

SURVIVAL OF VERTICILLIUM WILT IN PEPPERMINT STEMS FOLLOWING PROPANE FLAMING AT VARIOUS GROUND SPEEDS, 1995

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Abstract

Evaluation of propane flaming ground speeds from 2 mph to 4 mph were evaluated on a fifth-year commercial field of 'Murray mitcham' peppermint near Culver, Oregon. Three-inch samples from 15 stems per plot having visual symptoms of verticillium wilt were collected prior to flaming. Stems were tagged and a re-sampled after flaming. Control of verticillium wilt was significantly higher at 2 and 2 1/2 mph than for untreated plots. There were no significant differences between flaming at 3 to 4 mph and not flaming.

Introduction

During the 1960's Oregon State University plant pathologist, C. E. Horner evaluated post-harvest propane flaming as a method to control verticillium wilt in peppermint in the Willamette Valley.

He reported that an internal stem temperature of 60 ° F was necessary to kill 85-100 percent of *Verticillium dahliae* in infected stems. The propane flaming recommendation to achieve this temperature was 2 1/2 to 3 mph at 30 psi, 10 to 12 inches above the ground.

Evaluation of propane flaming speeds from 2 to 5 mph conducted in central Oregon during 1993 was inconclusive, but appeared to indicate that speeds above 2 1/2 mph may not provide adequate control of verticillium wilt.

Methods and Materials

Evaluation of propane flaming speeds from 2 to 4 mph was conducted during August 1995 on a fifth year field of 'Murray mitcham' peppermint near Culver, Oregon. The 30 ft x 30 ft plots were replicated 3 times in a randomized complete block design. Fifteen stems per plot that exhibited symptoms of verticillium wilt were tagged with a spot of florescent orange paint and a golf tee at the stem base with individual identification. Three-inch stem samples were taken 3 inches above the ground from each tagged stem August 4, prior to harvest. Flaming was conducted on August 14, followed by collection of the remaining 3 inch stems from tagged plants on August 15. These paired samples from the same stem were evaluated to determine the percent reduction in verticillium wilt.

Stem sections from pre- and post-flaming samples were stored temporarily under refrigeration, then surface disinfected with 10 percent household bleach in water. Three one-millimeter high sub-sections per stem were placed onto sterile plain agar in petri plates in the laboratory. Stem sub sections and surrounding agar were visually screened for fungal structures characteristic of verticillium wilt after one to two weeks. Any stem sub-section with presence of verticillium wilt was sufficient for the stem to be labelled as infected with the pathogen.

Flaming was conducted with a Rears 30 ft flamer operated at 40 psi, with covers 12 inches above the ground in front and 8-9 inches in the back.

Results and Discussion

Control of verticillium wilt was significantly higher at 2 and 2 1/4 mph than for peppermint that was not flamed (Table 1). There were no statistical differences between flaming at 3 to 4 mph and not flaming. Percent verticillium wilt control was 56 to 59 percent, which is quite low compared to 90 to 94 percent control for the same speeds in the 1993 evaluation.

Using florescent paint and golf tees for tagging stems, and the use of the same stem for both the pre- and post-flaming samples were significant refinements in the evaluation process. It appears that additional evaluation is needed to explain variability in control for different years and - locations.

Table 1. Percent control of verticillium wilt in stems by flaming at speeds from 2 mph to 4 mph near Culver, Oregon, 1995.

Treatments	Reduction of verticillium wilt in infected stems
(tractor speed)	(percent control)
2 mph	56 a
2 1/4 mph	59 a
3 mph	50 ab
3 1/4 mph	41 ab
4 mph	44 ab
Untreated	16 b

Mean separation with the T-method at P 0.05