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LABORATORY REPORT

Advanced
Materials
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Client: Diversified Biotech
Gregory Kwak

Date: August 18, 2022
Project #: 22P1231 Cress
PO #: PO-20557

Purpose:

Evaluate the composting material used in the disintegration of one (1) material per ASTM D-6002-02 (germination) and by the plant growth test for toxicity per OECD 208 (cress seed evaluation).

Sample Identification:

- A. Planet Safe Petri Dish, PSPD-1000, 19.4 grams, As Received
Base = 10.4 grams, Bottom = 35.5 mil, Sidewall = 34.5 mil
Lid = 9.0 grams, Top = 35.0 mil, Sidewall = 33.5 mil
- B. Blank Compost Material
- C. Standard Soil
- D. Cress - Beefsteak Tomato

Source:

Diversified Biotech

Monterey Mushroom Inc.
AMC, Inc./UIC
Neseed

Results:

The seed germination capacity for the one (1) sample was above the recommended 90%.

The one (1) sample/compost material passed the OECD 208 (cress seed) toxicity test.

Discussion:

The evaluation of the compost materials used in the evaluation of the one (1) sample was run per ASTM D-6002-02 Sec. 6.5 and OECD 208. Beefsteak Tomato seeds purchased from Neseed (Lot # 01229) were used in the cress seed test.

Section I - Tomato Seed Germination - ASTM D 6002

Dilutions were used from the supernatant that was collected from the wash of the composting material. Dry compost was washed with RO Water in a 0.0029 inch (200 mesh) USA Standard Testing Sieve. The RO water was poured over the compost while in the sieve. A blank control, a 25%, 50%, 75% dilution and a 100% concentrated supernatant were used for the test. Twenty seeds were placed on filter paper and 10 ml of each type of dilution was added. The samples were placed in a dark room at room temperature for four (4) days. After four (4) days, the samples were evaluated to determine the level of germination for each group. All dilutions had a germination capacity over the recommended 90%. Refer to Table III.

The cress seed germination was also recorded using the petri dish method. Twenty (20) cress seeds were put on moist filter paper in a petri dish and placed in a dark area for four (4) days. The percentage of seeds germinated was recorded. The average number of Cress (Tomato Seeds) germinated using the petri dish method was 95.0%. Refer to Table IV for a complete listing of values.

Section II - Plant Growth - OECD 208

A 400 ml plastic beaker was used for each pot. Drainage holes were punctured at the bottom of each pot. This allows for air flow, drainage of excess water, and also water to wick up through the soil/compost material to the roots of the plants. The room temperature was controlled and kept constant around 22° C +/- 10° C. The humidity was also monitored for a constant reading of 70% +/- 25%. The plants were exposed to seventeen (17) hours of light and seven (7) hours of darkness. The testing period lasted for two (2) weeks.

Each compost sample from the eighty-four (84) day ISO 20200 Disintegration was dried before the OECD 208 was started. The compost was then ground in a blender to eliminate large pieces. The replicates that required a compost/soil mixture were blended together for uniformity. The seeds were placed 0.5" below the top of the planting material.

In total, eighteen (18) flower pots per sample type were used (three replicates of each of the three different mixtures) for the OECD 208 Test (cress seed) toxicity test. The amounts of standard soil, blank compost and the one (1) sample/compost material are given on a volumetric basis and are listed in Table I, Test Set-up Cress Seed which are attached. The values represent one pot of each sample type. The remaining pots had the same amount of material added to them. The volumetric densities were determined by dividing the dry weight (grams) of each compost sample type by 150 ml. The standard soil which was used was potting soil produced by United Industries Corporation in St. Louis, Mo and it contained 40-50% peat.

The amount of cress seeds that germinated during the OECD 208 was also recorded. One (1.0) gram of cress seeds were placed into each pot of each sample type (3 x 6 = 18 total pots). There are 380 seeds in each pot of each replicate. The average percent germination from each sample was recorded. The averages are expressed in Table V.

The test was stopped after 14 days. Table II shows the fresh weight and dry weight yields (of above ground plant parts) for each test series along with their standard deviations. Comparison is based on the dry weight yields and not the fresh weight due to weight differences caused by watering/evaporation and compost mixtures. Table V shows the average germination of cress seeds from each sample pot.

In order for the test to be considered valid, the following performance criteria must be met in the controls:

- ✓ The seedling emergence is at least 70%
- ✓ The seedlings do not exhibit visible phytotoxic effects (e.g. chlorosis, necrosis, wilting, leaf and stem deformations) and the plants exhibit only normal variation in growth and morphology for that particular species
- ✓ The mean survival of emerged control seedlings is at least 90% for the duration of the study
- ✓ Environmental conditions for a particular species are identical in growing media contain the same amount of soil matrix, support media, or substrate from the same source.

