

# DISEASES

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## Response of Texas Root Rot to a Soil Sterilant The Second Year After Application in Marana, 1989

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### ABSTRACT

*Two years after sterilizing a sandy loam soil in Marana, we measured significant yield responses of short staple cotton. The yield response was significant in the first year as well, but was not enough to pay the cost of sterilization. This second year of yield response made the treatment economically feasible.*

### INTRODUCTION

In 1986, Safford farmer Ben Whitmer originated the idea of deep injecting a soil sterilant to control Texas Root Rot (*Phymatotrichum omnivorum*) in cotton. In field experiments in Graham County, Clark and Cluff (1,2) measured significant yield responses of Pima cotton in Texas Root Rot infested soil. We have also found significant yield responses of short staple cotton in Pima County (3,4).

The soil sterilization treatment, however, is very expensive. In the first year of this experiment (applied before the 1988 crop), the most cost-effective treatment would have been a break-even proposition at best. To be economic, the sterilization would have to provide more than one year's benefits.

To quantify the second year's benefits, we measured the 1989 yield responses and plant survival in the 1988 test plots.

### MATERIALS AND METHODS

Before planting the 1988 crop, we deep injected methyl bromide/chloropicrin (MB/C) at rates of zero, 300, 400, and 500 pounds per acre into a large kill pattern of Texas Root Rot. The field is known as the Cement Plant Farm, and is on the north side of Avra Valley Road on the west side of Interstate 10.

Details on the injection method and experimental design are in the 1989 Cotton Report (5). The challenge with this sterilization technique is to work the soil into a fine enough tilth, so that the soil sterilant can reach and kill all of the Texas Root Rot fungus. In a 1987 experiment on clay and clay loam soils, we found this to be virtually impossible (3,4). The 1988 experiment, however, is on a sandy loam soil, and without large clods, the injecting conditions were ideal.

## RESULTS AND DISCUSSION

We measured significant yield responses to the sterilization in the second crop year (Table 1). However, there were no significant differences in the percent plant mortality between any of the treatments.

In the 1987 experiment on clay and clay loam soils, there were no significant yield responses to the sterilization in the second year (4). We believe that the response in the 1988 experiment is due to the soil type; we were able to work the sandy loam into an ideal tilth for fumigation.

In the first year of the experiment, significantly fewer plants died in the sterilized plots. In the second year, most of the plants in all plots died and we could detect no significant differences in mortality (Table 2).

**Table 1. Lint yield and plant mortality response to MB/C fumigation the second year after treatment.**

MB/C Application Rate -----pounds per acre-----	Lint Yield		Plant Mortality -percent-	
400	1852	a*	99	a*
500	1727	a	65	a
300	1265	a b	83	a
Check	728	b	96	a
<b>Coefficient of Variation</b>	<b>31.7%</b>		<b>187.6%</b>	

\* Means followed by the same letter within a column do not differ significantly at the .05 level.

The yield response in the second year makes the difference between profit or loss from the treatment (Table 2). For the 400 lb/acre treatment, expenses exceeded returns by \$137. per acre at the end of the first year. But at the end of the second year, the additional yield made the treatment profitable.

Table 2. Economic analysis of the 400 pound per acre MB/C treatment at the Cement Plant Farm, 1988-89; in dollars per acre.

400 lbs MB/C @ \$1.00/lb.	\$400.	
Application cost	30.	
Total soil sterilization cost		- \$ 430.
Value of 1988 yield response:		
544 extra lbs lint @ \$.60	326.	
Less time value at 10% per year	- 33.	
Net value of year 1 yield response		293.
Net returns at the end of year 1		- 137.
Value of 1989 yield response:		
1124 extra lbs lint @ \$.60	674.	
Less time value at 10% per year	- 135.	
Net value of year 2 yield response		539.
Net returns at the end of year 2		\$ 402.

### ACKNOWLEDGEMENTS

This experiment was made possible by the support and cooperation of Ben Whitmer and Don Stokes. Ameri-Brom, Inc. donated the MB/C. Eastern Arizona Machinery Company donated transportation of the injection rig to the test site.

### REFERENCES

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