which minimizes pathogens, viable weed seeds, and odors. It shall have soluble salts ≤ 20 mmhos/cm and pH of 4.5-8.04. Suitability for use shall be determined by the testing protocol described in Appendices A-C and the requirements of the United States Environmental Protection Agency in 40CFR, Part 503, Table 3. (See also, Landscape Soil, Potting Soil.)

Container Soil/Mix: (See Potting Soil.)

Cypress Bark Mulch: products derived from the genus *Taxodium* and a maximum wood content of 15%.

Cypress Mulch: products derived 100% from trees of the genus *Taxodium*.

Forest Products: Untreated wood and its untreated by-products generated from the harvest of timber. These products may include lumber, sawdust, bark and similar materials but do not include reprocessed wood from fabricated consumer or industrial products.

Garden Soil: (See Landscape Soil.)

Hardwood Bark Mulch: products derived from deciduous hardwood trees and a maximum wood content of 15%.

Hardwood Mulch: products derived 100% from deciduous hardwood trees.

Hemlock Bark Mulch: products derived from the genus *Tsuga* and a maximum wood content of 15%.

Hemlock Mulch: products derived 100% from the genus *Tsuga*.

Horticultural Growing Medium: Any substance or mixture of substances which is promoted as or is intended to function as a commercial or consumer growing medium for the managed growth of horticultural crops in containers.

Humus: A material for soil conditioning that is derived primarily from the decomposition of animal or vegetable matter in such manner as the origin of the material is not recognizable. It shall have soluble salts ≤ 5.5 mmhos/cm and pH of 3.5-7.54. Suitability for use shall be determined by the testing protocol described in Appendix C. (See also, Landscape Soil, Soil Amendment.)

Landscape Soil: A material, mix or blend for in-ground growing of plants, and made primarily from natural soils, bark, peat, humus, compost, and/or manure. It may include fertilizer, pesticides, and/or additives intended as soil conditioners (e.g., perlite, vermiculite, sand, peat moss, charcoal). It shall have soluble salts ≤ 20 mmhos/cm and pH of 4.5-7.54. Suitability for use shall be determined by the testing protocol described in Appendix C.

Manure: Dried, pulverized, shredded, composted, or otherwise processed, manipulated, or treated animal manures are the excreta of animals together with whatever organic bedding or other materials are needed to follow good dairy barn, feedlot, poultry house, etc., practice in order to maintain proper sanitary conditions, to conserve plant food elements in the excreta, and to absorb the liquid portion without the addition of other material. It shall have soluble salts ≤ 100 mmhos/cm and pH of 4.5-9.04. Suitability for use shall be determined by the testing protocol described in Appendix C. (See also, Soil Amendment.)

Mulch Blends: Bark, wood products, or reprocessed wood products containing more than one genus or a mix of forest products and/or reprocessed wood that have been mechanically screened and/or shredded. If reprocessed wood products are used in any portion of a blend, such use must be indicated on the product ingredient label.

Mulch: Any product or material except peat or peat moss, that is advertised, offered for sale, or sold for primary use as a horticultural, above-ground dressing; for decoration, moisture control, weed control, erosion control, temperature control, or other similar purposes. (NIST²)

Peat: Naturally occurring material for soil conditioning formed chiefly from the decomposition of organic matter in a water-saturated environment. It is composed chiefly of organic matter that contains some nitrogen of low activity. It shall have soluble salts ≤ 3.5 mmhos/cm and pH of 4.5-7.24. Suitability for use shall be determined by the testing protocol described in Appendix C. (See also, Soil Amendment.)

Peat Moss: Naturally occurring material formed chiefly from the partial decomposition of moss plants and organic matter in a water-saturated environment. It shall have soluble salts ≤ 3.5 mmhos/cm and pH of 3.0-6.54. Suitability for use shall be determined by the testing protocol described in Appendix C. (See also, Potting Soil, Landscape Soil and Soil Amendment.)

Peat Moss, Sphagnum: A material obtained from a sphagnum peat deposit (bog) of which an oven dried sample contains a minimum of 66-2/3% sphagnum moss fiber by weight. Those fibers shall be stems and leaves that have recognizable fibrous and cellular structure. (AAPFCO¹) (See also, Potting Soil, Landscape Soil and Soil Amendment.)

