Suitability Document for Bear Creek Worm Farm

This document is being prepared for Bear Creek Worm Farm to show the Georgia Department of Agriculture Commissioner in a practical manner the suitability of earthworm castings as a growth media for retail distribution.

Company: Bear Creek Worm Farm, located in Douglas, GA, produces earthworms for sale to fishing and bait shops across the Southeastern USA. Earthworm manure, also known as castings, is produced as a natural by-product of growing earthworms. Castings are well known as an excellent plant growth media or soil amendment. In an effort to increase marketable products, Bear Creek Worm Farm owner, Jack Brantley, wishes to license its earthworm castings in order to sell them as a soil amendment.

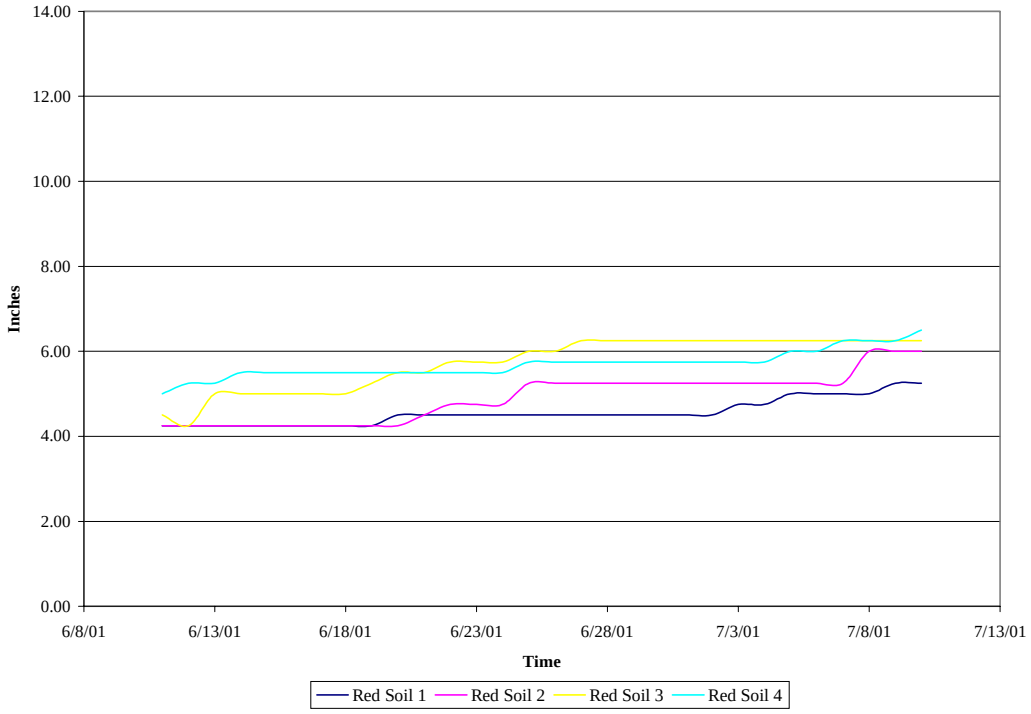
Objective: As a third party, The University of Georgia's Engineering Outreach Program was asked to conduct a simple growth experiment to demonstrate the viability of Bear Creek Farm's earthworm castings as a planting media. The objective is to demonstrate that earthworm castings are comparable to potting soil as a plant growth media for early growth of common plants.

Experiment: The experiment was conducted using earthworm castings, regular potting soil and common Georgia red soil (as a control). Transplantable cherry tomato plants were purchased locally at a hardware store and used as the test plants. The healthy tomato plants were between 4 and 6 inches in height when purchased. Each plant was placed in a 2.5" x 2.5" x 3" growing pot with equal volumes of growth media (castings, soil and mix) in each pot. Because a true representation of growth cannot be obtained from a single plant, four replicates of each growing media were used to insure reproducibility and reduce variability. All plants received equal amounts of water (every two days) and were exposed to equal sunlight. The plants were kept in doors in a climate controlled setting (approximately 73F). See pictures for exact layout of the plants. The length of the growth trial was one month with height measurements taken on a daily basis. Pictures of all plants were taken each week to visually show growth patterns. The following is a presentation of the data collected for the duration of the experiment. Table 1 presents all the data collected on each day of the trial.

