UNIVERSITY OF FLORIDA

Institute of Food and Agricultural Sciences
North Florida Research and Education Center – Suwannee Valley

Response of Mulched Lettuce, Cauliflower, and Tomato to Megafol Biostimulant 98-08

George J. Hochmuth[1]

Materials and Methods

Research with lettuce, cauliflower, and tomato response to Megafol biostimulant (LidoChem, Inc., Haslet, NJ) was carried out at the University of Florida Horticultural Research Unit in Gainesville, FL during the spring season of 1998. The objective was to evaluate crop response to foliar sprays of Megafol biostimulant.

The soil used for the research was an Arredondo fine sand that tested (Mechlich-1) medium-low in K, high in P, Mg, Ca, and micronutrients, with a pH range from 6.4 to 6.8. The soil was plowed and disked in preparation for fertilization and bedding. Beds were formed on 4-ft centers with a combination rototiller-bed press. Final beds were 6 inches in height and 24 inches across the top. During rototilling, 300 lbs per acre of a 13-4-13 (N-P_2O_5-K_2O) complete analysis fertilizer (IMC, Tifton, GA) was incorporated in the soil. Beds were fumigated with methyl bromide and drip-irrigation tube (Chapin Watermatics, Inc., Watertown, NY) with 12-inch emitters, 0.4 gal/100 ft/min and 10 mil. thick walls was placed on center surface of the bed. Beds were covered with black polyethylene mulch (0.5. mil. thick) (Sonoco, Mt. Olive, NC).

Lettuce ('South Bay') and cauliflower ('Candid Charm') transplants were planted on 13 March and tomatoes ('Agriset 761') were planted on 30 March 1998. Lettuce was planted in twin-row fashion with 12 inches between plants and 12 inches between rows. Cauliflower was also planted in twin-rows with 24 inches between plants and 12 inches between rows. Tomatoes were planted in single-row fashion on 18-inch spacing. Plot lengths were 20 ft long for lettuce and 25 ft long for both cauliflower and tomatoes.

Foliar treatments of Megafol biostimulant were applied according to the following rates and schedule:

Treatment

1. Megafol at 0.321 gal/acre, the first application at transplanting and repeated every 2 weeks throughout growing season. Sprays were made with a CO_2-pressurized back-pack sprayer delivering about 50 gallons per acre at 30 psi.

[1] George J. Hochmuth, Professor, Horticultural Sciences Department, University of Florida, Gainesville, FL 32611-0690

2. Megafol at 0.321 gal/acre, the first application at transplanting followed by two additional applications timed at least two weeks apart.

3. Megafol at 0.321 gal/acre, a 1% solution of MKP (monopotassium phosphate) every two weeks throughout growing season, with the first at transplanting.

4. One-percent solution of MKP at transplanting and every two weeks throughout growing season.

5. The same as treatment No. 1 with total nitrogen for the growing season reduced by 25%. (This was achieved by discontinuing fertilizer injections for the last quarter of the season for the plots included in this treatment.)

6. Control, consisting of a water spray.

There were five replications for each of the above treatments for each of the three crops.

Irrigation was supplied by drip irrigation to maintain soil moisture potential at -10 cb on a tensiometer with the ceramic tip placed 6 inches deep in the soil in the root zone. Diseases and insects were controlled by timely applications of labeled pesticides.

Fertilizer injections were made on a weekly basis through the growing season as recommended in the Vegetable Production Guide for Florida published by the University of Florida.

On 14 April, two whole lettuce plants were sampled for dry weight measurements and on 15 April for cauliflower. On 29 April, two whole tomato plants were sampled for dry weight measurements. On 7 April, a visual evaluation of crop growth was performed for the lettuce and cauliflower, and for the tomatoes on 28 April. Leaf samples were taken for each crop at harvest to be analyzed for nitrogen, potassium, and phosphorus levels.

Lettuce heads were harvested at maturity on 6 May then weighed and graded for firmness, tip burn, and stem length. Cauliflower was harvested at maturity on 27 May, again on 29 May, and weighed. Tomato fruits were harvested when they reached the mature-green stage on dates 12 June, 22 June, and 30 June. Fruits were graded on a Kerian roller sizer into extra-large, large sizes, and culls, then counted and weighed. All data were analyzed by analysis of variance.