Perlite, Horticultural: A unique volcanic aluminosilicate mineral which expands to about 13 times its original volume when it is heated to a temperature of approximately 1,600° F. It is commonly used as a potting-compost ingredient or separately as a medium for rooting cuttings or for hydroculture.

Pine Bark Mini-nuggets: products derived from the genus Pinus with particle size from 0.5” to 1.25” in diameter and a maximum wood content of 15%.

Pine Bark Mulch: products derived from the genus Pinus and a maximum wood content of 15%.

Pine Bark Nuggets: product derived from the genus Pinus with particle size from 1.25” to 2.75” in diameter and a maximum wood content of 15%.

Pine Mulch: products derived 100% from conifers of genus Pinus.

Planting Mix: (See Landscape Soil.)

Potting Mix: (See Horticultural Growing Media)

Potting Soil, Standard: Any material for in-container growing of plants with suitability for use determined by the testing protocol described in Appendix A.

Potting Soil, Premium: Any material for in-container growing of plants, with suitability for use determined by the testing protocol described in Appendix B.

Potting Soil, Professional: A potting soil formula used in commercial container production businesses with documented sales to professional growers of these establishments.

Processed: Deliberately treated or manipulated to modify or transform physical, chemical, or biological characteristics of the natural state of the substance.

Product Label: An information panel which shall be prominently displayed on the product bag and

which shall list the contents of the bag by component materials in declining order by percentage of volume.

Product Name: The primary identification of a product given by the manufacturer and printed most prominently on the front of a product bag for the purpose of identifying the product to the consumer.

Raw: In the natural state, and not prepared, modified or manipulated for use.

Reprocessed/Recycled Wood: Wood sourced from fabricated consumer or industrial products. Sources may include wood from pallets, construction and/or demolition materials that (1) have not been treated with preservatives, stain or paint; (2) contain no materials whose original manufacturer recommends against grinding or mulching; and (3) are not contaminated with any hazardous or other regulated substances.

Seed Starter: A special purpose soil product formulated for in-container growing of plants from seed with suitability for use determined by the testing protocol described in Appendix D1.

Sludge/ Biosolids: The solid precipitate, resulting from water or sewage treatment processes, that contains human waste matter. It shall have soluble salts ≤ 20 mmhos/cm and pH of 4.5-7.24. Suitability for use shall be determined by the testing protocol described in Appendix C and the requirements of the United States Environmental Protection Agency in 40CFR, Part 503, Table 3. (See also, Soil Amendment.)

Soil Amendment: Any substance which is intended to improve the physical characteristics of the soil, except commercial fertilizers, agricultural liming materials, unmanipulated animal manures, unmanipulated vegetable manures, pesticides and other materials exempted by regulation. (AAPFCO¹) Suitability for use shall be determined by the testing protocol described in Appendix C.

Soil Conditioner: (See Soil Amendment.)

Soil: Any product or material except peat or peat moss that is advertised or offered for sale, or sold for primary use as a horticultural growing media, soil amendment, and/or soil replacement. (NIST²)

Soilless: Without naturally occurring earth soil such as topsoils, mineral soil, clay, and silt.

Stump & Root Mulch: products derived 100% from the processing of tree stumps and/or roots.

Vermiculite, Horticultural: An aluminosilicate mineral, heat-treated to form expanded or 'exfoliated' granules with very low bulk density and a laminated structure that allows for good aeration and water retention.

Top Soil: (See Landscape Soil.)

Water-holding Polymer: Polyacrylamides, polyvinyl alcohols, starches and other substances, specifically manufactured to increase water retention in soil or substrates.

Western Bark Mulch: products derived from conifer trees common to the Western region of North America with no more than 15% wood content.

Western Bark Nuggets: products derived from conifer trees common to the Western region of North America with particle size from 1.50" to 2.25" in diameter, and a maximum wood content of 15%.

Western Bark Mini-Nuggets: products derived from conifer trees common to the Western region of North America with particle size from 0.75" to 1.50" in diameter, and a maximum wood content of 15%.

Western Mulch: products derived 100% from conifers common to the Western region of North America.

Wetting Agent: A liquid or granular compound applied to horticultural mixes to improve their ability to wet, rewet and distribute water.

Wood Mulch: Wood, wood products, or reprocessed wood that is mechanically shredded and/or screened.

