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INCREASED STAND OF 'FLORIDA STAYSWEET' CORN BY SEED TREATMENT WITH FUNGICIDES[1]

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Abstract. **Two field trials for the control of pre- and post-emergence damping-off of 'Florida Staysweet' sweet corn by seed treatment were conducted at Belle Glade in the spring of 1978. The fungicides Banrot, Benlate, Captan, Demosan, Difolatan, Vitavax and experimental fungicide CGA-48988 were evaluated alone or in combination with Difolatan. For each fungicide used rates were 2 or 4 oz. a.i. per cwt of seed. The combination of Benlate + Difolatan was most effective, increasing plant stand by 35% and yield by 28% when compared to the untreated control. Benlate, Difolatan, Banrot, Demosan and Banrot + Difolatan were as effective as Benlate + Difolatan in maintaining high plant stand, however, only Difolatan and Banrot + Difolatan contributed to similar yields along with high stands. Lowest stands and yields were obtained with the Vitavax and CGA-48988 treatments.**

Investigation of sweet corn plantings on muck soils in the Belle Glade area have indicated that pre- and post-emergence damping-off contribute to significant reductions in plant stands. The variety 'Florida Staysweet,' which carries the sh_2 high sugar retention gene, appears to be more susceptible to damping-off than other sweet corn varieties. In addition to the high sugar levels, 'Florida Staysweet' has a low starch content which reduces seedling vigor especially under stress conditions. These characteristics may contribute to the susceptibility of the variety to damping-off organisms.

Isolations from damped-off corn seedlings grown in natural muck soil consistently yielded a *Penicillium* sp. This as yet unidentified species caused pre- and postemergence damping-off and stunting of corn seedlings seeded in sterilized soil reinfested with the organism. In addition to the *Penicillium* sp., *Rhizoctonia solani* Kuehn and *Pythium* spp. also were commonly isolated from damped-off corn seedlings.

In previous studies (1, 2) on controlling damping-off of sweet corn by fungicide seed treatments, the combinations of Benlate + Difolatan, Benlate + Dexon and Difolatan + Dexon were shown to be very effective in increasing plant stands. However, none of the above fungicide combinations are registered for use as a seed treatment on sweet corn. Some reasons for the lack of registration are insufficient control data and/or residue tolerances for particular fungicides have not been established on sweet corn. The purpose of this study was to obtain additional information on the effectiveness of several fungicides as sweet corn seed treatments for controlling damping-off.

Materials and Methods

The fungicides evaluated as seed treatments to improve stands of 'Florida Staysweet' sweet corn were: methyl 1-(butylcarbamoyl)-2-benzimidazolecarbamate (benomyl, Benlate 50 WP); 5-ethoxy-3-trichloromethyl-1, 2,4-thiadiazole (15%) plus dimethyl 4,4-0-phenylenebis (3-thioallophanate) (25%) (Banrot); cis-N-[(1,1,2,2-tetrachloroethyl) thio]-4-cyclohexene-1,2-dicarboximide (captafol, Difolatan 4F); 1,4-dichloro-2,5-dimethoxybenzene (chloroneb, Demosan 65 WP); N-[(trichloromethyl) thio]-4-cyclohexene-1,2-dicarboximide (Captan 80 WP); 5,6-dihydro-2-methyl-1, 4-oxathiin-3-carboxanilide (carboxin, Vitavax 75 WP); and Ciba-Geigy experimental fungicide CGA-48988. These fungicides were used singly and in the following combinations: Benlate + Difolatan, Banrot + Difolatan, Demosan + Difolatan, Vitavax + Difolatan, and CGA 48988 + Difolatan. Rates used were 2 or 4 oz. a.i./cwt of seed. All chemicals were applied as a spray (.4 gal. of water/cwt of seed) to seeds in rotating glass jars. For the untreated control, seeds were sprayed with water only. After treatment the seeds were allowed to air dry before planting.

The seed treatments were evaluated in two field trials on peaty muck soil at Belle Glade. Planting dates were March 3, and March 16, 1978. Each treatment consisted of single 29 ft. long rows replicated four times and arranged in a randomized complete block design. Each replication contained 50 seeds planted 0.6 ft. apart in rows 3 ft. apart. Plant stands were recorded 2 and 4 weeks after seeding in trial 1 and 3 and 5 weeks after seeding in trial 2. Data on marketable yield were collected on a one time harvest for each trial. Only U.S. Fancy and No. 2 grade ears were considered as marketable.

Results and Discussion

The results of the seed treatment trials are shown in Table 1. Unless otherwise indicated, all results mentioned in this section represent the lower rate (2 oz. a.i./cwt of seed) of fungicide(s) used. Considering the mean stand for the two trials the combination of Benlate + Difolatan contributed to the highest plant stand of 93% compared to 69% for the untreated control. Significantly similar stands were obtained with Banrot + Difolatan, Benlate, Banrot, Demosan and Difolatan (4 oz. a.i./cwt of seed). Other treatments providing plant stands significantly higher than the untreated control were: Demosan + Difolatan, Difolatan and Vitavax + Difolatan. In the latter treatment the increase in stand was probably due to the influence of Difolatan since Vitavax alone was no better than the untreated control.

Most chemicals tested provided some degree of protection against preemergence damping-off as indicated by the initially higher plant stands in each trial (Table 1). Final seedling counts were usually lower as a result of post-emergence damping-off which was especially severe in trial 1. In trial 1, several chemicals providing initially high stands as a result of protection from preemergence damping-off were not very effective in controlling postemergence damping-off. Included in this group were Captan, Vitavax (2 and 4 oz. a.i./cwt of seed) and CGA 48988. Both Captan and Vitavax are used commercially as standard sweet corn seed treatments. In trial 2, losses due to postemergence damping-off were not as apparent as in trial 1 because stand counts were taken at a later date after seeding. Most losses due to postemergence damping-off occur within 2 weeks after emergence.

