CharGrow®
BioGranules™

Field Trials
Transplant & Row Crops

Eggplant starts
Photo Courtesy of Potomac Vegetable Farms 2016

INTRODUCTION

CharGrow USA manufactures biochar-based soil inoculants in Mills River, North Carolina. Field studies on these amendments have been ongoing since 2005. One of the most important products of the company is called CharGrow® BioGranules™ (also known as CharGrow Original Concentrate). This proprietary formula evolved out of work with compost based potting soils, and the need to provide high populations of beneficial organisms in “peat lite” growing media.

Field trials with CharGrow® BioGranules™ (BG) have shown better plant productivity (than compost based and conventional potting soil) when BG is added at 2.5% -3% by volume.

Factors that have contributed to increased plant growth when BG is added to soils and mixes include:

- Increased plant health due to colonization of roots by beneficial organisms
- Increased nutrient cycling of soil nutrients when the transplant was planted in the field
- Better Utilization of nutrients from cover crops that were tilled in prior to planting
- Earlier plant maturity (earlier flowering & fruit set)
- Greater yield at first pick and through the growing season
- Increased resistance to drought

Ohio
Sweet Corn

The earliest replicated trials for BG were conducted on organic sweet corn in Ohio. This occurred during a drought year and the grower reported that the BG treated soil was holding more water and that fungal activity was visible above ground on cover crop residue. When applied at 10 lbs BG per acre, (applied down the row) the grower achieved an average 20% increase in yield.

In this trial, microbial populations were assessed at the beginning of the season (just before planting) and then again at time of harvest. Results indicated the following:

17%	Increase in Bacteria
43%	Increase in Total Fungi
66%	Increase in Flagellates
206%	Increase in Amoebae
522%	Increase in Mycorrhizal Fungi

without BioGranules

with BioGranules

Based on these results, field trials were repeated on sweet corn at Virginia Tech in 2006 and 2007. Yields increased by 10 -15% in these plots.

In a New Jersey sweet corn trial, the grower was able to obtain 100 bu. per acre yield with a 20% reduction in fertilizer use when BG was applied at 20 lbs per acre.

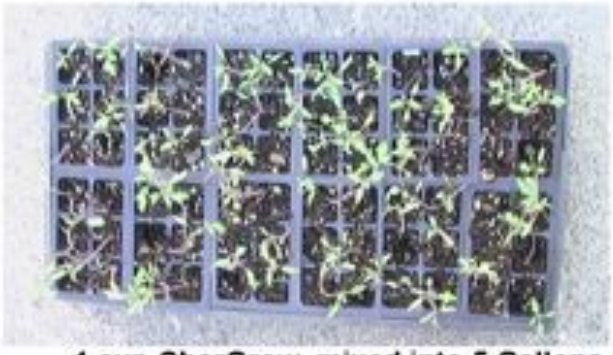
North Carolina
Tomato Transplants

Greenhouse trials were conducted at an organic farm in western North Carolina to look 2 lower rates of BG addition. Results in this trials showed that the biology of the soil and the effects of the BG were visible at 4 ½ weeks from seeding. Plant biomass was greater when rates were increased from 1 cup to 2 cups of BG per 5 gallons of potting soil (roughly equivalent to 1% and 2 % by volume). In later trials, if was found that biomass was greatest when used at 3% by volume.

The effect of addition of CharGrow beneficial soil microorganisms on tomato transplants

(plants shown below are 4 ½ weeks old)

Fafard Organic Potting Soil



1 cup CharGrow mixed into 5 Gallons of Fafard Organic Potting Soil

2 cups CharGrow mixed into 5 Gallons of Fafard Organic Potting Soil

University of Florida
Vinca

To ascertain the effects for BG on nursery stock plantings, research was conducted at the University of Florida on Vinca plants. In this study BG was applied at 10 and 20 lbs. per cubic yard of container media.