Wood: The interior hard fibrous (cellulitic) xylem of trees.

References:

¹ MSC, The Mulch & Soil Council-Membership Approved

² NIST, National Institute of Standards and Technology, Gaithersburg, MD. Handbooks 130 and 133.

³ AAPFCO, American Association of Plant Food Control Officials, West Lafayette, IN. Official Publication Handbook, No. 52, et seq.

⁴ Stated as a recommended characterization only, subject to suitability verification as defined in Appendix C. Saturated Media Extract Method (SME).

APPENDICES

A: Standard Potting Soil (SPS) Test Protocol

B: Premium Potting Soils (PPS) Test Protocol

C: Landscape Soils & Soil Amendments (LSSA) Test Protocol

D: Specialty Soil Products

1. Seed Starter Soil (SSS) Test Protocol

E: CCA Test Protocol for Horticultural Mulches

Mulch & Soil Council

Test Protocol for Standard Potting Soils (SPS)

Purposes are to use commonly grown plants as a bioassay to assure that these potting soils: (1) do not contain materials that would prevent the growth and development of plants, (2) will support plant growth. For a potting soil to pass this test, seedling survival must be statistically equal to or greater than for the control soil, and plants grown must produce true leaves.

Materials

Plant species: radish, ‘Early Scarlet’ (*Raphanus sativus*); tomato, ‘Better Boy’ (*Lycopersicon esculentum*); and marigold, ‘Janie’ (*Tagetes patula*).

Pots: Eight (8), 4-inch square (or round) plastic pots per species.

Control potting soil: To assure testing uniformity, the MSC produces and distributes a uniform control sample. Companies wishing to conduct in-house testing should order control media directly from the association (comes in 1-CF bags). The control soil is considered useable for a period of 4 months after the manufacture date. The expiration date is provided on every bag produced. Along with the control soil sample, the purchaser will be issued a set of cards, which include the MSC logo and lot code of bag(s) of control soil sent. This card is to be included in photos taken of plants at the end of all growth tests run for product registration during the 4 month period after control soil production.

Environment: standard greenhouse environment or equivalent. 75-85°F Day / 60-70°F Night.

Procedure

1. All tests will include four pots of test soil and four pots of control soil for each of three (3) test species for a total of 24 test pots. Seeds should be sown and covered exactly as in step 4.
2. Pots should be filled to overflowing and the excess brushed away so that the soil is even with the top of the pot. Pots may be grouped in trays (such as 1020 trays) for ease in handling.
3. All pots should be thoroughly watered prior to sowing to insure adequate moisture.
4. For each of the three test species, place five (5) seeds in each of the four test soil pots and five seeds in each of the 4 control soil pots for a total of 40 seeds per species. Each pot contains only one species of seed. All seeds should be covered with a very light layer of the same fresh soil before testing.

| For each species of seeds | | |
|---------------------------|-------------|---------------------|
| Treatment | No. of pots | No of seeds per pot |
| Control Soil | 4 | 5 |
| Test Soil | 4 | 5 |

5. Pots should be misted using a standard 3-point fogging

nozzle. Pots should be misted as needed to insure adequate moisture. Pots may need misting four times daily in summer; less in winter. Misting should occur until seedlings have established. This may be 3 to 5 days for radish, 5 to 7 days for the others.

6. After germination, plants should be watered as needed.
7. Plants should be counted to determine seedling survival. Time will vary depending on season and species grown, and could be as early as 5 to 7 days for radish. All plants should be counted 14 days after sowing, with data entered in the form on the tab for Standard Potting Soils, in the file “MSC Data Sheets for Testing Protocols”, available on the MSC website (Link: www.mulchandsoil.datasheet.com).
8. Each pot will be thinned to one plant per pot, plants will be grown for a total of four weeks from sowing, and will be watered as needed. If plant growth stalls after 4 weeks (fails to produce a set of fully expanded leaves), one application of a 20-10-20 general purpose fertilizer will be made at 200 ppm N. Otherwise, plants should receive no fertilizer.
9. One additional week of growth will be allowed after fertilization to assess if growth will resume.
10. Photos: At the completion of the growth test, for all species tested, photos are to be taken of a representative plant growing in the test soil and control soil. Each separate photo should include a card showing the MSC logo and control soil lot code, sent with the control soil sample when purchased.

