Cabbage Transplant Production Using Organic Media at Cornell University, 2008

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Introduction

Successful transplant production begins with good growing media. Healthy vigorous transplants will be less susceptible to insects, diseases and transplant shock leading to better crop performance. Formulating organic potting mixes is especially challenging. Organic sources of nitrogen such as compost can be inconsistent. Compost can change over time with storage and N release can be unpredictable. Many organic potting mixes are supplemented with nitrogen sources such as alfalfa meal, soybean meal and blood meal. An alternative to compost is vermicompost. Vermicompost is thought to be a more soluble nitrogen source as an amendment for organic potting media. Past research in the Rangarajan lab has shown improved yield with vermicompost compared to thermophillic compost. The object of this project is to create an improved potting media for organic vegetable transplant production. Here, we tested eight potting media for growth and productivity of cabbage. These mixes were used in a previous on-farm experiment (April, 2008) in a cooler environment. We suspect microbial activity is responsible for converting vermicompost to N that is available to the plant. Microbial activity is temperature sensitive. Therefore, growing in cool temperatures nutrients from vermicompost would be less available.

Transplant production

Cornell University now has an organically-managed greenhouse at the Guterman Research Facility. The facility is being operated to comply with all the NOFA-NY (local certifier) and NOP requirements. The growers mix was Sunshine Organic Blend (SunGro) plus Fertrell 5-5-3 (Fertrell Co, Bainbridge, PA,12 lbs/yd^3). Sunshine Organic Blend ingredients are Canadian sphagnum peat moss, coarse grade perlite, gypsum, dolomitic lime, and a long-lasting wetting agent. The Cornell base mix consisted of sphagnum peat moss, coarse grade perlite, vermiculite and dolomitic lime (1.1 lbs/yd^3). Sphagnum peat moss was broken up in a soil mixer (Sprout Waldron, Model B-28, Muncy, PA) and placed in covered plastic barrels. A 70% peat, 15% vermiculite and 15% perlite mix was made in large quantities then lime was added as a separate step. Vermicompost (Worm Power, Avon, NY), Alaska hummus (Fertrell Co, Bainbridge, PA) and blood meal mix were added to the growers mix (Table 1). Treatment mixes were placed into 200-cell flats. Before planting, sub-samples of all potting mix treatments were sent to the University of Massachusetts Soil and Plant Tissue Testing Laboratory, Amherst, MA, for chemical analysis (Table 2). Cabbage seedling production started on May 22, 2008. Organic cabbage seed cv. 'Kaitlin' (Seedway, Elizabethtown, PA) was planted in the trays. The seed trays were placed on the greenhouse benches to germinate. The plants were grown at approximately 75º F day and 65º F nights. Ten plants from each treatment were cut at soil level, dried and weighed to determine aboveground biomass on June 9, 19, 26. (Figure 1).

Results and Discussion

All treatment media had nutrient levels and analysis that was appropriate for vegetable transplant production (Table 2). Plant growth in Cornell base plus vermicompost (10% v/v) plus blood meal , grower mix plus vermicompost (10% v/v) and grower mix plus vermicompost (10% v/v) plus blood meal was superior (Figure 1 and see photos). Growers mix as a base and vermicompost 10% (v/v) plus blood meal as an amendment produced significantly larger plants than Cornell base and other amendments (Table 3). The potting mixes performed differently at the Cornell facility with warmer temperatures than at grower's facility (Cabbage Transplant Production Using Organic Media, April, 2008). All plants grown at Cornell's greenhouse were much larger than at the grower's facility. This winter we are planning to setup a trial with several temperature regimes for growing cabbage transplants in the mixes described in the report.

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Table 1. Organic transplant media evaluated for the production of cabbage.

Treatment	Formulation
Grower mix	Sunshine SunGro Organic Blend plus Fertrell 5-5-3 (12 lbs/yd^3)
Grower mix plus blood meal mix	Grower mix with blood meal, green sand and rock phosphate (7 lbs/yd^3)
Grower mix plus dairy vermicompost 10%(v/v)	base mix plus dairy vermicompost
Grower mix plus dairy vermicompost 10% (v/v) plus Blood meal mix	Grower mix plus dairy vermicompost with blood meal, green sand and rock phosphate (7 lbs/yd^3)
Cornell base mix	70% peat, 15% vermiculite and 15% perlite mix plus lime (1.1 lbs/yd^3)
Cornell base mix plus dairy vermicompost 10% (v/v)	Cornell base mix plus dairy vermicompost
Cornell base mix plus dairy vermicompost 10% (v/v) plus blood meal mix	Cornell base mix plus dairy vermicompost and blood meal, green sand and rock phosphate (7 lbs/yd^3)
Cornell base mix plus dairy vermicompost 20% (v/v)	Cornell base mix plus dairy vermicompost

Table 2. Nutrient analysis of organic potting media 2008.