[1]Florida Agricultural Experiment Stations Journal Series No. 1540.
[2]1 oz/cwt = 64.9 g/100kg. For other metric conversions see the table at the front of this volume. Ed.

Table 1. Effect of seed treatment on the percent stand and yield of 'Florida Staysweet' grown at Belle Glade.

Treatment	Rate oz. a.i./cwt	Percent stand					Yield[y]
		Trial 1[w]		Trial 2			
		2 wk.	4 wk.	3 wk.	5 wk.	Mean[x]	Crates/acre
Benlate + Difolatan	2+2	98 a[z]	97 a	90 a	90 a	93 a	367 a
Banrot + Difolatan	2+2	91 abcde	91 abc	91 a	90 a	90 ab	339 a
Benlate	2	93 abc	91 abc	88 ab	86 ab	88 abc	322 bcd
Banrot	2	93 abc	93 ab	85 abcd	84 abcd	88 abc	317 bcd
Difolatan	4	91 abcde	87 bcde	88 ab	86 ab	86 abc	356 ab
Demosan	2	95 ab	88 abcd	86 abc	84 abcd	86 abc	322 bcd
Demosan + Difolatan	2+2	89 bcde	83 cdef	84 abcd	84 abcd	83 bcd	327 abcd
Difolatan	2	90 bcde	85 bcde	81 abcde	79 bcde	82 cde	339 abc
Vitavax + Difolatan	2+2	87 cdef	77 efgh	81 abcde	79 bcde	78 def	332 abc
CGA 48988 + Difolatan	2+2	90 bcde	78 defgh	76 cde	75 cde	76 defg	316 bcd
Vitavax + Captan	2+2	92 abcd	80 defg	72 ef	71 ef	75 efg	315 bcd
Vitavax + Captan	4+4	92 abcd	77 efgh	74 de	73 de	75 efg	302 cd
Captan	2	87 cdef	74 fgh	78 bcde	75 cde	74 fg	325 bcd
Vitavax	4	81 f	69 hi	58 gh	56 gh	62 h	250 ef
Vitavax	2	85 def	71 ghi	52 h	50 h	60 h	263 ef
CGA 48988	2	82 f	64 i	55 gh	54 gh	59 h	226 f
Control	–	84 ef	77 efgh	63 fg	62 fg	69 g	286 de

[z]Values followed by the same letter do not differ significantly at the 5% level according to Duncan's Multiple Range Test.
[y]Mean yield for the 2 trials, 4.5 doz. ears/crate.
[x]Mean of the final stand counts for trials 1 and 2.
[w]Stand counts were made 2 and 4 (trial 1) and 3 and 5 weeks (trial 2) after planting.

The fungicide seed treatments which provided the highest stands in addition to uniform plant growth also contributed to the highest yields. (Treatments with high stands also appeared more uniform in growth, however, there were generally no differences in silking rates between treatments.) Although both U.S. Fancy and No. 2 grade ears were considered marketable there were very few No. 2 grade ears harvested. Therefore, yield values in Table 1 represent almost all U.S. Fancy grade. The treatment Benlate + Difolatan provided the highest marketable yield of 367 crates/acre compared to the control which yielded 286 crates/acre representing a 28% increase in yield. Similar high yields were provided by Banrot + Difolatan, Difolatan (2 and 4 oz. a.i./cwt of seed), Demosan + Difolatan, and Vitavax + Difolatan. However, only Benlate + Difolatan, Banrot + Difolatan and Difolatan (4 oz. a.i./cwt of seed) provided the highest stands and yields. The lowest stands and yields were obtained in the Vitavax (2 and 4 oz. a.i./cwt of seed) and CGA-48988 treatments.

Results from this study indicate that several fungicide seed treatments can significantly increase plant stands and yields of 'Florida Staysweet' sweet corn. However, since damping-off can reduce stands of most sweet corn varieties grown in south Florida, registration of one or more of the most effective compounds as a seed treatment would help to decrease sweet corn stand maintenance problems.

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YIELD REDUCTION IN TOMATO CAUSED BY BACTERIAL SPOT AND DISEASE CONTROL WITH COPPER SPRAYS[1]

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Abstract. **Both bacterial spot and the copper compounds used for control of the disease are reported to cause losses in field grown Florida tomatoes. When symptoms of bacterial spot appeared in inoculated 'Walter' tomato plots 1 month prior to harvest and affected 75% of the foliage by harvest time, the disease index was highly and significantly correlated with the lower yield of infected plots. In a separate trial where bacterial spot appeared only 2 weeks before harvest and affected 35% of the foliage by harvest time, yield differences were not significant. Significant reduction in disease index was achieved through use of copper materials. A flowable tribasic copper sulfate, an emulsifiable copper acid salts, and particularly a combination of flowable tribasic copper sulfate and elemental sulfur were effective in reducing disease symptoms to 6% of the foliage. Captafol 4F at 2.64 liters/ha was statistically as effective as the copper materials in controlling bacterial spot.**

Bacterial spot of tomato incited by *Xanthomonas vesicatoria* (Doidge) Dows is an adverse factor in tomato production (4). In south Florida the disease occurs from the beginning of planting in summer through December and again in spring (7). The disease progresses rapidly and is diffi-

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