Data Analysis

Seedling survival is a test of 2 proportions, using the 99% confidence level, and is automatically calculated, along with the pass/fail determination, from the data entered on the MSC data file. If the proportion surviving in the potting soil is statistically equal to or greater than the control soil, proceed to step 8. If the proportion of seeds surviving in the test soil is statistically lower than the control soil, the potting soil sample will fail the test.

Pass/Fail

If plants of all 3 species in the test soil produce cotyledons and the first set of true leaves, and the seedling survival is within 99% confidence level of controls, by proportion analysis, the test soil will have passed the MSC Grow Test for Standard Potting Soils. If the test soil stalls during the four weeks, but resumes growth after a fertilizer treatment, it will be assumed that the reason for the stall was due to a lack of nutrition and not due to toxicity. For the soil sample to pass the test, results for all 3 plant species must meet the criteria, at which point, this test soil will have passed the Standard Potting Soil Test.

The completed data file and photos are to be submitted with the application form for product registration.

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Test Protocol for Premium Potting Soils (PPS)

Purposes are to use commonly grown plants as a bioassay to assure that these potting soils: (1) do not contain materials that would prevent the growth and development of plants, (2) will promote plant growth and provide performance greater than standard potting soils. For a potting soil to pass this test, seedling survival must be statistically equal to or greater than for the control soil, and plant dry weight must be statistically equal to or greater than for the control soil.

Materials

Plant species: radish, ‘Early Scarlet’ (*Raphanus sativus*); tomato, ‘Better Boy’ (*Lycopersicum esculentum*); and marigold, ‘Janie’ (*Tagetes patula*).

Pots: Eight (8), 4-inch square (or round) plastic pots per species.

Control potting soil: To assure testing uniformity, the MSC produces and distributes a uniform control sample. Companies wishing to conduct in-house testing should order control media directly from the association (comes in 1-CF bags). The control soil is considered useable for a period of 4 months after the manufacture date. The expiration date is provided on every bag produced. Along with the control soil sample, the purchaser will be issued a set of cards, which include the MSC logo and lot code of bag(s) of control soil sent. This card is to be included in photos taken of plants at the end of all growth tests run for product registration during the 4 month period after control soil production.

Environment: standard greenhouse environment or equivalent. 75-85°F Day / 60-70°F Night.

Procedure

1. All tests will include four pots of test soil and four pots of control soil for each of three (3) test species for a total of 24 test pots. Seeds should be sown and covered exactly as in step 4.
2. Pots should be filled to overflowing and the excess brushed away so that the soil is even with the top of the pot. Pots may be grouped in trays (such as 1020 trays) for ease in handling.
3. All pots should be thoroughly watered prior to sowing to insure adequate moisture.
4. For each of the three test species, place five (5) seeds in each of the four test soil pots and five seeds in each of the 4 control soil pots for a total of 40 seeds per species. Each pot contains only one species of seed. All seeds should be covered with a very light layer of the same fresh soil before testing.

| For each species of seeds | | |
|---------------------------|-------------|---------------------|
| Treatment | No. of pots | No of seeds per pot |
| Control Soil | 4 | 5 |
| Test Soil | 4 | 5 |

5. Pots should be misted using a standard 3-point fogging nozzle. Pots should be misted as needed to insure adequate

moisture. Pots may need misting four times daily in summer; less in winter. Misting should occur until seedlings have established. This may be 3 to 5 days for radish, 5 to 7 days for the others.

6. After germination, plants should be watered as needed.
7. Plants should be counted to determine seedling survival. Time will vary depending on season and species grown, and could be as early as 5 to 7 days for radish. All plants should be counted 14 days after sowing, with data entered in the form on the tab for Premium Potting Soils, in the file “MSC Data Sheets for Testing Protocols”, available on the MSC website (Link: www.mulchandsoil.datasheet.com).
8. Each pot will be thinned to one plant, plants will be grown for a total of four weeks from sowing, and will be watered as needed. Plants should receive no fertilizer.
9. At 4 weeks after sowing, test plants will be compared to controls. Plant dry weights will be taken, with data entered in the form on the tab for Premium Potting Soils, in the file “MSC Data Sheets for Testing Protocols”, available on the MSC website (Link: www.mulchandsoil.datasheet.com).
10. Photos: At the end of the growth test, prior to taking plant dry weights, for all species tested, photos are to be taken of a representative plant growing in the test soil and control soil. Each separate photo should include a card showing the MSC logo and control soil lot code, sent with the control soil sample when purchased.

