

EFFECT OF SUPPLEMENTAL ORGANIC AMENDMENTS ON ORNAMENTAL PLANT GROWTH

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ABSTRACT: Phase two initial soil amendment evaluation, begun in 1999, was initiated in June 2001 to examine the effect of adding supplemental soil amendment to the previously established soil amendment beds. Pansy plants grown during the winter of 2001-2002 were smaller in plots that received the 1.0 rate of supplemental amendment compared to plants grown in plots receiving the 0 and 0.5 rates. Supplemental amendment application did not affect the number of flowers on pansy or vinca plants. Supplemental amendment applications did affect the size of vinca plants in two out of six amendment treatments. In the Cotton Gin Waste 3 inch depth beds, the 0.5 rate of supplemental amendment yielded plants larger than the 0 rate, while in the Pine Bark 6 in depth beds, plants receiving no supplemental amendment were larger than vinca plants receiving the 1.0 rate.

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MATERIALS AND METHODS: Three soil amendments were evaluated in this trial. 1) Pine bark, screened to a 3/8 in maximum, was treated with 1% N as anhydrous ammonia and 0.5% iron (PBN). The anhydrous ammonia was applied to the bark utilizing a commercial process. 2) Pine bark, screened to a 3/8 in maximum particle size, was composted with cotton gin waste in a 2:1 pine bark:cotton gin waste ratio (CGW). The cotton gin waste had a fertilizer analysis of 3% nitrogen, 1% phosphorus and 2% potassium. 3) Pine bark, screened to a 3/8 in maximum size (PB). The two depths of amendment application rates were 3 and 6 in deep on the plots while the control rate of application was zero. Although no amendment was added to the plot in the control treatment, soil from the drive middle between the plots was added to the plots to raise the surface of the plots up to the level of the plots that had amendment added. The seven soil amendment treatments are listed in Table 1. Each of the seven soil amendment treatments was applied across 2 levels of tillage, 4 and 8 in.

The original beds constructed in 1999 measured 15 x 4 ft. In 1999 the entire bed was amended by incorporating either CGW3, CGW6, PB3, PB6, PBN3, or PBN6 into the native soil. For the second phase of the trial, each of the original beds were divided into 3 equal subdivisions, into which was incorporated additional amendment at rates of either 1.0 x (original depth), or 0.5 x (1/2 original depth), or 0 x (no additional amendment). Therefore, supplemental rates of

amendment added to the beds that received 6 in of amendment in the original construction of the beds were 6, 3, and 0 in (1.0 x, 0.5 x, and 0 x) of amendment. Likewise, the supplemental rates of amendment added to beds that received 3 in of amendment in the original construction were 3, 1.5, and 0 in of amendment (Table 1).

The experimental design was a split, split plot design with the main plot factor being tillage depth and the split plot factor consisting two factors: three soil amendments; CGW, PB, and PBN; and two rates of amendment added to the soil; 3 and 6 in deep. The split, split factors were the supplemental rates of amendment added the beds. The main plots were arranged in a randomized complete block. There were four replications. The data collected during the trial were analyzed by SAS PROC MIXED (SAS Institute Inc, Cary, NC). Mean separation was conducted with Fisher's Protected LSD at the 0.05 significance level.

During the growing season, fertilizer was applied monthly at a rate of 7.7 lb 8-8-8 N-P-K (IMC Rainbow Agribusiness Inc, Florence, AL) 1000 ft² of bed. Grassy weeds were controlled with fluazifop at a rate of 4 oz/ac ai post emergence spray while broadleaf weeds were controlled with paraquat at a rate of 12.4 oz/ac ai directed post emergence spray and hand weeding. Water from microsprinklers was applied at a rate of 1 in weekly in absence of rain.

The growth index used to measure plant growth was calculated by the following formula: $B \cdot r^2 \cdot h$, where $r^2 = (((\text{width}1 + \text{width}2)/2)/2)^2$. Width 1 and width 2 were measured at right angles to each other to get an average plant diameter and h=plant height.

Viola x wittrockiana 'Majestic Giant' pansy plants were grown in 4 in pots and then transplanted to the beds in November 2002. There were 4 pansy plants in each subplot. *Catharanthus roseus* 'Rose Cooler' vinca plants were also grown in 4 in pots until they were transplanted to the beds. There were 4 vinca plants in each subplot.

RESULTS AND DISCUSSION: Pansy plants grown in plots that received the 1.0 rate of supplemental amendment were smaller than plants grown in plots that received the 0 and 0.5 rates of supplemental amendment (Table 2). There was no difference in the plant size of pansies grown in the plots that received the 0.5 and 0 rate of supplemental amendment. Pansies grown in beds amended with CGW6 and CGW3 were larger than plants grown in beds amended with PB6 and PBN3. There were no differences in the number of flowers on the pansy plants due to soil amendment treatments or to supplemental amendment treatments.

Vinca plants grown in beds amended with PB3 and PB6 produced fewer flowers on July 30 compared to plants grown in beds amended with CGW6, CGW3, and PBN6 (Table 3).

