Influence of foliar applications of plant activators/foliar nutrients on TSWV incidence and yield in processing tomato, 2007

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Introduction

Plant activators, materials that cause a response in the plant that decreases disease incidence, severity or damage done by a pathogen, have shown promise against viruses and some plant activators are being used commercially.

Methods

In 2007, a study to assess the effect of three plant activators applied at several treatment intervals on the incidence of TSWV, percentage of TSWV-symptomatic fruit and yield of processing tomatoes was conducted at University of California West Side Research and Extension Center at Five Points, California.

On 22 May, 'AB2' variety processing tomato plants were transplanted on Panoche clay loam and irrigated. The materials tested included Actigard 0.3 oz/a (acibenzolar-S-methyl: Syngenta Crop. Protection), Messenger 4.0 oz/a (harpin protein, Plant Health Care, Inc.) and Nutri-Phyte 1.5 qts/acre (phosphite, Biagro Western). Each material was applied on three different schedules as follows:

a.) an **early** application made pior to transplanting on 21 May (Messenger, Nutri-Phyte) or to plants on 25 May (Actigard)
b.) four applications **early**, 14 Jun, 3 Jul and 3 Aug
c) seven application , **early**, 6 Jun, 20 Jun, 3 Jul, 19 Jul, 3 Aug and 16Aug
d) **early**, with **Success spinosad insecticide** 6.0 fl oz on 14 Jun, 3 Jul, 3 Aug and 16 Aug
A treatment with **Success** 6.0 fl oz applied on 14 Jun **and no plant activators**, and an untreated control were also included.

Each plot consisted of one 66-inch bed 70 feet long. Treated areas were separated by 5 feet between plots within a row. The experimental design was a randomized complete block with four replications. All materials were applied in the equivalent of 25 gallons of water per acre with a CO_2 pressurized backpack sprayer at 30 psi. A spray boom with three Teejet 8002 flat fan nozzles spaced 18-inches apart. The adjuvant, Induce 0.25% v/v was included in all applications. On 18 Jul and 15 Aug, the number of plants exhibiting TSW-symptoms was recorded. The incidence of symptomatic plants is presented as a percentage of total plants. On 25 Sep, each 70 ft plot was harvested with a commercial harvester and weighed. An 18 to 22 lb sub-sample was taken from each plot. The fruit in each sub-sample was sorted by healthy red fruit, healthy green fruit, sun burned fruit, rotten fruit, TSW-symptomatic fruit. Fruit in each category were weighed and a percentage is presented below. Analysis of Variance was performed and Least Significant Difference ($P \leq 0.05$) is presented.

Results

Some plant activator treatments had lower TSW-symptom incidence than the untreated control (P=0.05). On 18 Jul, treatments with lower disease incidence than the untreated control included 4 applications of Actigard with Success, 4 applications of Messenger and 4 applications of Nutri-Phyte, with or without Success (P=0.05). On 15 Aug, treatments with lower disease incidence than the untreated control included 7 applications of Actigard with Success, 4 applications of Actigard with Success, 4 and 7 applications of Messenger, and 1 and 7 applications of Nutri-Phyte (P=0.05). Yields were low and fruit rot and sunburn was high due to a late harvest date and rains prior to harvest. There were no differences among treatments in fruit ratings and there were no differences in yield between any of the treatments and the untreated control. The likely cause of the low yields was the late harvest date as evidence by the overall high percent rot.

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Material, rate/acre[z]	Number of plant activator applications[y]	Plants with TSW-symptoms (%)		Fruit rating					Yield (tons/ acre)
		18 Jul	15 Aug	Red (%)	Grn (%)	Rot (%)	Sun-burn (%)	TSW (%)	
Actigard 0.3 oz	4 aps	6.7	29.3	56.7	4.0	16.9	21.8	0.5	19.4
Actigard 0.3 oz	7 aps	5.9	23.2	59.0	2.3	21.3	14.4	3.0	16.4
Actigard 0.3 oz	1 ap	12.0	29.3	52.7	2.4	26.8	15.5	2.6	23.3
Actigard 0.3 oz **Success** 6.0 fl oz on 14 Jun	4 aps	4.7	23.6	56.7	2.6	25.7	13.3	1.6	23.8
Messenger 4.0 oz	4 aps	4.7	21.4	56.1	1.6	22.6	18.8	1.4	21.0
Messenger 4.0 oz	7 aps	6.0	24.6	50.2	1.4	23.0	22.9	2.5	19.4
Messenger 4.0 oz	1 ap	8.7	29.3	55.4	2.0	22.5	18.8	1.3	19.3
Messenger 4.0 oz **Success** 6.0 fl oz on 14 Jun	4 aps	7.0	28.6	51.9	4.3	24.7	17.4	1.7	16.9
Nutri-Phyte 1.5 qts	4 aps	5.3	26.1	53.8	2.0	21.6	20.9	1.7	18.2
Nutri-Phyte 1.5 qts	7 aps	10.7	25.4	55.0	3.2	20.0	17.4	4.4	17.7
Nutri-Phyte 1.5 qts	1 ap	6.3	24.3	55.0	2.0	24.3	13.2	5.5	14.6
Nutri-Phyte 1.5 qts **Success** 6.0 fl oz on 14 Jun	4 aps	4.7	27.1	60.6	2.1	23.7	11.3	2.3	26.0
Success 6.0 fl oz on 14 Jun		8.7	28.6	56.5	2.0	20.9	18.9	1.7	23.1
Untreated		10.7	33.6	60.0	1.5	20.3	17.5	0.7	19.6
LSD (P=0.05)		5.4	8.3	NS	NS	NS	NS	NS	8.6

[z] All materials were applied on 1 June with the adjuvant, Induce 0.25% v/v, in the equivalent of 25 gallons of water per acre with a CO_2-pressurized backpack sprayer at 30 psi.

[y] Plant activator application schedule:

First application: Messenger and Nutri-Phyte were applied to plants the day before transplanting; Actigard was applied three days after transplanting

1 ap = first application only

4 aps = first application, 14 Jun, 3 Jul, 3 Aug

7 aps = first application, 6, 20 Jun, 3, 19 Jul, 3 and 16 Aug