Data Analysis

1. Seedling survival is a test of 2 proportions, using the 99% confidence level, and is automatically calculated, along with the pass/fail determination, from the data entered on the MSC data file. If the proportion surviving in the potting soil is statistically equal to or greater than the control soil, proceed to step 8. If the proportion of seeds surviving in the test soil is statistically lower than the control soil, the test potting soil sample has failed the test.

2. Plant dry weight is a t-test for means separation, using the 0.05 level of alpha (a) for significance, and is automatically calculated, along with the pass/fail determination, from the data entered on the MSC data file.

Pass/Fail

In order to pass the MSC Grow Test for Premium Soils, plant growth in the test potting soil must be equal to or greater than the control soil, for all 3 plant species as follows: (1) plant top dry weights clipped at the soil level must be statistically equal to or greater than the control soil, as determined by the t-test, and (2) seedling survival must be within 99% confidence level of controls, by proportion analysis. For the soil sample to pass the test, results for all 3 plant species must meet the criteria.

The completed data file and photos are to be submitted with the application form for product registration.

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Test Protocol for Landscape Soils & Soil Amendments (LS/SA)

Purposes are to use commonly grown plants as a bioassay to assure that these soil amendments: (1) do not contain materials that would prevent the growth and development of plants, (2) will support plant growth. For a soil amendment to pass this test, seedling survival must be statistically equal to or greater than for the control soil, and plants grown must produce true leaves.

Materials

Plant species: radish, ‘Early Scarlet’ (*Raphanus sativus*); tomato, ‘Better Boy’ (*Lycopersicon esculentum*); and marigold, ‘Janie’ (*Tagetes patula*).

Pots: Eight (8), 4-inch square (or round) plastic pots per species.

Control potting soil: To assure testing uniformity, the MSC produces and distributes a uniform control sample. Companies wishing to conduct in-house testing should order control media directly from the association (comes in 1-CF bags). The control soil is considered useable for a period of 4 months after the manufacture date. The expiration date is provided on every bag produced. Along with the control soil sample, the purchaser will be issued a set of cards, which include the MSC logo and lot code of bag(s) of control soil sent. This card is to be included in photos taken of plants at the end of all growth tests run for product registration during the 4 month period after control soil production.

Environment: standard greenhouse environment or equivalent. 75-85°F Day / 60-70°F Night.

Procedure

1. The test landscape soil or soil amendment will be tested as two test samples. Sample one will be “as is” (100% of test product). Sample two will be same product blended with builder’s grade sand in volumetric ratios according to label directions. [The sample product may contain soluble salts that are fine for soil amendments but toxic to young seedlings. The blended product test is designed to dilute these possible high levels of salts. However, the test product may be blended with as much as 50% sand, according to label directions. The blended sample may be too course for good seed germination. Therefore, the tests are run both ways to provide a fair test.]

2. All tests will include four pots of test soil and four pots of control soil for each of three (3) test species for a total of 24 test pots.

3. Pots should be filled to overflowing and the excess brushed away so that the soil is even with the top of the pot. Pots may be grouped in trays (such as 1020 trays) for ease in handling.

4. All pots should be thoroughly watered prior to sowing to insure adequate moisture.

5. For each of the three test species, place five (5) seeds in each of the four test soil pots and five seeds in each of the 4 control soil pots for a total of 60 seeds per species. Each pot contains only one species of seed. All seeds should be covered with a very light layer of the same fresh soil before testing.

| For each species of seeds | | |
|---------------------------|-------------|---------------------|
| Treatment | No. of pots | No of seeds per pot |
| Control Soil | 4 | 5 |
| Test Soil (100%) | 4 | 5 |
| Test Soil (Blended) | 4 | 5 |

6. Pots should be misted using a standard 3-point fogging nozzle. Pots should be misted as needed to insure adequate moisture. Pots may need misting four times daily in summer; less in winter. Misting should occur until seedlings have established. This may be 3 to 5 days for radish, 5 to 7 days others.