Analysis of the vinca plant size measurement data recorded on July 29 revealed an interaction between soil amendment and supplemental rate of amendment. There were no differences in vinca plant size in the CGW6, PBN6, PBN3, and PB3 beds due to the addition of supplemental amendment (Table 4). Plants grown in plots of the CGW3 beds receiving the 0.5 rate of supplemental amendment were larger than plants grown in the plots receiving the 0 rate of supplemental amendment. Plants grown in plots in the PB6 beds that received the 0 rate of

supplemental amendment were larger than plants grown in the plots that received the 1.0 rate of supplemental amendment.

There were no differences in the plant size of vinca measured on September 16 due to the different rates of supplemental amendment (Table 5). Vinca plants grown in beds amended with PB3 and PB6 were smaller than plants grown in beds amended with CGW6, CGW3, and PBN6. The dry weight of vinca plants measured on November 11 did not differ due to the original soil amendment treatments or the supplemental amendments.

Table 1. Supplemental soil amendment treatments and rates of application

Soil amendment composition	Original depth of application	Supplemental rate of amendment		
		1.0 x	0.5 x	0 x
Pine bark (PB 3)	3 in	3 in	1.5 in	0 in
Pine bark (PB 6)	6 in	6 in	3 in	0 in
Pine bark plus nitrogen (PBN 3)	3 in	3 in	1.5 in	0 in
Pine bark plus nitrogen (PBN 6)	6 in	6 in	3 in	0 in
Pine bark plus cotton gin waste (CGW 3)	3 in	3 in	1.5 in	0 in
Pine bark plus cotton gin waste (CGW 6)	6 in	6 in	3 in	0 in
Control (no amendment)	0 in	0 in	0 in	0 in

Table 2. Landscape response of ‘Majestic Giant’ pansy to supplemental soil amendment 2002.

Soil Amendment	Growth Index (cm ³) ^z April 29	Number of flowers April 24
CGW6	13,178 a ^y	25.0 a
CGW3	12,649 ab	22.2 a
PBN6	10,819 a-c	22.4 a
PB3	10,171 b-d	23.3 a
PB6	9,912 cd	21.5 a
PBN3	9,694 d	21.6 a
LSD 0.05	2507	NS
Supplemental amendment		
1.0 x	10,112 c	21.5 a
0.5 x	11,460 ab	22.7 a
0 x	11,641 a	23.8 a
LSD 0.05	1213	NS

^z Growth Index = $\pi \cdot r^2 \cdot h$

^y Mean comparison within columns by Fisher’s Protected LSD at P=0.05. Means with the same letter do not differ.

Table 3. Landscape response of ‘Rose Cooler’ vinca to supplemental soil amendment on July 30, 2002.

Soil Amendment	Number of flowers July 30
CGW6	37.8 a ^z
CGW3	31.6 a-c
PBN6	32.7 ab
PBN3	27.9 b-d
PB3	24.6 de
PB6	18.1 e
LSD 0.05	6.7
Supplemental amendment	
1.0 x	27.2 a
0.5 x	29.3 a
0 x	30.7 a
LSD 0.05	NS

^z Mean comparison within columns by Fisher’s Protected LSD at P=0.05. Means with the same letter do not differ.

Table 4. Landscape response of ‘Rose Cooler’ vinca to supplemental soil amendment in 2002.

Soil Amendment	Plant size on July 29 ^z			LSD 0.05 across rates of supplemental amendment
	0 rate	0.5 rate	1.0 rate	
CGW6	35,118 a ^y	41,661 ab	44,301 a	NS
CGW3	31,292 b	43,302 a	37,314 ab	10,662
PBN6	30,694 ab	34,917 a-c	28,662 bc	NS
PBN3	27,197 ab	28,530 cd	29,661 bc	NS
PB3	23,710 b	22,784 de	17,088 d	NS
PB6	21,555 b	17,382 e	7,288 d	10,662
LSD 0.05	10,097	10,097	10,097	

^z Growth Index = $\pi \cdot r^2 \cdot h$

^y Mean comparison within columns by Fisher’s Protected LSD at P=0.05. Means with the same letter do not differ.

Table 5. Landscape response of ‘Rose Cooler’ vinca to supplemental soil amendment 2002.

Soil Amendment	Growth Index (cm ³) ^z Sept 16	Dry weight (kg) November 11
CGW6	108,678 a ^y	0.19 a
CGW3	104,813 ab	0.15 a
PBN6	104,121 a-c	0.11 a
PBN3	89,199 a-d	0.09 a
PB3	82,232 d	0.14 a
PB6	69,443 d	0.12 a
LSD 0.05	20,615	NS
Supplemental amendment		
1.0 x	93,503 a	0.15 a
0.5 x	39,630 a	0.13 a
0 x	92,110 a	0.12 a
	NS	NS

^z Growth Index = $\pi \cdot r^2 \cdot h$

^y Mean comparison within columns by Fisher’s Protected LSD at P=0.05. Means with the same letter do not differ.