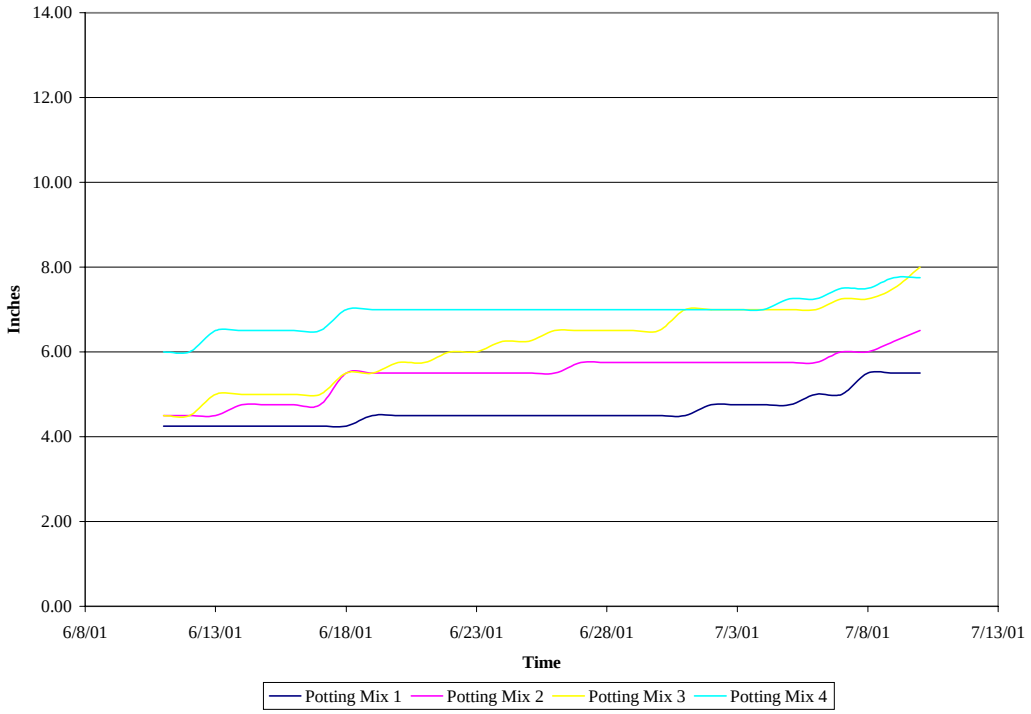
Table 1 Collected data for growth medias (in inches)

	Worm Castings				Red Soil				Potting Mix			
Days	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
6/11/01	5.00	5.50	5.00	5.75	4.25	4.25	4.50	5.00	4.25	4.50	4.50	6.00
6/12/01	5.00	5.75	5.00	6.00	4.25	4.25	4.25	5.25	4.25	4.50	4.50	6.00
6/13/01	5.25	6.00	5.25	6.00	4.25	4.25	5.00	5.25	4.25	4.50	5.00	6.50
6/14/01	5.75	6.00	5.25	6.25	4.25	4.25	5.00	5.50	4.25	4.75	5.00	6.50
6/15/01	5.75	6.25	5.25	6.25	4.25	4.25	5.00	5.50	4.25	4.75	5.00	6.50
6/16/01	5.75	6.25	5.25	6.25	4.25	4.25	5.00	5.50	4.25	4.75	5.00	6.50
6/17/01	5.75	6.25	5.50	6.50	4.25	4.25	5.00	5.50	4.25	4.75	5.00	6.50
6/18/01	5.75	6.50	5.50	6.50	4.25	4.25	5.00	5.50	4.25	5.50	5.50	7.00
6/19/01	5.75	6.75	5.75	6.50	4.25	4.25	5.25	5.50	4.50	5.50	5.50	7.00
6/20/01	6.00	6.75	5.75	7.00	4.50	4.25	5.50	5.50	4.50	5.50	5.75	7.00
6/21/01	6.00	6.75	6.25	7.25	4.50	4.50	5.50	5.50	4.50	5.50	5.75	7.00
6/22/01	6.25	7.50	6.50	7.75	4.50	4.75	5.75	5.50	4.50	5.50	6.00	7.00
6/23/01	6.25	7.50	6.50	7.75	4.50	4.75	5.75	5.50	4.50	5.50	6.00	7.00
6/24/01	6.50	7.75	6.75	8.00	4.50	4.75	5.75	5.50	4.50	5.50	6.25	7.00
6/25/01	6.75	8.00	6.75	8.00	4.50	5.25	6.00	5.75	4.50	5.50	6.25	7.00
6/26/01	7.00	8.25	7.00	8.75	4.50	5.25	6.00	5.75	4.50	5.50	6.50	7.00
6/27/01	7.35	8.50	7.50	9.00	4.50	5.25	6.25	5.75	4.50	5.75	6.50	7.00
6/28/01	7.50	9.00	7.75	9.25	4.50	5.25	6.25	5.75	4.50	5.75	6.50	7.00
6/29/01	7.75	9.00	8.00	9.25	4.50	5.25	6.25	5.75	4.50	5.75	6.50	7.00
6/30/01	8.00	9.50	8.25	9.50	4.50	5.25	6.25	5.75	4.50	5.75	6.50	7.00
7/1/01	8.25	10.00	8.50	10.00	4.50	5.25	6.25	5.75	4.50	5.75	7.00	7.00
7/2/01	8.25	10.00	8.75	10.25	4.50	5.25	6.25	5.75	4.75	5.75	7.00	7.00
7/3/01	8.50	10.25	9.25	10.75	4.75	5.25	6.25	5.75	4.75	5.75	7.00	7.00
7/4/01	9.00	10.25	9.50	11.50	4.75	5.25	6.25	5.75	4.75	5.75	7.00	7.00
7/5/01	9.25	10.50	10.00	11.75	5.00	5.25	6.25	6.00	4.75	5.75	7.00	7.25
7/6/01	9.50	10.50	10.50	12.00	5.00	5.25	6.25	6.00	5.00	5.75	7.00	7.25
7/7/01	9.75	10.75	10.50	12.25	5.00	5.25	6.25	6.25	5.00	6.00	7.25	7.50
7/8/01	10.00	11.00	11.00	12.50	5.00	6.00	6.25	6.25	5.50	6.00	7.25	7.50
7/9/01	10.50	12.00	12.00	12.75	5.25	6.00	6.25	6.25	5.50	6.25	7.50	7.75
7/10/01	10.75	12.00	12.25	13.00	5.25	6.00	6.25	6.50	5.50	6.50	8.00	7.75