7. After germination, plants should be watered as needed.

8. Plants should be counted to determine seedling survival. Time will vary depending on season and species grown, and could be as early as 5 to 7 days for radish. All plants should be counted 14 days after sowing, with data entered in the form on the tab for Landscape Soils and Soil Amendments, in the file “MSC Data Sheets for Testing Protocols”, available on the MSC website (Link: www.mulchandsoil.datasheet.com).

9. After 14 days, plants should have produced cotyledons and the first set of true leaves. If after 14 days, the plants fail to produce a set of fully expanded leaves, one application of a 20-10-20 general purpose fertilizer will be made at 200 ppm N. Otherwise, plants should receive no fertilizer.

10. Two additional week of growth will be allowed after fertilization to assess if growth will resume.

11. Photos: At the completion of the growth test, for all species tested, photos are to be taken of a representative pot of both test soils and control soil (three total). Each separate photo should include a card showing the MSC logo and control soil lot code, sent with the control soil sample when purchased.

Data Analysis

Seedling survival numbers of the test soil are compared to controls in a test of 2 proportions, using the 99% confidence level. A pass/fail chart was developed for comparison.

| Control | Test Mix |
|--------------------------|-----------------------|
| If Control is this count | Number needed to pass |
| 20 | 15 |
| 19 | 14 |
| 18 | 13 |
| 17 | 11 |
| 16 | 10 |
| 15 | 9 |
| 14 | 8 |

Pass/Fail

If plants of all 3 species in the test soil produce cotyledons and the first set of true leaves, and the number of these seedlings match the provided chart, the test soil will have passed the MSC Toxicity Test for Landscape Soils and Soil Amendments. Only one of the two test soils (100% or blended) needs to pass. If the test soil stalls during the two weeks, but resumes growth after a fertilizer treatment, it will be assumed that the reason for the stall was due to a lack of nutrition and not due to toxicity.

The completed data file and photos are to be submitted with the application form for product registration.

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Test Protocol for Special Purpose

Seed Starter Potting Soil (SSPS)

Purposes are to use commonly grown plants as a bioassay to assure that these potting soils: (1) do not contain materials that would prevent the growth and development of plants, (2) will support the germination and establishment of young seedlings. For a potting soil to pass this test, seedling survival must be statistically equal to or greater than for the control soil, and plants grown must produce true leaves.

Materials

Plant species: Radish, ‘Early Scarlet’ (*Raphanus sativus*); Tomato, ‘Better Boy’ (*Lycopersicon esculentum*); Marigold, ‘Janie’ (*Tagetes patula*); Basil, ‘Sweet Green’ (*Ocimum basilicum*); Impatiens ‘Dazzler Red’ (*Impatiens walleriana*); and Zinnia “Dreamland Red’ (*Zinnia elegans*).

Pots: Eight (8), 4-inch square (or round) plastic pots per species.

Control potting soil: To assure testing uniformity, the MSC produces and distributes a uniform control sample. Companies wishing to conduct in-house testing should order control media directly from the association (comes in 1-CF bags). The control soil is considered useable for a period of 4 months after the manufacture date. The expiration date is provided on every bag produced. Along with the control soil sample, the purchaser will be issued a set of cards, which include the MSC logo and lot code of bag(s) of control soil sent. This card is to be included in photos taken of plants at the end of all growth tests run for product registration during the 4 month period after control soil production.

Environment: standard greenhouse environment or equivalent. 75-85°F Day / 60-70°F Night.

Procedure

1. All tests will include four pots of test soil and four pots of control soil for each of six test species for a total of 48 test pots. Seeds should be sown and covered exactly as in step 4.
2. Pots should be filled to overflowing and the excess brushed away so that the soil is even with the top of the pot. Pots may be grouped in trays (such as 1020 trays) for ease in handling.
3. All pots should be thoroughly watered prior to sowing to insure adequate moisture.
4. For each of the six test species, place five (5) seeds in each of the four test soil pots and five seeds in each of the 4 control soil pots for a total of 40 seeds per species. Each pot contains only one species of seed. All seeds should be covered with a very light layer of the same fresh soil before testing.

| For each species of seeds | | |
|---------------------------|-------------|---------------------|
| Treatment | No. of pots | No of seeds per pot |
| Control Soil | 4 | 5 |
| Test Soil | 4 | 5 |

5. Pots should be misted using a standard 3-point fogging nozzle. Pots should be misted as needed to insure adequate moisture. Pots may need misting four times daily in summer; less in winter. Misting should occur until seedlings have established. This may be 3 to 5 days for radish, 5 to 7 days for the others.

