

Effects of 2,4-D on Sugar Beets

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Controlled field tests show that 2,4-D remaining in the soil after an application of this chemical may cause injury to seedling stands of sugar beets. This is especially true in areas where the rainfall is light and the chemical remains in the soil. Therefore, its application to sweet clover or other legumes at time of plowing under to prevent volunteering, or spraying of weeds in the fall, is a practice which should not be encouraged if subsequent injury to seedling beets or other crop seedlings is to be avoided. Such spraying as is done should be undertaken at a time when weeds or plants to be controlled through spraying are in a proper growing condition for most effective control.

TABLE I. EFFECT OF 2,4-D ON BEET WEIGHT AND SUCROSE PERCENTAGE (Grafton, North Dakota)

Week	2,4-D Sprayed Fields			Unsprayed Fields		
	Avg. Wt. Lbs.	% Sugar	Purity	Avg. Wt. Lbs.	% Sugar	Purity
Sept. 10	1.16	10.9	75.4	1.05	16.2	83.3
Sept. 15	1.61	11.3	75.7	1.67	16.0	82.7
Sept. 24	1.27	13.5	85.8	1.44	17.7	91.5
Sept. 30	1.56	13.5	86.3	1.72	16.8	86.2
AVERAGES:	1.38	12.2	80.3	1.45	16.7	85.9

The purpose of this article, however, is not to discuss weed control, but rather to point out the dangers arising from careless and indiscriminate use of herbicides and drift damage from same to sugar beets. That this is of more than academic interest is substantiated by reports of injury to many hundred acres of beets during the three years just past, in different parts of the United States, where sugar beets are grown as a commercial crop.

In 1947, reports were received from California of injury to seedling beets in fields adjacent to drain ditches which had been sprayed with 2,4-D to control willow trees. Many of the beet seedlings were killed outright and those which did survive showed typical malformational symptoms. Due to drastically reduced stands of beets, the tonnage yield of beets harvested was 18% below the average yield of the unsprayed portions of the same field.

In 1948, in the East Grand Forks, Minnesota area, a field of young beets was injured severely by 2,4-D application made to an adjoining grain field for the control of mustard. The drift damage killed many of the recently thinned beets, resulting in an appreciably reduced beet tonnage yield from the affected portion of the field. Although redress was sought in court by the injured party, the merits of the case still are undecided.

In 1949, more than 300 acres of sugar beets in the Grafton, North Dakota, area were injured severely by an apparently contaminated spray of toxaphene applied to beets in late August for the control of sugar beet webworm. Whether the containers were contaminated with 2,4-D is not known

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definitely, but the after-effects of the spray were typical of this material. To ascertain the extent of damage, samplings of affected and unaffected beets were taken each week for weight comparisons and determinations of sucrose percentage. The average results of these tests is shown in Table I.

The beets affected by the contaminated spray were extremely fibrous and difficult to slice, requiring many knife changes in slicing of these beets. In fact, many beets were so woody that it was impossible to process them. The resulting pulp was also very stringy, resembling excelsior rather than typical beet pulp. Also, the percentage sucrose in the beet was adversely affected.

In the Gothenburg, Nebraska, area, drift damage from 2,4-D spray was observed in a beet field adjoining an open drain ditch which was sprayed in mid-July for the control of weed plants. Samples were taken weekly of beets from the affected and unaffected portions of the field and are shown in Table II.

TABLE II. EFFECT OF 2,4-D ON BEET WEIGHT AND SUCROSE PERCENTAGE

(Gothenburg, Nebraska)

Week	Drift Damaged Field		Not Damaged Field	
	Avg. Wt. Lbs.	% Sugar	Avg. Wt. Lbs.	% Sugar
Sept. 9	1.41	12.9	1.67	13.1
Sept. 16	1.29	13.4	1.70	14.0
Sept. 23	1.49	13.7	1.94	14.5
AVERAGES:	1.40	13.5	1.77	13.8

The results indicate that while there was a depressing effect on the percentage sucrose in the beet, beet yield was more adversely affected. No record was available in this instance of the manufacturing worth of these beets, as the tonnage was too small to permit observation in the factory.

From the observations reported in this paper, it is apparent that 2,4-D damage to sugar beets varies according to the age of the plant. Assuming a normal concentration of 2,4-D material in spray applications, the drift damage to young beets is reflected in reduced stands of beets and consequent reduction in beet tonnage yield. When beets are injured by 2,4-D in mid-July, the tonnage yield is more adversely affected than the percentage sucrose in the beet. Where injury to beets is sustained from 2,4-D in August, the percentage sucrose in the beets is very materially depressed. Judging from the information at hand and from sectioning affected beets, regardless of time when injured, it is safe to conclude that, because of the fibrous nature of the beets, they are not desirable for sugar processing operations.

Considering the fact that in many instances the farmer is an innocent victim of careless handling of these spray materials, cognizance is being taken of this situation in some states by the promulgation of laws aimed at correcting abuses. Operators who engage in the application of these chemicals must have necessary training, registered materials and proper equipment for compliance with legal requirements. Aircraft used for spraying must have license for its operation. Drip-proof nozzles must be provided and the aircraft operated under wind velocities less than 10 miles per hour and flown not higher than 10 feet above the ground if the wind velocity is more than 5 miles per hour.

The above are some of the controls now being written into law in several states. This action is sorely needed in other states where flagrant abuses of proper precautionary measures have been a common occurrence and where redress by law is not had because of lack of legislation covering the field of operation. It would appear that concerted action of groups of individuals as an association would accomplish much by way of educating the careless operator in regard to the need of proper precautionary controls. Regardless of action taken, it is obvious that the use of 2,4-D must have intelligent and restricted application if detrimental experiences encountered to date are not to be repeated on a much more wide-spread scale.