media	bulk density (g/cm^3)	coarse frag	pH	EC (ds/M)	% total N	mg/kg Nitrate-N	mg/kg Ammonium-N	% OM	% estimated Organic C	Carbon/N ratio
Growers mix	0.17	4.8	6.7	1.42	0.73	285	180	65.5	35.4	48.5
Growers mix plus BM[z]	0.23	3.4	7.0	2.02	1.24	113	441	59.2	32	25.8
Growers mix plus 10% vermicompost	0.26	4.4	6.9	3.99	1.56	1137	121	65.1	35.2	22.5
Growers mix plus 10% vermicompost plus BM	0.29	3.5	7.4	3.57	1.82	372	352	61.4	33.2	18.2
Cornell base mix	0.23	6	5.8	0.25	0.55	43	71	57.7	31.2	56.7
Cornell base plus BM	0.20	5.7	5.2	0.61	1.23	120	73	53	28.6	23.3
Cornell base plus 10% vermicompost	0.21	6.1	5.3	2.2	1.45	724	57	60.5	32.7	22.5
Cornell base plus10% vermicompost plus BM	0.31	5	6.4	2.74	1.85	608	359	57.3	30.9	16.7

[z] BM equals bloodmeal, rock phosphate and green sand (7 lbs/yd^3 of each)

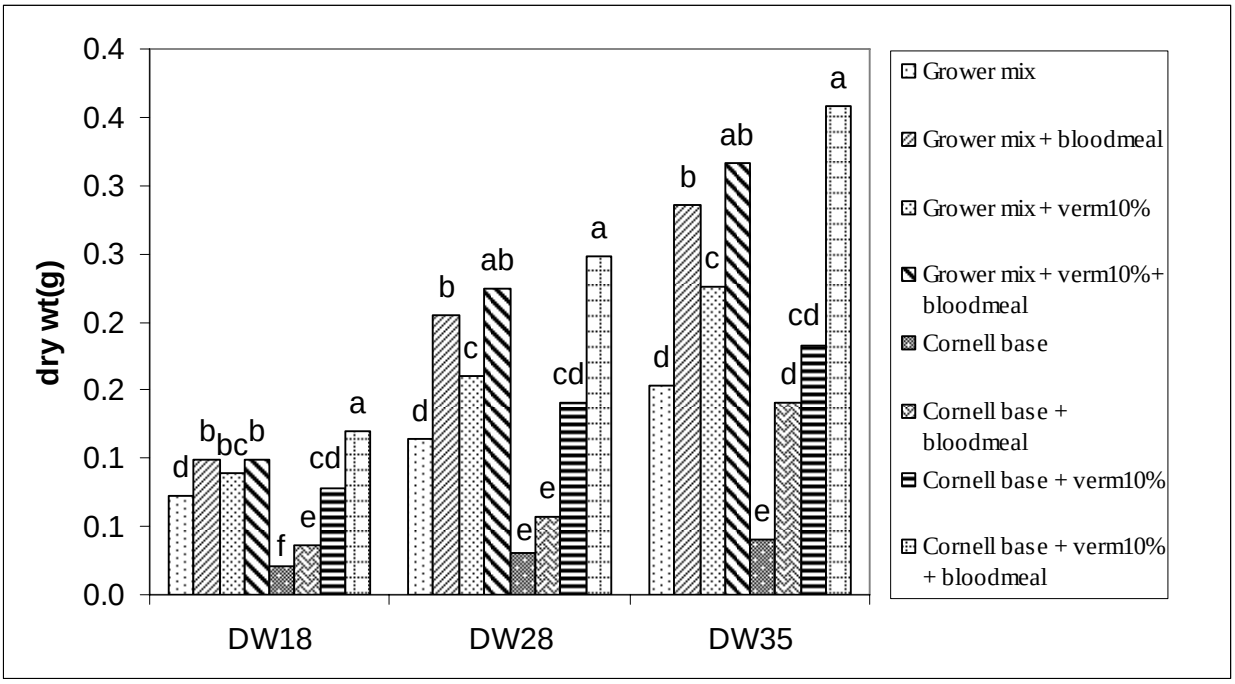

Figure 1. Dry weight of cabbage plants grown in eight organic potting media. Seed was sown on May 22, 2008 in 200-cell trays and were grown at 75º F day and 65º F night temperatures. DAP = days after planting cabbage seed. Columns labeled by a different letter on the same plant date are significantly different at $p<0.05$.

Table 3. Above ground biomass of cabbage plants grown in two different base mixes and four amendments, 2008.

		Dry wt. (g)		
		18 DAP[z]	28 DAP	35 DAP
Base				
	Grower mix	0.09 a	0.18 a	0.25 a
	Cornell base mix	0.06 b	0.12 b	0.18 b
Amendment				
	Bloodmeal mix	0.07 c	0.13 b	0.21 b
	Dairy vermicompost 10%(v/v)	0.08 b	0.15 b	0.20 b
	Dairy vermicompost 10%(v/v) plus bloodmeal mix	0.11 a	0.24 a	0.34 a
	none	0.05 d	0.07 c	0.10 c

[z]Seed was sown on May 22, 2008 in 200-cell trays and were grown at 75º F day and 65º F night temperatures. DAP = days after planting cabbage seed. Columns label by a different letter on the same plant date are significantly different at $p<0.05$.


Organic Cabbage
GH-2008
Our Base Mix +
Bloodmeal +
10% Vermicompost