The results in Figure I shows that the one (1) compost material had no significant reduction on the plant dry yield of cress plants compared to the blank compost. Visual observations during the test and at the end showed healthy cress plants in all test series.

In conclusion, there was no reduction in the germination and growth of cress (tomato) in compost obtained at the end of the eighty-four (84) day ISO 20200 Disintegration aerobic composting test of the one (1) sample material. This means after composting the material, there was no residual effects which negatively influenced the cress seed plant growth.

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Environmental Scientist

Attachments: Tables (I-V), Figure (I), Digital Photographs

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Table I: Individual densities and amounts per pot for standard soil, blank compost and the Sample A Compost

| Treatment | Soil or Compost (ml/pot) | Volumeric Density (kg/L) | Soil or Compost (g/pot) |
|--------------------|--------------------------|--------------------------|-------------------------|
| Blank Compost | 150 | 0.3507 | 52.60 |
| Standard Soil | 150 | 0.4160 | 62.40 |
| 3-Sample A Compost | 150 | 0.6473 | 97.10 |

Test Set-Up Cress Seed

| Treatment | Soil or Compost (ml/pot) | Volumeric Density (kg/L) | Soil or Compost (g/pot) |
|-------------------------------|--------------------------|--------------------------|-------------------------|
| 3-Blank Compost | 150 | 0.3507 | 52.60 |
| 3-Standard Soil | 150 | 0.4160 | 62.40 |
| 3-Blank Compost/Soil (1:1) | 150 | 0.3833 | 57.50 |
| 3-Blank Compost/Soil (1:3) | 150 | 0.4000 | 60.00 |
| 3-Sample A Compost/Soil (1:1) | 150 | 0.5253 | 78.80 |
| 3-Sample A Compost/Soil (1:3) | 150 | 0.4640 | 69.60 |

Table II: Fresh and Dry weight of Cress for each test series: Absolute and as percentage relative to Blank Compost.

| Test Series | Fresh Weight Yield | | | |
|-------------------------------|--------------------|-------|-------------------------------|-------|
| | (grams) | | (% relative to Blank Compost) | |
| | AVG.* | STD** | AVG.* | STD** |
| 3-Blank Compost | 9.475 | 0.302 | - | - |
| 3-Standard Soil | 9.493 | 0.190 | 100.19 | 0.21 |
| 3-Blank Compost/Soil (1:1) | 9.071 | 0.263 | 95.74 | 0.14 |
| 3-Blank Compost/Soil (1:3) | 9.270 | 0.225 | 97.84 | 0.21 |
| 3-Sample A Compost/Soil (1:1) | 8.626 | 0.360 | 91.05 | 0.15 |
| 3-Sample A Compost/Soil (1:3) | 8.992 | 0.199 | 94.91 | 0.23 |

| Test Series | Dry Weight Yield | | | |
|-------------------------------|------------------|-------|-------------------------------|-------|
| | (grams) | | (% relative to Blank Compost) | |
| | AVG.* | STD** | AVG.* | STD** |
| 3-Blank Compost | 0.559 | 0.427 | - | - |
| 3-Standard Soil | 0.556 | 0.149 | 99.48 | 0.22 |
| 3-Blank Compost/Soil (1:1) | 0.546 | 0.265 | 97.69 | 0.18 |
| 3-Blank Compost/Soil (1:3) | 0.565 | 0.409 | 101.15 | 0.18 |
| 3-Sample A Compost/Soil (1:1) | 0.528 | 0.295 | 94.51 | 0.23 |
| 3-Sample A Compost/Soil (1:3) | 0.556 | 0.249 | 99.43 | 0.21 |

*AVG = Average

** STD = Standard Deviation

Table III : ASTM D 6002 Germination Values of Cress Seeds Using 50 Seeds Per Container

| Treatment (%) and Replicate # | # Germinated | % Germination | Mean % Germination | Mean % Difference in Germination |
|-------------------------------|--------------|---------------|--------------------|----------------------------------|
| BK Control - 1 | 49 | 98 | 98 | - |
| BK Control - 2 | 49 | 98 | | |
| 25 - 1 | 49 | 98 | 97 | 1.0 |
| 25 - 2 | 48 | 96 | | |
| 50 - 1 | 48 | 96 | 96 | 2.0 |
| 50 - 2 | 48 | 96 | | |
| 75 - 1 | 48 | 96 | 95 | 3.0 |
| 75 - 2 | 47 | 94 | | |
| 100 - 1 | 48 | 96 | 95 | 3.0 |
| 100 - 2 | 47 | 94 | | |