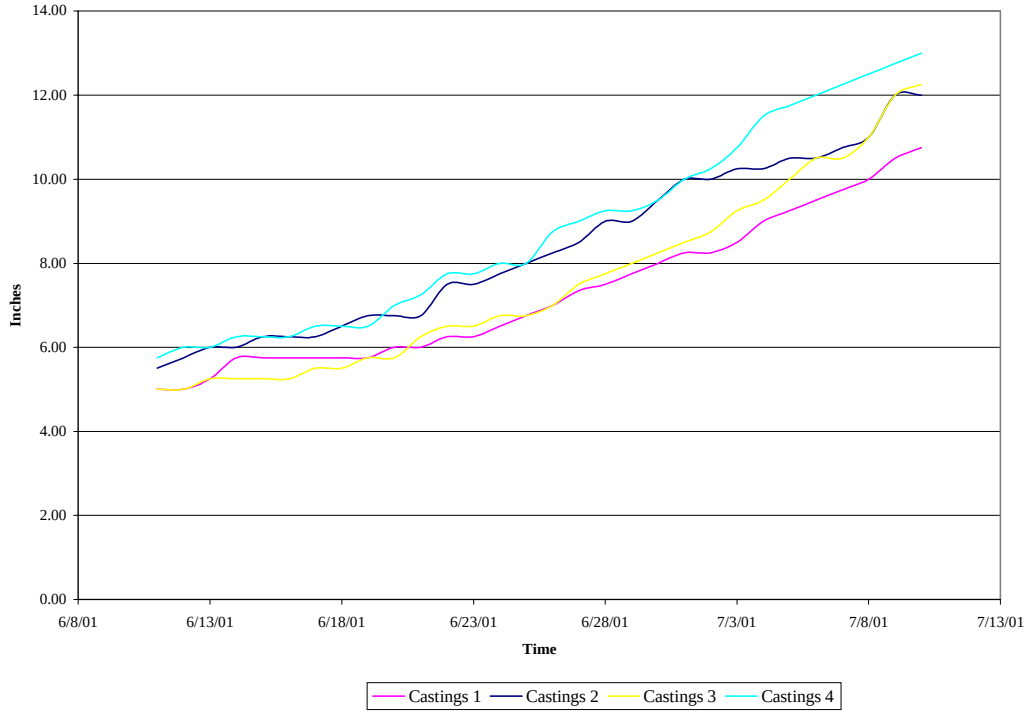
Red Soil



Potting Mix



Earthworm Castings



Growth Comparison

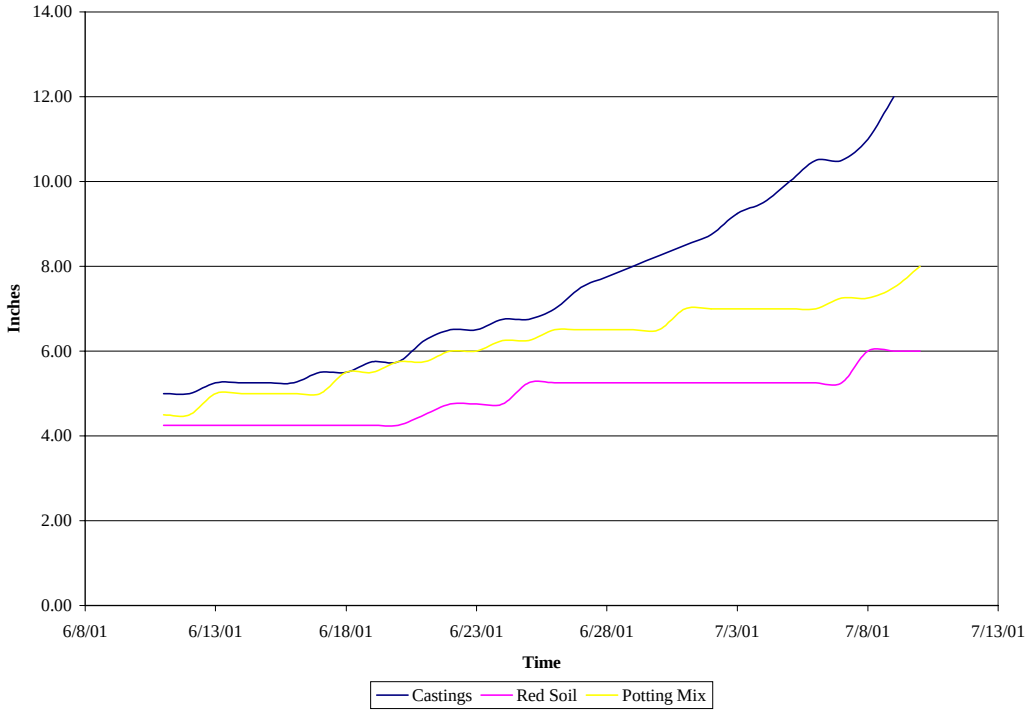


Figure 1 Tomato plants on 6/11/01 (Left Potting Mix, Middle Red Soil, Right Castings)

Figure 2 Tomato plants on 6/18/01 (Left: Potting Mix, Middle: Red Soil, Right: Castings)

Figure 3 Tomato plants on 6/28/01 (Left: Potting Mix, Middle: Red Soil, Right: Castings)

Figure 4 Tomato plants on 7/05/01 (Left: Potting Mix, Middle: Red Soil, Right: Castings)

Figure 5 Tomato plants on 7/11/01 (Left: Potting Mix, Middle: Red Soil, Right: Castings)

As can be seen from the charts and pictures, the earthworm castings performed very well when compared to the potting mix and red soil. Table 2 shows each replication's start height, end height, total growth and percent increase.

Table 2 Percent growth increase

	Worm Castings				Red Soil				Potting Mix			
	1	2	3	4	1	2	3	4	1	2	3	4
Start (in)	5.00	5.50	5.00	5.75	4.25	4.25	4.50	5.00	4.25	4.50	4.50	6.00
End (in)	10.75	12.00	12.25	13.00	5.25	6.00	6.25	6.25	5.50	6.50	8.00	7.75
Growth (in)	5.75	6.50	7.25	7.25	1.00	1.75	1.75	1.25	1.25	2.00	3.50	1.75
% Increase	115%	118%	145%	126%	24%	41%	39%	25%	29%	44%	78%	29%

In conclusion, the tomato plants grown in the earthworm castings grew on average 126% (standard deviation of 13.5) from their original height. The tomato plants grown in red soil grew on average 32% (standard deviation of 9) and those plants grown in the potting mix grew on average 45% (standard deviation of 23) from their original heights. This simple experiment convincingly demonstrates the viability of using Bear Creek Earthworm Castings as a growth media for young cherry tomato plants.