

## **Sugarbeet Response to the Plant Growth Regulator TRIGGRR in the San Joaquin Valley of California**

C. A. Frate, B. B. Fischer, T. A. Babb, and T. R. Johnson

University of California Cooperative Extension Tulare County  
and Fresno County; Spreckels Sugar Company, Inc., Wood-  
land and Mendota, California, respectively.

The cytokinin-containing growth regulator TRIGGRR was reported to increase the sucrose percentage, purity, and yield of sugar in sugarbeet trials conducted in the Red River Valley<sup>1</sup>.

To study the response of sugarbeets to the plant growth regulator TRIGGRR, three field trials were conducted in the San Joaquin Valley of California. Two formulations, a soil TRIGGRR and a foliar TRIGGRR, were evaluated. They were applied in water buffered to pH 6-6.5. In the foliar application, a surfactant was added at 0.1-0.5% of volume. All trials were furrow irrigated. Roots were harvested by a commercial type, mechanized beet digger equipped with an automatic scale. Sucrose and purity were obtained from samples analyzed by Spreckels Sugar Company's Tare Laboratory.

### **Trial 1**

Both Soil and Foliar TRIGGRR were included in trial 1, conducted on a Chino clay loam soil on the east side of the San Joaquin Valley. Individual plots were six 30-inch (76 cm) beds by 70 feet (21.3 m) in length, arranged in a randomized complete block design and replicated four times. Sugarbeet variety SS-LS2 was planted on January 8. Yield data were obtained from harvesting the center two rows in each plot September 26, 1990.

Soil TRIGGRR was applied during planting and at lay-by, 1 fl oz per thousand feet of row (29.6 ml/305 m), by wiring nozzles from a CO<sub>2</sub> pressurized backpack sprayer to the grower's equipment. At planting, this method worked very well as the material was sprayed directly into the seed row. However, this method was not satisfactory for the sidedress application at lay-by due to problems setting up equipment and putting the material at the appropriate depth. Foliar TRIGGRR, at 4 fl oz per treated acre (292 ml/ha), was applied three times at two-week intervals. All but one of the foliar applications were applied at the 2-4, 4-6, and 10-12 leaf stages. The "late" foliar treatment was applied when plants were in the 10-12, 14-16, and lay-by stages. Combinations of soil and foliar treatments were included.

---

<sup>1</sup>Foliar TRIGGRR, a new plant growth regulator for increasing yields in sugarbeets. L. W. Parker and P. L. Salk. 1989. American Society of Agronomy National Meetings (abstr.).

Treatments, yield, and purity analyses are listed in table 1. No visual differences were noted during the season, and no significant yield differences were obtained for any of the criteria tested.

**Table 1. Sugarbeet yield and purity results from 1990 TRIGGRR trial in Tulare County (Trial 1)**

Treatment	Rate of TRIGGRR fl oz	Dates applied	Roots T/A	Sucrose %	Sugar T/A	Nitrate	Potassium K	Sodium Na	Amide nitrogen AN
Check	--	--	44.1	11.1	4.91	14.6	125.4	109.5	16.8
Soil @ planting	1 /1000 ft	1/8	46.5	11.3	5.26	20.5	105.5	118.5	23.1
Soil @ planting + foliar (12" band)	1 /1000 ft 4 /A	1/8 3/1,13,27	45.2	10.8	4.95	12.9	122.2	108.6	18.2
Sidedress	1 /1000 ft	4/17	46.1	11.4	5.24	19.1	121.1	112.5	21.6
Sidedress + foliar (12" band)	1 /1000 ft 4 /A	4/17 3/1,13,27	47.7	11.2	5.31	21.0	106.6	119.1	20.8
Foliar alone	4 /A	3/1,13,27	45.2	11.6	5.26	17.8	117.0	110.0	17.6
Foliar alone	4 /A	3/27, 4/11,17	43.6	11.0	4.81	18.4	111.1	112.6	17.2
LSD			NS	NS	NS	NS	NS	NS	NS
% CV			8.1	7.9	13.0	31.8	10.3	20.7	41.7

Values are means of 4 replications. Variety SS-LS2 was planted January 8, 1990, and harvested September 26, 1990. Soil applications at planting and when sidedressed were with Soil TRIGGRR. Foliar applications used Foliar TRIGGRR.