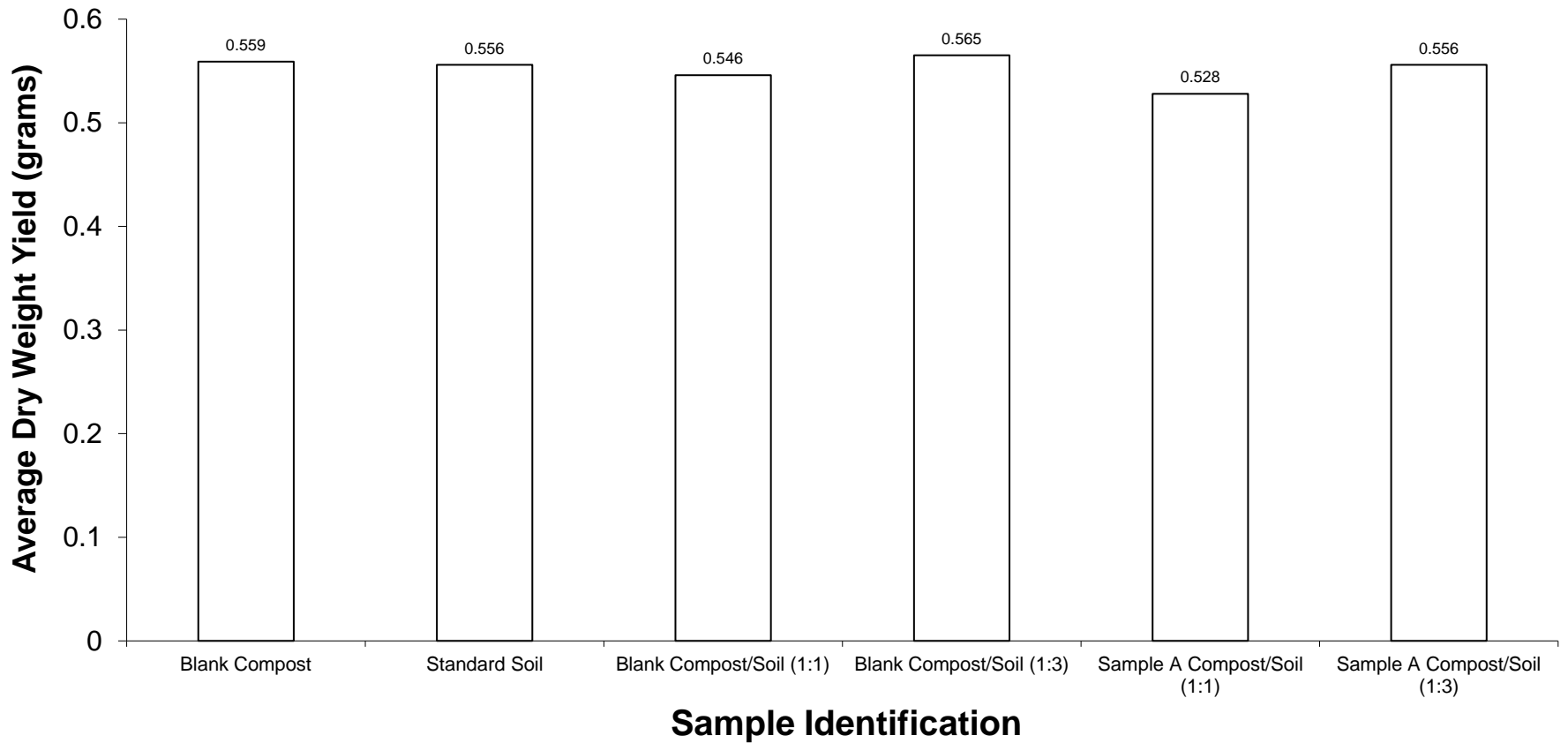
Table IV : ASTM D 6002 Germination Values of Cress Seeds Using 20 seeds Per Petri Dish

| Petri Dish | # of Cress Seeds | # of Seeds Germinated | Germination (%) |
|------------|------------------|-----------------------|-----------------|
| 1 | 20 | 20 | 100.0 |
| 2 | 20 | 19 | 95.0 |

Table V : OECD 208 Average Germination Values of Cress Seeds (1.0 grams ~ 380 seeds per Sample Pot) Per Sample Type

| Sample | # of Cress Seeds | Avg. # of Seeds Germinated | Avg. Germination (%) |
|---------------------------------|------------------|----------------------------|----------------------|
| 3 x Blank Compost | 380 | 370 | 97 |
| 3 x Standard Soil | 380 | 372 | 98 |
| 3 x Blank Compost/Soil (1:1) | 380 | 368 | 97 |
| 3 x Blank Compost/Soil (1:3) | 380 | 372 | 98 |
| 3 x Sample A Compost/Soil (1:1) | 380 | 354 | 93 |
| 3 x Sample A Compost/Soil (1:3) | 380 | 368 | 97 |

Figure I: OECD 208 - Cress
22P1231 - Diversified Biotech, Planet Safe Petri Dish, PSPD-1000
Average Dry Weight Yield





Blank Compost, Standard Soil, Blank Compost/Soil (1:1) and Blank Compost/Soil (1:3)



Sample A Compost/Soil (1:1) and Sample A Compost/Soil (1:3)