Results

Treatments had not effect on lettuce yields, head size, firmness, tip burn, or internal stem length (Table 1, Table 2). Lettuce yield was only average for this experiment due to excessive rain during March, April, and May leading to some loss of plant

stand. Early lettuce plant growth (Table 3), lettuce leaf nutrient concentration at harvest, and early plant vigor (Table 4), were not affected by Megafol sprays. All leaf nutrient concentrations were within or above sufficiency ranges (Table 3).

Cauliflower yield was affected by treatment (Table 5). Yield with the reduced fertilizer program suffered a 25% yield loss, consistent with the amount of fertilizer withheld from these plants. Growth and yield of cauliflower was very good and yields with all other treatments were similar. There was no benefit due to biostimulant sprays at rates used in these studies. Cauliflower plant growth one month after planting was not showing any effect of Megafol treatment (Table 3). Early cauliflower plant vigor was not affected by biostimulant sprays (Table 4). Cauliflower leaf nitrogen concentration was reduced with treatment #5, the reduced fertilizer treatment. Other N concentrations and all P and K leaf concentrations were not affected by treatment (Table 6).

Growth of young tomato plants was not affected by treatment (Table 3). Neither tomato yield variable measured was affected by treatment for any of the three harvests or for total season yield (Table 7). Average fruit weight was not affected by treatment. Tomato yields in this trial were very high and nearly 80% of fruits were at least large in size. Tomato plant vigor (Table 4) and leaf nutrient concentrations (Table 6) were not affected by biostimulant sprays.

In summary, for three vegetable crops studied, Megafol biostimulant did not influence plant growth, yield, or leaf nutrient concentrations at the rates used in this study.

Table 1. Responses of crisp head lettuce to Megafol biostimulant, Gainesville, FL, Spring 1998.

Treatment	Yield (50 lb carton/acre)			
	Large (>1.5 lb/head)	Small (1.2 to 1.5 lb/head)	Cull	Marketable
1	250	60	20	310
2	260	55	25	315
3	215	55	30	270
4	150	70	45	220
5	255	55	15	310
6	200	70	30	270
Significance	NS	NS	NS	NS
Prob. >F	0.5753	0.9236	0.3487	0.5876

Table 2. Responses of crisp head lettuce to Megafol biostimulant, Gainesville, FL, Spring 1998.

Treatment	Avg. head weight (lb)			Rating [z]		Stem Length (cm)
	Large	Small	Cull	Firmness	Tipburn	
1	1.94	1.36	0.80	2.7	1.3	6.9
2	1.94	1.48	0.84	2.7	1.4	6.5
3	1.96	1.10	1.08	2.7	1.2	7.2
4	1.84	1.38	1.00	3.1	1.3	6.4
5	1.96	1.40	0.42	2.9	1.6	6.9
6	1.92	1.36	0.82	2.8	1.6	6.4
Significance	NS	NS	NS	NS	NS	NS
Prob. >F	0.8099	0.3598	0.2133	0.6025	0.2729	0.5552

[z] Ratings were 1=most firm and no tipburn; 5=very soft had and serious internal tipburn.

Table 3. Responses of tomato, lettuce, and cauliflower plant growth and lettuce leaf nutrient concentrations to Megafol biostimulant, Gainesville, FL, Spring 1998.

Treatment	Tomato [w]	Cauliflower [x]	Lettuce [y]	Lettuce leaf nutrient concentrations (%) [z]		
	g per plant			N	P	K
1	16.5	16.9	9.3	4.2	0.26	8.9
2	17.7	17.2	8.8	4.3	0.28	9.9
3	17.7	16.3	7.2	4.2	0.30	8.9
4	18.7	17.7	7.9	4.2	0.24	9.3
5	17.6	17.7	8.2	4.2	0.32	8.7
6	18.9	17.8	8.0	4.4	0.30	9.7
Significance	NS	NS	NS	NS	NS	NS
Prob. >F	0.7986	0.7752	0.1573	0.5461	0.0770	0.1007

[z] Whole leaf (wrapper leaf) sampled at harvest.
[y] Whole lettuce plant samples on 14 April, one month after planting.
[x] Whole cauliflower plants sampled 15 April, one month after planting.
[w] Whole tomato plants sampled on 29 April, one month after planting.