12 week-old Vinca Pacifica
Photo Courtesy of University of Florida

The results of these trials demonstrated longer-term color retention and reduced nutrient runoff measured by soluble salts and nitrate-N analyses. When used at 20 lbs. / yd of growing media, BG significantly improved growth and soil nitrate-N retention. It was also noted that BG would likely allow growers to lower their controlled release fertilizer rates. This can reduce nutrient runoff to the environment, an added benefit.

Virginia Tech
Tomato Transplants

In addition to corn research, a preliminary study on tomatoes was conducted at Virginia Tech in 2006, resulting in 25% larger transplants. Based on this finding, replicated trials were continued over the next 3 years. In these studies, product was used at 2.5 cups per 5 gallons of potting soil (3% by volume).Harvest at the end of season showed yields up by as much as 20 %. However, and perhaps more importantly, first pick was earlier and first pick yield averaged 51% greater than non-inoculated plants over 3 years of replicated trials.

Control (no CG) CG-inoculated (2.5%)

CG-inoculated transplants were greener and approximately 25% taller at field setting than control plants. Shortening the time required to produce healthy transplants reduces production costs.

Earlier fruiting yield in CG-inoculated plants was increased by 51%, compared to non-inoculated plants. Earlier fruiting normally results in increased profits, especially for growers in northern short-season climates.

Earlier fruiting did not compromise yield potential of CG-inoculated plants, which remained vigorous throughout the growing season. This “stay green” effect resulted in high total tomato yield and would permit extended multiple harvests in areas with long-growing seasons.

North Carolina
Germination / Transplant Trials

Simple growing mix trials were conducted using ProMix MP and CG BioGranules mixed in at 2.5% by volume.

Zinnia

In the first of these trials, Zinnia was grown for 3 weeks prior to stepping up from 72 call trays to 4-inch pots. Zinnia plants showed better root systems and were about 25% larger at the time they were moved to 4-inch pots.

Marigolds

Marigolds treated with BioGranules had much larger root systems and as a results plugs held together much better when they were stepped up. Marigolds with BioGranules also flowered 7 days earlier.

With

Without

Cucumbers, Squash and Sunflowers

Larger roots and higher above ground biomass was also visible with cucumbers, squash and sunflowers.

