

## **An Assessment of Simulated Cooling Tower Salt Drift on Cotton**

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### Summary

The impact of foliar salt deposition, similar to that which will occur in the vicinity of the Palo Verde Nuclear Generating Station, was investigated on field grown cotton. There was a trend towards reduced yield when salt deposition was increased from 0 to 370 lbs/A per year.

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When in operation, the cooling towers at the Palo Verde Nuclear Generating Station will discharge several tons of salts per day into the atmosphere. These salts will settle onto the ground and vegetation surrounding the facility. To investigate the impact of this problem, the effects of simulated salt deposition on the growth of field grown DPL 90 were studied in the Marana area in 1983.

### Methods

A modified tobacco sprayer was used to apply small doses of saline solution over the canopy. The treatments included an unsprayed control, distilled water, and 7.4, 74, and 370 lbs/A per year of simulated saline drift. The actual amount applied per day was approximately equivalent to the amount that will be deposited daily at these annual deposition rates. The Bechtel Corporation predicts actual deposition rates of 7.4 lbs/A per year or less from the towers.

Visual analyses of the plants were performed weekly to detect any salt-induced injury or changes in growth. Physiological and morphological functions were monitored throughout the season. Detailed flowering and fruiting studies were conducted by placing dated tags on flowers as they opened in seven foot plots.

### Results

In general, there were no physiological changes observed at any of the treatment levels. Beginning 25 August, the unsprayed control plants showed more chlorosis as compared to the plants in the 370 lb/A per year plots. This indicated that the salt solution, which contained many essential plant nutrients, may have had some beneficial effects due to foliar fertilization.

There were no differences in the number of flowers produced in any of the treatments, however, boll production was consistently lower in the plots

treated with 7.4 lb/A per year or more salt. Only the 370 lbs/A per year treated plants had statistically fewer bolls produced as compared to the controls. This indicates that the salts may be affecting fruit set after flowering.

There were two estimates of yield from each experimental plot. Two rows were machine harvested, and in a separate portion of the treated plot, a seven foot section of row was hand harvested as the bolls opened. Both yield measurements showed a trend towards reduced yield with increased salt application as compared to the sprayed control (Figs. 1 and 2, Table 1). These differences were statistically significant only in the hand harvested plots. No differences in fiber quality were detected.

**Table 1. Seed cotton yields (lb/a) from machine and hand harvested plots treated with simulated saline drift, Marana, 1983.**

SALT TREATMENT (lb/a per yr)	SEED COTTON (LB/A)	
	HAND HARVESTED PLOTS	MACHINE HARVESTED PLOTS
Unsprayed	2527.2 ab	2269.6
0	2734.3 a	2594.4
7.4	2356.5 ab	2316.2
74.0	2237.4 bc	2238.8
370.0	1905.2 c	2124.4
LSD (.05)	381.6	NS
Standard Error	30.4	133.3

Means followed by the same letter within a column are not statistically different at the 5% level using the least significant difference (LSD) test.

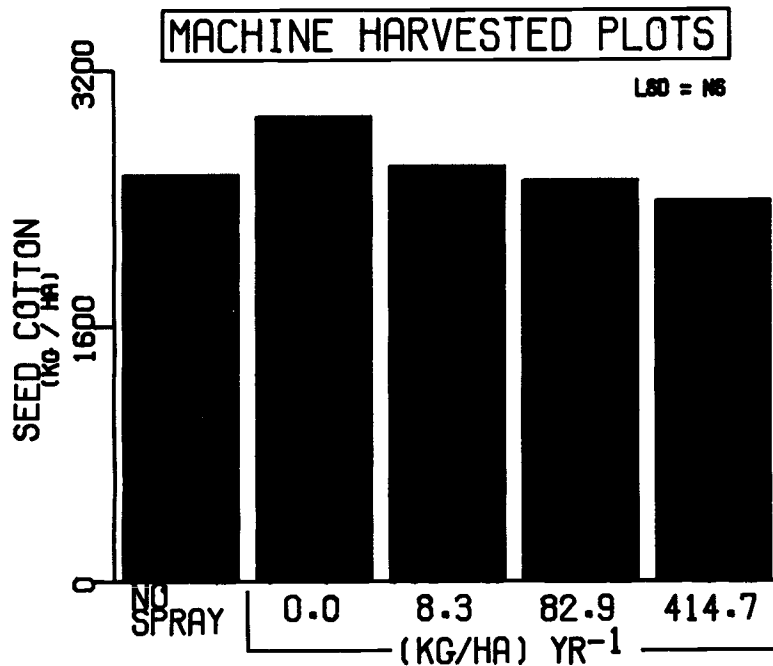


Fig. 1. Seed Cotton Yields from Machine Harvested Plots Treated with 0, 8.3, 82.9, and 414.7 kg/ha per year (0, 7.4, 74.0, and 370.0 lbs/A per year) of Simulated Saline Drift. Marana 1983.

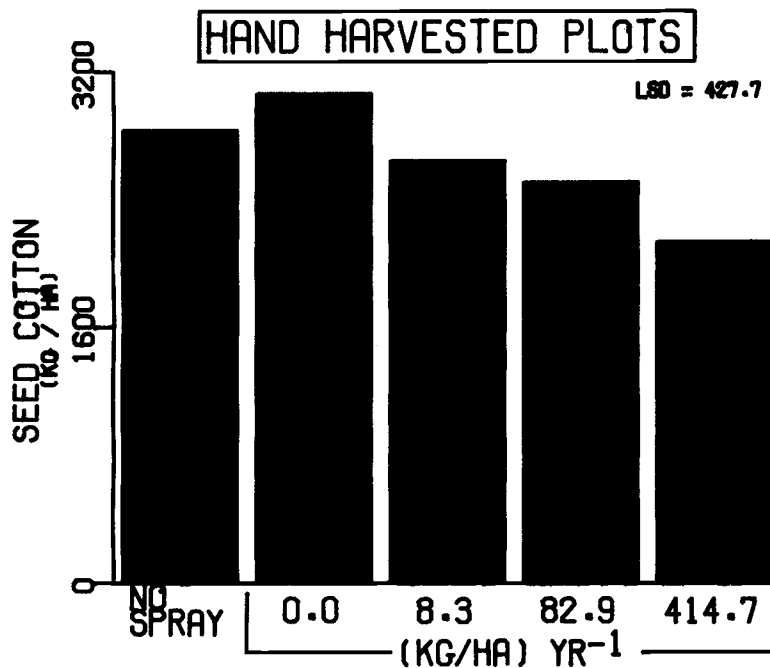


Fig. 2 Seed Cotton Yields from Hand Harvested Plots Treated with 0, 8.3, 82.9, and 414.7 kg/ha per year (0, 7.4, 74.0, and 370.0 lbs/A per year) of Simulated Saline Drift. Marana 1983.