

# Effect of Preplant Fumigation on Yield of Chile Pepper Infected with Root-Knot Nematode

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## Abstract

*A field test was established in 1999 to determine the effect of preplant soil fumigation on yield of chile pepper in southeastern Arizona in order to give growers data on which to base management decisions. Replicated plots within a nematode-infested field planted with New Mex 6-4 chile in March 1999 were either treated with Telone II fumigant at 7 gal/A two weeks before planting or not treated. In a mid-season assay in July 1999, the effects of fumigation were evident in plant canopy growth although numbers of J2/cc soil were not significant between treatments ( $p=0.058$ ). Differences in yields between fumigated plots and untreated plots were significant ( $p=0.014$ ). The average yield in fumigated plots was 12.4% higher than that in untreated plots.*

## Introduction

Yield loss in chile pepper due to infection by southern root-knot nematode, *Meloidogyne incognita*, is considered a problem in many areas of chile production, and preplant soil fumigation is commonly used in infested fields. However, there is no data available for growers on the effect of preplant fumigation on yields of chile pepper in Arizona. Root-knot nematode infects many crops that are rotated with chile pepper in southern Arizona including cotton, corn and small grains, making economic rotations difficult. Fumigation is expensive, and growers in Arizona need more information about the effects of fumigation on yields to make management decisions. The fumigant of choice for this trial was Telone II because of its cost compared to other soil fumigants registered for use in Arizona and the results of similar studies in cotton in Arizona (Husman, et al., 1996).

## Materials and Methods

A field test was established in 1999 to determine the effect of preplant soil fumigation on yields of chile pepper in a field known to have a high root-knot nematode infestation. The field was planted in cotton previously and was sampled for root-knot nematode before cotton was harvested in November 1998. Test plots were established on March 12, 1999. Telone II fumigant was applied 14-18 inches deep at 7 gal/A to six four-row plots the length of the field, skipping four rows between applications to serve as untreated control plots. The field was planted two weeks after fumigation with chile pepper variety New Mex 6-4 and grown for dry red chile.

All plots of both treatments were sampled July 2, 1999 for root-knot nematode populations by taking core samples in the root zone of plants in the middle two rows of each plot. Twenty samples were taken from each treatment and bulked. A subsample of each replicate was assayed for root-knot using mist extraction according to standard methods and reported as the number of second stage juveniles per cubic centimeter of soil (J2/cc). On November 16, 1999, a commercial picking crew harvested plots. The middle two rows of each plot, an area of 0.18 A, were harvested. Weights of chile peppers in each plot were recorded immediately after harvest. These field weights represent the yield data for this test since it was not possible to obtain dehydrated weights from individual plots.

## Results and Discussion

The root-knot nematode population was very high in the field in fall, 1998, before cotton was harvested. Numbers varied from 0.96 to 10.88, with an average of 4.42 J2/cc. In July 1999, at about midseason of chile production, the effect of fumigation on top growth of plants was evident even though numbers of J2/cc soil did not differ significantly between treatments (Table 1). Weights of harvested chile pepper in fumigated and untreated plots were significant between treatments (Table 1). Average yields were 12.4% higher in the fumigated plots. The average increase in yield, when extrapolated to lb/ A, was considered economical for Telone II application since it easily covered the cost of application. Results indicate that chile peppers can withstand a fairly high level of nematode infection, and in high yielding fields, the yield loss may not be obvious. The overall yield in this field was high compared to average yields for red chile in Southeastern Arizona. Under conditions in which yields are lower and nematode damage is high early in the season, fumigation may be even more important.

## Literature Cited

Husman, S., M. McClure and B. Deeter. 1996. Telone II and Temik Efficiency on Root-knot Nematodes in Cotton. Cotton Report, College of Agriculture, Series p-103.

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**Table 1. Root-knot nematode populations at mid-season and field weight of harvested chile pepper in fumigated and untreated plots.**

Treatment	Average (std dev) number nematodes (J2/cc)*	Average (std dev) yield (lb/0.18 A) of chile pepper**
Fumigated	0.07 (0.13)	2808 (214)
Untreated	1.27 (1.37)	2459 (191)
ANOVA (p=0.05)	F = 4.57, p = 0.058	F = 8.84, p = 0.014

\*Average and standard deviation of second stage juveniles/cc soil (J2/cc) sub-sampled from a bulked sample of 20 samples in each plot.

\*\*Average and standard deviation of field weights of chile peppers in the two center rows in each plot (0.18 A).