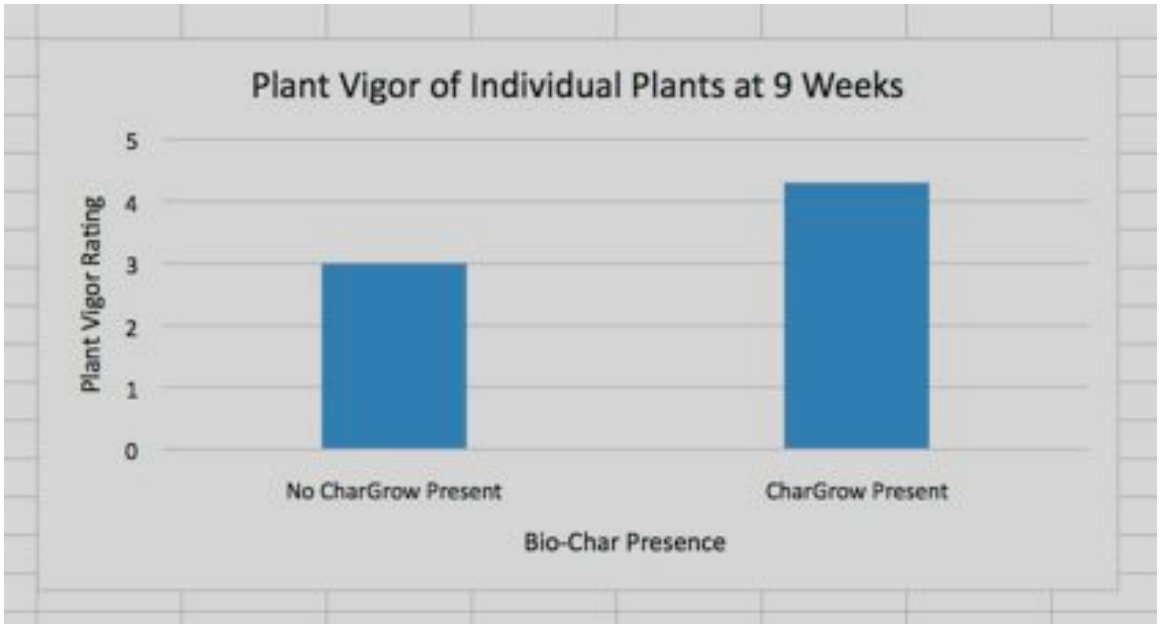
Cucumbers

Squash

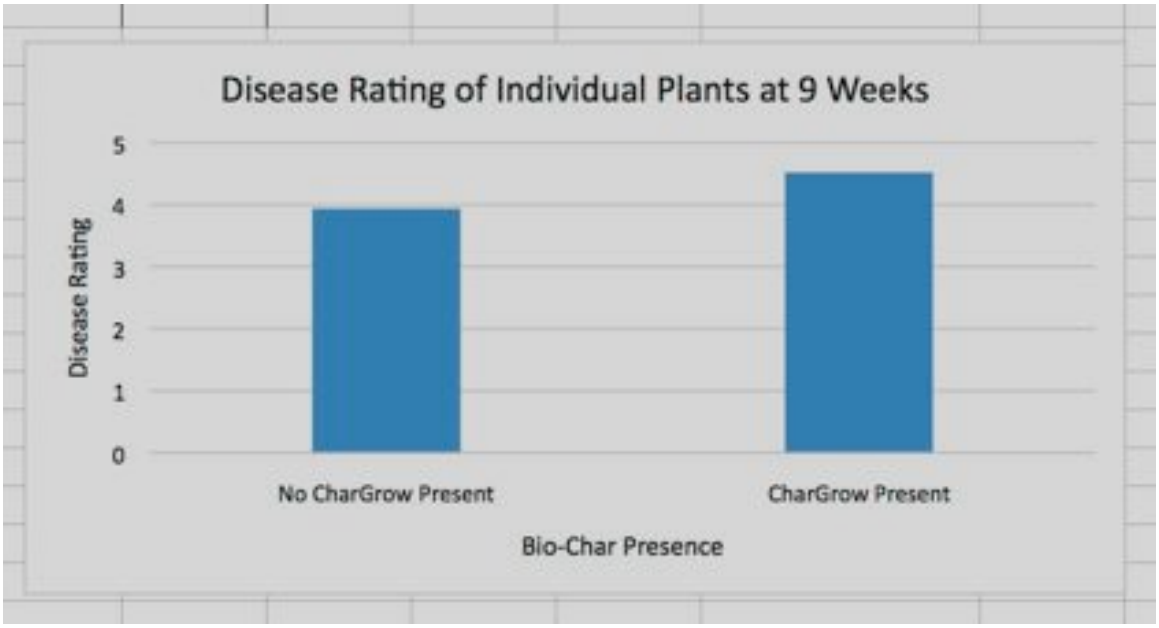
Sunflowers

NC State University
Hemp Transplants

Field trials conducted at Ball Farms in Fletcher North Carolina. Half the hemp clones in the field had CharGrow BioGranules included in the potting mix (at 2.5% by volume); the other half was treated with the same potting media just without the CharGrow. All the plants came from the same supplier (Shane Wilson, LL Hemp Farm), location, and were treated the same in terms of clone cutting date, bumping up date to larger cells, fertilization, irrigation, etc.



43% Better Vigor



14% Better Rating on Disease Resistance

Virginia
Commercial Hops

In this trial, in Virginia Beach, VA four varieties of hops were grown: Columbia, Columbus, Cascade, SAAV. Compost and trace minerals were added to sand and clay soils prior to planting. CharGrow BioGranules were applied at rate of 1 lb. per 100 square feet of planting area. Compost tea was applied 4 times during the growing season…straw and/or hay mulch was used in all plantings.
The plant provider said to expect 5 to 8 feet growth in the first year.

“First year results were plants over the top of our 16 foot trellis and 80 % of plants had plentiful hops in a short season”

“Second year (this year), all plants over the top and loaded with hops”
- John Wilson, Capstone Creations, LLC