Table 4. Plant growth response of lettuce, cauliflower, and tomato to Megafol biostimulant, Gainesville, FL, Spring 1998.

Treatment	Early plant growth vigor rating [z]		
	Lettuce	Cauliflower	Tomato
1	2.4	3.0	2.8
2	3.0	3.2	3.2
3	3.4	3.4	2.6
4	3.2	3.0	2.8
5	3.0	3.0	2.8
6	3.0	3.6	2.4
Significance	NS	NS	NS
Prob. >F	0.4895	0.6258	0.7222

[z] Rating was 1=least vigor; 5=most vigor as determined by size and darkest green color.

Table 5. Response of cauliflower to Megafol biostimulant, Gainesville, FL, Spring 1998.

Treatment	No. 23-lb Mkt. cartons/acre
1	1040
2	1230
3	1180
4	1180
5	710
6	1140
Significance	**
Prob.	0.0078
LSD (0.05)	300

Table 6. Whole-length (most-recently-matured) nutrient concentrations for tomato and cauliflower for Megafol biostimulant experiment, Gainesville, FL, Spring 1998.

Treatment	Tomato			Cauliflower		
	N	P	K	N	P	K
- % -						
1	4.0	0.18	2.3	2.8	0.50	1.9
2	3.7	0.20	2.2	2.9	0.54	1.8
3	3.7	0.20	2.1	209	0.56	2.1
4	5.2	0.20	2.4	2.8	0.50	2.0
5	3.7	0.14	1.9	2.1	0.46	1.6
6	3.3	0.16	2.4	2.8	0.52	2.1
Significance	NS	NS	NS	*	NS	NS
Prob. >F	0.2107	0.0792	0.1745	0.0348	0.5489	0.0862

Table 7. Responses of tomato to Megafol biostimulant, Gainesville, FL, Spring 1998.

Treatment	Yield (25-lb carton/acre)					Avg. fruit wt. (lb)
	Extra Large	Large	Medium	Marketable	Cull	
---------- First Harvest ----------						
1	375	220	80	680	10	0.46
2	365	260	85	710	15	0.47
3	340	245	80	670	15	0.46
4	410	275	80	760	5	0.46
5	365	200	60	630	5	0.46
6	400	235	70	705	10	0.46
Significance	NS	NS	NS	NS	NS	NS
Prob. >F	0.9820	0.8733	0.9465	0.9720	0.2720	0.9894
---------- Second Harvest ----------						
1	680	980	490	2160	30	0.42
2	480	890	400	1760	20	0.43
3	560	880	390	1830	30	0.46
4	560	850	350	1760	30	0.44
5	670	800	410	1880	40	0.44
6	630	930	380	1940	30	0.45
Significance	NS	NS	NS	NS	NS	NS
Prob. >F	0.7039	0.7728	0.8330	0.7897	0.6229	0.4372
---------- Third Harvest ----------						
1	24	250	260	530	20	0.36
2	90	320	250	660	20	0.37
3	55	310	330	690	30	0.37
4	90	280	215	590	10	0.36
5	70	230	200	500	15	0.36
6	105	310	190	610	10	0.36
Significance	NS	NS	NS	NS	NS	NS
Prob. >F	0.4875	0.9043	0.4082	0.1294	0.3690	0.9372
---------- Total Season ----------						
1	1080	1450	830	3360	60	0.41
2	930	1470	730	3130	50	0.42
3	960	1430	800	3190	80	0.43
4	1060	1400	650	3120	45	0.42
5	1100	1240	670	3010	60	0.42
6	1140	1480	640	3250	50	0.42
Significance	NS	NS	NS	NS	NS	NS
Prob. >F	0.8041	0.0790	0.4176	0.5647	0.2434	0.7119