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Apple Cultivar Sensitivity to Azoxystrobin Fungicide

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Abstract

Apple cultivar sensitivity to azoxystrobin fungicide was evaluated over two years. A single application of azoxystrobin at 200 ppm concentration was applied to selected shoots of over fifty different apple cultivars and rootstocks. Treated shoots were then evaluated for phytotoxicity four to seven days later. Cultivars that showed symptoms in one or both years included 'Braeburn', BC 8S-26-50, 'Gala', 'Gold-Rush', 'Hampshire', 'Jonamac', NY 75414-1, NY 65707-19, NY 75907-72, 'Silken', 'Spigold', 'Suncrisp' and 'Zestar!' Of the rootstocks tested, only CG.179 and EMLA.26 exhibited phytotoxicity on treated leaves. Cultivars that were not injured by azoxystrobin in either year were 'Arlet', 'Carousel', 'Creston', 'Enterprise', 'Fortune', 'Fuji', 'Gala Supreme', 'Ginger Gold', 'Orin', 'Pristine', 'Rome Beauty', 'Sansa', 'Shizuka', 'Yataka', and 'York Imperial'.

Introduction

Azoxystrobin is a new broad spectrum fungicide with a unique mode of action. In the United States it is sold by Syngenta under different trade names depending upon the crops it will be used on. Abound® is the trade name of the formulation that is labeled for use in grapes, stone fruit, citrus, nuts and tropical fruits within the United States. It is not labeled for use in apples because it causes phytotoxic damage to leaves and fruits. The fungicide has been implicated in a number of orchards as possibly causing some unique physiological and phytotoxic damage (2, 3). In early June 1999 a report from a county agent in Erie County Pennsylvania indicated that several apple growers who also produced grapes were having severe phytotoxicity on certain apple cultivars that were downwind of grape vineyards. Cultivars that were the most affected by the compound included 'McIntosh' and its relatives as well as 'Cortland'. Other cultivars were also believed to have shown symptoms. Although Syngenta had indicated that other cultivars are susceptible as well, many of the cultivars were older or not often grown in the United States (1). The purpose of our study was to evaluate the susceptibility of new apple cultivars to foliar phytotoxic symptoms from a single application of azoxystrobin.

Materials & Methods

Experiments were conducted at the Horticultural Research Farm at the Russell E. Larson Research Center at Rock Springs, PA. The area is outside any commercial grape growing region and no azoxystrobin had previously been used on the farm. Many of the cultivars treated were part of the Northeast Regional Research Project 183 research plantings. Individual shoots on various cultivars and rootstocks were sprayed with a 200 ppm a.i. concentration of azoxystrobin on July 6, 2000 and June 7, 2001. The dosage was chosen based on greenhouse tests conducted by the company that showed a good level of response (J. A. Frank, personal communication). The date of the treatment in 2000 was approximately 4 weeks after phytotoxic symptoms had been observed in commercial orchards located in Erie County, Pennsylvania. The solution was mixed in a small spray bottle and applied as a fine mist to the tagged shoots. Shoots were then evaluated for injury seven days later. The treated plants represent a range of commercial cultivars, selections, and rootstocks (Table 1).

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Results and Discussion

Some cultivar sensitivity varied by year which may indicate that phenological stage of the leaf development may affect observed response. Of the fifty cultivars and rootstocks that were treated with azoxystrobin in 2000, six showed phytotoxic symptoms (Table 1). The determination was made by visual inspection of treated shoots and comparisons to nearby untreated shoots one week after application. The following cultivars showed symptoms: NY 75414-1, 'Braeburn', 'GoldRush', 'Jonamac', CG.179 and EMLA.26. Treated shoots of NY 75414-1 exhibited browning along the edges. The

Table 1. Apple cultivars and rootstocks observed for sensitivity to azoxystrobin in 2000 and 2001.

