use of higher herbicide rates to provide adequate and consistent weed control while minimizing the potential for crop injury. At present, this research is being pursued.

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EFFECT OF BIOSTIMULANTS ON FRUITING OF STRAWBERRY

E. E. ALBREGTS, C. M. HOWARD, AND CRAIG CHANDLER
University of Florida, IFAS
Agriculture Research and Education Center
13138 Lewis Gallagher Road
Dover, Florida

RICK L. MITCHELL
Hillsborough County Cooperative Extension Service
5339 State Road 579
Seffner, Florida 33584

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Abstract. **Commercially available biostimulants were evaluated for effect on fruiting of 2 strawberry (*Fragaria* X *ananassa*, Duch.) clones during 3 seasons. Biostimulants were applied according to the label or the manufacturer's recommendation. Biostimulants evaluated included Respond, Keyplex, Goemar MZ63 and BM86, Cytex, Culbac, Blossom Pop, Burst, Dynazyme, Triggrr, Humic Acid, and a control (water). The biostimulants contained either amino acids, cytokinins, alpha- keto amino acids, purine- and adenine-like compounds and some were derived from seaweed. Many also contained micronutrients. No significant differences in total marketable fruit yield, average fruit weight, or percent marketable fruit were found.**

The monthly yield with the control was not significantly less than the monthly yield with any biostimulant treatment except with the Respond treatment in March of 1985 with the 'Dover' cultivar.

Within the past few years several materials which may regulate growth and fruiting of plants have been placed on the market. Many strawberry growers have used these materials and have reported various degrees of success. As with most vegetable enterprises, competition is great and strawberry growers are searching for ways to increase fruit yield, size, and quality in an economic manner. Research has been conducted on several crops relating the effect of growth regulators to plant response. On the sandy and alkaline soils of south Florida, Bryan (1, 2) obtained a growth and yield response of tomatoes to an application of alpha keto acids and humates. These soils are very low in organic matter and this may have influenced results. Csizinszky reported an increase in tomato fruit size with Keyplex and Cytex (4), and increased yields with seaweed products (3). However, fruit size results with several other growth regulators evaluated by Csizinszky (4) were not consistent. Corn and potato yields have also been reported to be affected by seaweed preparations (5). Hanson (6) has stated that humic acid enhances uptake of nutrients.

To determine possible effects of some of the available biostimulants on fruiting of strawberry, experiments were conducted over three seasons evaluating effects of spray and soil application on strawberry fruiting response.

Materials and Methods

Biostimulants were evaluated for three seasons in winter fruiting experiments conducted at AREC-Dover on a Scranton, adjunct, fine sand. During each season, beds were fertilized with 200N, 16P, 166K, 0.075 B and Cu. 0.175 Mn and Zn, and 0.225 Fe (lb. per acre). One-fourth of the fertilizer was incorporated into the bed and the remainder banded in the bed center 1 to 2 inches below the surface. Each Sept., beds were fumigated with a mixture of methyl bromide (98%) and chloropicrin (2%) at 350 lb./acre of bedded area and were mulched with black polyethylene.

In 1985-86, locally grown 'Dover' and Canadian-grown 'Chandler' plants were used in the Respond experiment. Florida breeding line 79-1126 and Canadian-grown 'Pajaro' plants were used in the 1986-87 and 1987-88 experiments, except for the humic acid study. With the latter experiment, Canadian-grown 'Chandler' plants received all rates of humic acid while locally-grown 'Dover' received only the 0 to 300 lb./acre rates.

The experimental design of the 1986-87 multiple biostimulant experiment was a randomized complete block, while the 1987-88 experimental design was a split plot arranged in a randomized complete block. The biostimulant treatments were the main plots while clones were sub-plots. The Respond experimental design was the same as that used with the 1987-88 multiple biostimulant experiment. The humic acid experimental design was a randomized

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Table 1. Biostimulant applications to fruiting strawberry over 3 seasons.

