Cracked Stem of Celery

boric acid sprays reduced incidence of disorder in field trials with nitrogen and potash fertilization

M. Yamaguchi, F. W. Zink, and A. R. Spurr

Boric acid sprays can control the occurrence of cracked stem in certain varieties of celery which follows excessive applications of nitrogen and potash fertilizers—or potash alone, when the soil fertility is optimal.

Cracked stem of celery—also known as brown checking, scratch, and adaxial cracked stem—is a physiological disorder associated with boron deficiency in the celery plant, which may be accentuated by excess potash and nitrogen fertilization. Symptoms of the disorder are brown lesions, with transverse cracks, on the inner surface of the petiole or shank. In severe cases cracked stem occurs along the ridges on the outer surface of the petioles and is sometimes referred to as cat-claws.

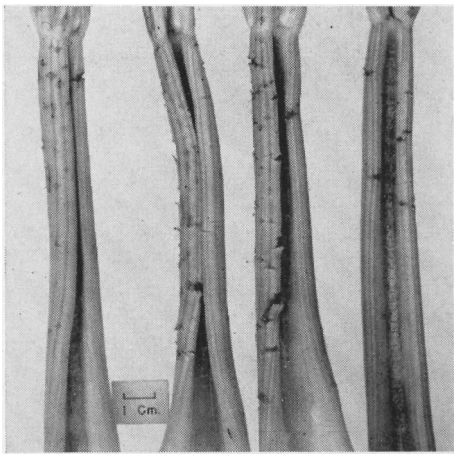
Utah 10-B is the most susceptible variety, and Utah 52–70 and Summer Pascal are most resistant to the disorder.

In the summer and fall of 1952, Utah 10-B plots were set out in Contra Costa and Monterey counties to study the factors causing cracked stem and the means of its prevention. Some trials showed no cracked stem, while in others cracked stem was general throughout the field and the data collected showed only trends.

In the trials at Knightsen, Contra Costa County, the check plots showed an average of 7.4% cracked stem, while plots with high potash had 16.0%. High nitrogen plots showed 24% cracked stem, while on the high nitrogen plus high potash plots 20% of the plants showed the symptoms.

At Salinas, Monterey County, experiments were conducted in a field of Utah 10-B to study the effects of potash fertilizers on the induction of cracked stem and the effects of boric acid sprays on its prevention.

To a direct-seeded field, 800 pounds of potash—K_2O—per acre were applied at time of thinning. At the same time the plants on some fertilized and nonfertilized plots were sprayed thoroughly with a 1.5% boric acid solution. This gave four different treatments: *1*, check, *2*, 800 pounds of potash, *3*, boric acid spray, and *4*, boric acid spray plus 800 pounds of potash per acre. These were in addition to the grower's regular fertilizer program, which totaled 500 pounds of nitrogen—N—208 pounds of phosphorus—P_2O_5—and 104 pounds of potash—K_2O— per acre. Treatments were replicated four times.



Severe cracked stem affecting both the inside and outside of petioles. Field-grown Utah 10-B.

Celery Cracked Stem on Dffierent Varieties as Affected by Fertilizer Treatments at Brentwood, California

Fertilizer treatment*	Varieties			
	Utah 10-B	Utah 16	Utah 52–70	Summer Pascal
	Per cent cracked stem			
Check	1.0	0.0	0.0	0.0
600 lb. K_2O	0.0	0.0	0.0	0.0
400 lb. N	13.2**	4.2**	0.0	0.0
400 lb. N + 600 lb. K_2O	19.6	2.5**	0.0	0.0

* Treatments are in addition to grower's regular fertilizer practice.

** Highly significant over the check plots.

At harvest the check plot showed 5.2% cracked stem; treatment *2*, 23.6%; treatment *3*, 0.5%; and treatment *4*, 2.1%. These data show that the application of high potash—as in treatment *2*—induced a high percentage of cracked stem. On the other hand, boric acid sprays—treatments *3* and *4*—reduced the incidence of cracked stem even when an excess of potash had been applied. These results were statistically highly significant.

In an independent trial conducted by another staff member at Salinas in a field of Utah 10-B, a plot treated with 800 pounds of potash and 110 pounds of nitrogen, in addition to the regular grower application, produced 27% cracked stem, while the rest of the field showed no symptoms.

At Brentwood, Contra Costa County, four test plots in a field of transplanted Utah 10-B were given the following fertilizer treatments: *1*, check, *2*, 600 pounds of potash, *3*, 400 pounds of nitrogen, and *4*, 600 pounds of potash plus 400 pounds of nitrogen per acre. These treatments were in addition to the grower application of 10 tons cow manure per acre and 240 pounds of nitrogen, 80 pounds of phosphorus and 40 pounds of potash per acre. The plots were replicated four times.

At harvest cracked stem counts were made, and the results were: *1*, check plot—1.0%; *2*, potash plot—0.0%; *3*, nitrogen plot—10.9%; and *4*, potassium and nitrogen plot—19.9%. These results showed that in this field high nitrogen significantly increased cracked stem. In the high potash plus high nitrogen plots, the cracked stem occurrence was found to be statistically highly significant. The non-appearance of cracked stem in the potash plot may be explained by insufficient nitrogen. From field observations, it appears that the celery plant must be in a vigorously growing state—with sufficient amounts of nitrogen—before cracked stem appears.

The fertility of the soil on which the crop is grown is an important factor in determining the quantity of additional fertilizer that would cause the celery crop to develop the cracked stem disorder in varying degrees of severity.

In addition to the plots of Utah 10-B at Brentwood, identical trials replicated twice were made on Utah 52–70, Utah 16, and Summer Pascal to determine the varietal responses to the fertilizer applications. At harvest only a very few of the Utah 16 developed symptoms. Neither Utah 52–70 nor Summer Pascal showed any cracked stem.

M. Yamaguchi is Assistant Olericulturist, University of California, Davis.

F. W. Zink is Assistant Specialist in Vegetable Crops, University of California, Davis.

A. R. Spurr is Assistant Olericulturist, University of California, Davis.

Arthur S. Greathead, Farm Advisor, Monterey County, University of California, conducted the independent trial at Salinas and Melvin Zobel of the Department of Vegetable Crops, University of California, co-operated in the studies reported here.

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