2000		
Cultivars	**Cultivars**	**Rootstocks**
Akane	Jonagold	**CG.179***
Arlet	**Jonamac***	CG.202
Braeburn*	Melrose	CG.16
Carousel	Nittany	G.65
Creston	**NY 75414-1***	G.30
Empire	Orin	B.146
Enterprise	Paulared	Cepiland
Firmgold	Pristine	M.27
Fortune	Rome Beauty	M.9
Fuji	Sansa	Mac.9
Gala	Shizuka	**EMLA.26***
Gala Supreme	Spigold	Ott.3
Ginger Gold	Suncrisp	B.9
Golden Supreme	Sunrise	Mac.39
GoldRush*	Winter Banana	Jork 9
Honeycrisp	Yataka	
Jerseymac	York Imperial	

2001		
Cultivars	**Cultivars**	**Cultivars**
Ambrosia	Ginger Gold	Pink Lady
Arlet	Golden Delicious	Sonata
BC 8S-26-50*	Golden Supreme	Pristine
Braeburn	GoldRush	Rome Beauty
Carousel	GRE 1197	Runkel
Chinook	**Hampshire***	Sansa
Coop 29	Honeycrisp	Shizuka
Coop 39	Jerseymac	**Silken***
CQR 10T17	Jubilee Fuji	**Spigold***
Creston	NJ 109	Stayman
Delblush	NJ 90	**Suncrisp***
Enterprise	**NY 65707-19***	Sunrise
Fortune	**NY 75414-1***	Yataka
Fuji	NY 75907-49	York Imperial
Gala Supreme	**NY 75907-72***	**Zestar!***
Gala*	Orin	

*Indicates cultivars and rootstocks that showed a phytotoxic response

potential for phytotoxic damage does not appear to be an inherited trait. NY 75414-1 is a cultivar from the Cornell University breeding program with parentage of 'Liberty' x 'Macspur' while 'Empire' which also has 'McIntosh' in its parentage did not show any phytotoxic damage. Damage to 'Braeburn' and 'GoldRush' appeared as purple discoloration along the leaf veins. 'Jonamac' treated leaves showed browning along leaf edges as well as purple spots. The rootstocks CG.179 and EMLA.26 did not exhibit the usual symptoms. Treated leaves on these rootstocks curled inward looking similar to aphid damage.

Shoots on these cultivars and rootstocks were sprayed in early July of 2000 which was later than the physiological age of leaves in commercial orchards in Erie County Pennsylvania that showed damage. Therefore, additional shoots were treated in 2001. In 2001, shoots were treated on 7 June which was closer to the timing of damage observed in 1999 to trees in commercial orchards. A visual determination of phytotoxicity was made 4 days after the application. The following cultivars showed symptoms: 'Suncrisp', NY 75414-1, 'Spigold', 'Gala', 'Hampshire', NY 65707-19, BC 8S-26-50, 'Zestar!', 'Silken' and NY 75907-72.

Damage to 'Suncrisp' and NY 75414-1 appeared as browning along the leaf margins. 'Spigold', 'Hampshire', NY 65707-19 and 'Zestar!' exhibited browning along the edges as well as curling. Damage to 'Silken' and NY 75907-72 manifested itself as leaf spots, 'Gala' as leaf spots with curling and BC 8S-26-50 as spots and browning along the margins. 'Braeburn', 'GoldRush', 'Spigold' and 'Gala' were treated in both years although phytotoxic symptoms were only observed in one of the years. These discrepancies may be due to the different timing of sprays. In commercial orchards, damage coincided with the first fungicide application to grapes which was in early June. The application in 2000 was not made until July when presumably the leaves on apple trees would be more mature.

Literature Cited

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Age of Apple Flowers Affects Growth of *Erwinia amylovora* and Biological Control Agents

The influence of flower age on growth of *Erwinia amylovora*, the pathogen causing fireblight of apple and pear, was studied under the humid conditions of Hamilton, New Zealand and the arid conditions of Logan, Utah. 'Royal Gala' flowers from 1-8 days old were atomized with *E. amylovora*. Pistils, 1-3 days old (UT) and 1-4 days old (NZ), supported exponential growth of *E.amylovora*. Bacterial populations did not increase when older flowers were inoculated. Similar patterns of bacterial growth occurred with the biological control agents *Pseudomas fluorescens* Pfa50nr and *Pantoea agglomerans* (*Erwinia herbicola*) Eh318nr. The authors suggested that the distinct effect of flower age on growth of both *Erwinia* and antagonistic bacteria may be important in deciding when to treat with biological control agents or bactericides. From: Thompson, S.V. and S.C. Gouk. 2003. Influence of age on growth of *Erwinia amylovora* and biological control agents. Plant Disease. 87:502-509.