Biostimulant spray and composition	Rate	Application times	Season of study 1985-86	1986-87	1987-88
Burst, cytokinins	16 fl oz/acre	21 days after transplanting and then every 14 days		x	
Blossom Pop, a cation-based material	48 fl oz/acre	7 days prior to first bloom and then every 14 days			x
Cytex, cytokinins	32 fl oz/acre	21 days after transplanting and then every 14 days		x	x
Culbac, nonviable *Lactobacillus acidophilus* lactic acid	4 fl oz/acre, first 5 fl oz/acre, second	21 days after transplanting and at flowering			x
Dynazyme, unnamed hormones, enzymes, and amino acids plus Mg, S, Mn, Fe, Zn	32 fl oz/acre first 2 sprays and then 16 fl oz/acre	21 days after transplanting and then every 14 days during 1986-87 and 21 days during 1987-88		x	x
Humic acid	0, 75, 150, 300, 600, and 1200 lb./acre	Before planting			x
Keyplex 350, alpha keto amino acids, micro-nutrients and Mg.	32 fl oz/acre	21 days after transplanting and then every 14 days		x	x
Goemar MZ63 (3x), seaweed paste, Mn, Zn, N plus BM86 thereafter, (seaweed base, B, Mg, Mo, N)	32 fl oz/acre	MZ63 21 days after transplanting plus 2 sprays at 14-day intervals and BM-86 thereafter at 14-day intervals		x	
Respond, organic compounds, adenine and purine-like structures plus vitamin B complex materials	12 fl oz/acre	1) 10/7/85 & 3/4/86 2) 12/9/85 & 3/12/86 3) 10/9/85 & 1/15/86 4) water	x		
Triggrr	4 fl oz/acre	At first bloom and then every 14 days			x
Control	water	Every 14 days	x	x	x

complete block for each clone. All experiments consisted of 4 replicates with 18 plants/plot except that the humic acid and Respond experiments had 16 and 20 plants per plot, respectively. Additional information on treatments is given in Table 1.

Plants were set in Oct. of each season. Labelled pesticides were applied as needed and overhead sprinkler irrigation was provided as needed for moisture, plant establishment and freeze protection. Fruit were counted, graded, and weighed. plants were also rated 1 to 4 times each season for size and foliage color.

A heavy cover crop of sudan-sorghum was grown every summer on the experimental area to maintain the soil organic matter.

Table 2. Effect of 'Respond' on fruiting of strawberry clones during 1985-80 season.

Clone	Treatment[z]	Total marketable yield flats/acre	Avg. fruit wt. (oz/fruit)
Chandler	1	2884	0.54
	2	2887	0.54
	3	2712	0.54
	4	2809	0.54
Significance[y]		NS	NS
Dover	1	2869	0.56
	2	2821	0.55
	3	2900	0.55
	4	2664	0.56
Significance[y]		NS	NS

[z]Treatments were: 12 fl oz/acre of Respond applied on 1) 7/11/85 and 4/3/86 2) 9/12/85 and 12/3/86, 3) 9/12/85 and 1/15/86, and 4) none. Non-significant (NS) by F test.

Results and Discussion

Total fruit yields of treatments receiving 'Respond' were not significantly different from the control (Table 2). However, the Mar. fruit yield with the 'Dover' control treatments was significantly less than the 'Dover' Respond treatment (data not presented). Neither total or monthly fruit yields of 'Pajaro' and Florida breeding line 79-1126 were significantly different because of biostimulant treatments during 2 seasons (Table 3). In addition, average fruit weight and percent of fruit which were marketable were not significantly different from the control (Table 4). The application of 'humic acid' with the fertilizer did not significantly affect total and monthly fruit yield, average

Table 3. Effect of biostimulants on marketable fruit yield during two seasons.

Treatments	Marketable fruit yield (flats/acre) 1986-87 Pajaro	1987-88 Pajaro	1987-88 79-1128
Keyplex	2150	2046	2838
MZ63	2409	2160	2879
Cytex	2462	2378	2560
Culbac	—	2443	2950
Blossom Pop	—	2265	2990
Burst	2482	2064	2838
Dynazyme	2118	2256	3096
Triggrr	—	2002	2847
MZ63 and MB86	2246	—	—
Control	2353	2504	2894
Significance[z]	NS	NS	NS

[z]Non-significant (NS) by F test.

Table 4. Effect of biostimulants on marketable fruit weight and percent marketable fruit during two seasons.