6. After germination, plants should be watered as needed.

7. Plants should be counted to determine seedling survival. Time will vary depending on season and species grown, and could be as early as 5 to 7 days for radish. All plants should be counted 14 days after sowing, with data entered in the form on the tab for Seed Starter Potting Soils, in the file “MSC Data Sheets for Testing Protocols”, available on the MSC website (Link: www.mulchandsoil.datasheet.com).

8. Each pot will be thinned to one plant. Plants will be grown for a total of four weeks from sowing. Plants will be watered as needed but should receive no fertilizer.

9. Photos: At the completion of the growth test, for all species tested, photos are to be taken of a representative plant growing in the test soil and control soil. Each separate photo should include a card showing the MSC logo and control soil lot code, sent with the control soil sample when purchased.

Data Analysis

1. Seedling survival is a test of 2 proportions, using the 95% confidence level, and is automatically calculated, along with the pass/fail determination, from the data entered on the MSC data file. If the proportion surviving in the potting soil is statistically equal to or greater than the control soil, proceed to step 8. If the proportion of seeds surviving in the test soil is below the control soil, the potting soil sample will fail the test.

Pass/Fail

If plants of all 6 species in the test soil produce cotyledons and the first set of true leaves, and the seedling survival is within 95% confidence level of controls, by proportion analysis, the test soil will have passed the MSC Grow Test for Seed Starter Soils.

The completed data file and photos are to be submitted with the application form for product registration.

Mulch & Soil Council Test Protocol for Determining Chromated Copper Arsenate Levels in Horticultural Mulches

Purpose is to determine if any materials containing the wood preservative, Chromated Copper Arsenate (CCA), have been used in the production of a specific mulch product.

Materials

A mulch sample will be sent to the Horticultural Substrates Laboratory, NC State University for testing. A sample will consist of at least two cubic feet of mulch. Preferably, the sample will be in a bag as it would be ready for sale (e.g., 2 cu ft or 3 cu ft bag).

A. If XRF technology is available at the testing facility, START HERE:

XRF Procedure

1. Each sample will be first tested using the X-Ray Fluorescent Spectrophotometer (XRF).
2. The sample will be analyzed non-destructively through the sample bag using a one-minute exposure per reading.
3. Five (5) readings will be taken on both the front and back of the sample for a total of 10 readings.
4. If after 10 readings no copper, chromium or arsenic are detected*, no further analysis will be required.
5. If any detection of copper, chromium or arsenic is found, the entire sample will be tested further as described below.

Open Bag Procedure

1. The contents of the sample will be emptied into a large plastic tray and further examined for CCA.
2. The entire sample will be visually examined.
3. Suspicious pieces will be tested with the XRF Analyzer.
4. Those pieces with detections of As, Cu or Cr will be returned to the bag for further testing as described below.
5. The entire bag sample will be tested as described below.

B. If XRF technology is not available at the testing facility, START HERE:

Pre-test Grinding Procedure

1. The sample mulch will be ground so as to pass through a 1/16th inch sieve screen.
2. The ground mulch will be thoroughly mixed and placed back into the original bag for samples.

Sample Procedure

1. Samples will be collected through a diagonal cross section using a modified version of the AOAC procedure for dry products.
2. Three samples will be collected for analysis.

Sample Preparation

1. Samples will be digested using a microwave-assisted acid digestion of siliceous and organically-based matrices (EPA Method 3052).
2. A five (5) gram sample will be used instead of the typical 0.5 gram sample for analysis.

Analysis

1. Once the sample is digested, it will be analyzed for arsenic, chromium and copper content using inductively coupled plasma-mass spectrometry (EPA Method 6020).

Pass/Fail

1. If the average values for the all three metals are below 10 ppm, the sample will have passed the MSC CCA Test for Landscape Mulches.
2. If the test values are 10 ppm or more, new samples of the mulch product will be requested and retested for verification. If the retest is similar to the original, the mulch will be considered to contain CCA and will fail the MSC CCA Test for Landscape Mulches.

*Lower Detection Limit for As = 4ppm, Cu = 22ppm & Cr = 84ppm.



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