## Trial 2

Trial 2 was also conducted on Chino clay loam soil in a grower's field on the east side of the San Joaquin Valley. Three treatments replicated eight times were included on plots of four 30-inch (76 cm) beds wide and 70 ft (21.3 m) long. In addition to the untreated, there were two treatments with Foliar TRIGGRR. In one treatment, Foliar TRIGGRR was applied three times, at two-week intervals, at 4 oz per treated acre (292 ml/ha). This coincided with plants having 3-4, 6-10, and 10-16 leaves. The other foliar treatment was a single application at 8 oz per treated acre (584 ml/ha) when plants had 6-10 leaves.

The sugarbeet variety SS-334 was planted in mid-January. By mid-August a high level of root rot was observed in the trial. Yields were not obtained due to the high incidence of root rot, but randomly selected samples of healthy roots were taken in late August for purity analysis. A summary of the treatments and analysis are presented in table 2. There were no differences detected among treatments.

**Table 2. Sugarbeet sucrose content and purity from 1990 TRIGGRR trial, Tulare County (Trial 2)**

Treatment	Rate of TRIGGRR fl oz/A	Dates applied	Live plants 8-15-90 %	Sucrose %	Nitrate	Na	K	AN
Check	--	--	71.1	12.3	54.7	141.6	166.8	40.2
TRIGGRR foliar	4	3/16,3/27,4/11	70.0	12.5	54.2	138.8	159.8	39.8
TRIGGRR foliar	8	3/29	75.1	12.8	52.1	140.0	170.2	35.7
LSD			NS	NS	NS	NS	NS	NS
% CV			12.2	6.24	28.9	12.6	12.4	19.2

Values are means of 8 replications. Variety SS 334 was planted in mid-January and root samples were taken on August 26, 1990.

### **Trial 3**

The third trial was conducted on the University of California West Side Field Station in Fresno County on a Panoche clay loam soil. Each plot consisted of four 30-inch (76 cm) beds, 40 feet (12.2 m) long. Treatments were arranged in a randomized complete block design, replicated five times. Variety SS-334-R was planted on March 12, 1990. Thirty-five feet (10.7 m) from each of the center two beds were harvested for yield data on September 19, 1990.

Three methods of foliar applications were evaluated; a broadcast spray, a crown treatment in which the volume and rate was calculated as though the application was broadcast but the spray nozzle was turned 90 degrees so that the material was flowing in a line above and centered over beet crowns, and a 12-inch band in which the rate of application was calculated on a per-treated-acre basis.

The first applications were on May 8, 1990, when beets had eight or more leaves. Repeat applications were made at approximately eight-day intervals, May 17 and May 25, 1990.

The treatment schedule, yield data, and sucrose percentage are summarized in table 3. No significant differences among the treatments for root yields, percent sucrose, sugar, or nitrates were obtained.

**Table 3. Yield results from 1990 TRIGGRR trial at the University of California West Side Field Station (Trial 3)**

Treatment	Rate of TRIGGRR fl oz/A	Dates applied	Roots T/A	Sucrose %	Sugar T/A	Nitrates PPM
Check	--	--	24.3	13.7	3.2	78.2
Broadcast	16	5/8	25.4	13.3	3.4	86.1
Broadcast	8	5/8,17,25	26.6	13.0	3.5	108.5
Crown	16	5/8	25.4	13.1	3.3	96.3
Crown	8	5/8	26.7	12.5	3.3	117.4
Crown	8	5/8,17,25	25.9	12.9	3.3	108.9
Band (12")	8	5/8	25.8	13.2	3.4	101.3
Band (12")	4	5/8,17,25	27.0	12.5	3.4	114.5
LSD			NS	NS	NS	NS
% CV			11.5	8.2	8.0	36.8

Values are means of 5 replications. Variety SS-334-R was planted March 12, 1990, and harvested September 19, 1990.

### Summary

Results from these trials do not indicate a significant response to the growth regulator TRIGGRR from irrigated sugarbeets under California conditions with a relatively long growing season.