	Avg. fruit wt. (oz/fruit)[z]			Marketable fruit (%)[z]		
	1986-87	1987-88		1986-87	1987-88	
Treatments	Pajaro	Pajaro	79-1126	Pajaro	Pajaro	79-1120
Keyplex	0.06	0.62	0.57	65.3	80.7	79.3
MZ63	0.62	0.62	0.58	68.5	83.1	80.2
Cytex	0.61	0.61	0.57	69.0	87.0	77.8
Culbac	—	0.63	0.56	—	81.5	81.0
Blossom Pop	—	0.61	0.57	—	85.2	80.5
Burst	0.62	0.62	0.56	64.2	81.3	79.4
Dynazyme	0.61	0.62	0.58	72.1	82.7	77.8
Triggrr	—	0.62	0.56	—	81.3	79.8
MZ63 and MB86	0.60	—	—	69.4	—	—
Control	0.63	0.62	0.56	66.9	85.5	79.4
Significance	NS	NS	NS	NS	NS	NS

[z]Non-significant (NS) by F test.

Table 5. Effect of 'Humic Acid' on fruiting of 2 strawberry clones during 1987-88 season.

Clone	Humic acid (lb./acre)	Total mkt. yield (flats/acre)	Marketable %	Avg. fruit wt. (oz/fruit)
Chandler	0	2574	83.3	.5707
	75	2448	80.6	.6021
	150	2516	82.4	.5792
	300	2613	84.5	.5873
	600	2552	85.6	.5877
	1200	2616	84.1	.5947
Significance[z]		NS	NS	NS
Dover	0	3635	75.5	.5489
	75	3554	74.0	.5358
	150	3509	75.4	.5471
	300	3390	74.3	.5411
Significance[z]		NS	NS	NS

[z]Not significant (NS) by F test.

fruit weight, and percent of the fruit which were marketable (Table 5). Plant size and foliage color did not vary significantly because of biostimulant treatment. Although many of the biostimulants contain micronutrients, no beneficial or detrimental effects on fruit or foliage were observed.

Researchers elsewhere (1, 2, 3, 4) have increased tomato fruit size and yields with some of the biostimulants evaluated in these trials. Our experiments were conducted on a soil which had grown a summer cover crop for several years. Thus, the soil organic matter was maintained or enhanced. Some of the soils used by other researchers are inherently low in organic matter content and/or no cover crops are grown. Organic matter increases the water and nutrient holding capacity of the soil and improves soil tilth. Such enhancement in the soil's ability to grow and produce crops may overcome any advantages of applied biostimulants. With good production practices, such as the growing of a cover crop and proper fertilization and crop management, the addition of biostimulants to the production program would most likely not be beneficial for strawberry fruit production.

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IMPROVING PLANT STANDS OF SUPER SWEET CORN BY SEED TREATMENT

D. J. Cantliffe and M. Bieniek
Vegetable Crops Department, IFAS
University of Florida
Gainesville, FL 32611

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Abstract. **Super sweet corn (*Zea mays* L.) seed was treated with captan, thiram, captafol, metalaxyl, and imazalil in combination or alone to evaluate their effect on emergence and stand establishment. Seeds were treated by a standard batch seed dusting method, or during seed priming which allowed the seed to partially hydrate in the presence of the chemical solution. Three microbial treatments were also evaluated for their effects on stand establishment and early seedling growth using the priming technique. Seeds were sown on 4 planting dates in the Spring of 1988, on sandy soil in Gainesville. After the first planting, severely low temperatures occurred, however, 76% emergence was obtained with a captan, thiram, metalaxyl, and imazalil combination treatment compared to 56% for the control. Similar differences in stand were observed on the second planting while stands were similar regardless of treatment in the third and fourth plantings where soil temperatures were warmer. Seed priming combined with seed treatment improved the rate of germination. The addition of the microbial treatments did not improve sweet corn stands.**

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A continued grower problem with super sweet corn cultivars which possess the *shrunken-2* (*sh2*) gene is inconsistent plant stands that occur especially under conditions of environmental stress. Hannah and Cantliffe (5) observed that the percent stands of two *sh2* hybrids were 38 and 66%, while a *sugary* (*su*) cultivar had 82% emergence 9 days after planting. Seeds of *sh2* hybrids were smaller, lighter, and more easily damaged due to a higher sugar