

APPLE (*Malus domestica* 'Golden Delicious')  
Scab; *Venturia inaequalis*  
Powdery Mildew; *Podosphaera leucotricha*

J. W. Pscheidt and J. A. Whitney  
Dept. of Botany and Plant Pathology  
Oregon State University  
Corvallis, OR 97331

### **Evaluation of fungicide safety for management of apple diseases on Golden Delicious, 2024**

Fungicide treatments were arranged in a randomized complete block design in an orchard of 'Golden Delicious' apples on M-26 rootstock planted in 1979 on 20 x 20 ft spacing. Each treatment consisted of 4 single tree replicates. Fungicide treatments were applied using a hydraulic handgun sprayer at approximately 100 psi such that 4 to 5 gal of a spray suspension was applied per 4 trees (87 to 109 gal/A). Treatments were applied on 2 Apr (calyx to pink bud), 16 Apr (full bloom), 1 May (petal fall), 17 May (traditional 1<sup>st</sup> cover), 31 May (2<sup>nd</sup> cover), 14 Jun (3<sup>rd</sup> cover), and 28 Jun (4<sup>th</sup> cover) for a total of 7 applications. Trees were pruned 5 Feb. No fertilizer or insecticides were applied to the block during the trial. GlyStar Plus was spot sprayed on 29 Jan for management of perennial weeds and then used as a strip spray at 5.7 pt/A on 18 Mar for general management of weeds. Apple scab infection periods were monitored using a Meter Atmos 41 weather station equipped with standard sensors including one for leaf wetness. Using a modified primary infection model (wet periods start with rain and end with 8 hr drying time), a total of 9 infection periods were detected from Apr through Jun: 3 high infection periods (25 Apr, 3 May, and 2 Jun), 4 moderate infection periods (22 Mar, 2 Apr, 1 May and 16 Jun) and 2 low infection periods (28 Mar and 6 Apr). The incidence of leaf scab and powdery mildew was determined on 15 Jul, by examining all leaves from 20 arbitrarily selected vegetative shoots (298 to 342 leaves with an average of 318) from each tree. The incidence of fruit scab and russet was determined on 2 Sep, by examining 100 fruit per tree. To evaluate possible phytotoxicity, leaf yellowing was evaluated on 15 Jul and then various aspects of fruit russet and the height and width of fruit was determined on 2 Sep by examining 100 fruit arbitrarily selected from each tree.

Rainfall during the dormant season 2023-24 was 4.1 inches above normal, spring weather conditions were close to long term norms while summer was accented by a few high heat events. Scab was first observed on crabapple pollenizers in a nearby plot on 25 Mar and then on non-treated trees on 22 Apr. Flag shoots with powdery mildew were first observed on 29 Apr. There was no significant difference in apple scab on leaves among the various treatments, however, non-treated trees had significantly higher apple scab on fruit than all other treatments (Table 1). Lowest apple scab on fruit was found on trees treated with Luna Sensation and significantly lower than all other treatments. Highest amount of powdery mildew was found on non-treated trees and was significantly higher than the powdery mildew found on fungicide treated trees. Lowest incidence of powdery mildew was on trees treated with IKF-309 plus OVS-90-NIS and was significantly lower than the powdery mildew found on all other treated trees. Highest amount of total fruit russet was found on non-treated trees and was significantly higher than the russet found on fungicide treated trees (Table 1).

No phytotoxicity was specifically observed in trees treated with any of the materials used. Some minor leaf yellowing was observed on 15 Jul but was not an important issue on the overall growth of trees. Some fruit developed a ring russet that is characteristic of pesticide damage when drying slowly on fruit (Table 2). Overall, there was no significant difference in leaf yellowing, ring russet or fruit diameter to height ratio among the various treatments.

Table 1. Apple scab, powdery mildew and fruit russet found on Golden Delicious apples.

Treatment & rate/A or /100 gal as indicated below	Time of application <sup>X</sup>	Apple Scab <sup>Y</sup>		Powdery Mildew Leaves (%) <sup>Y</sup>	Fruit Russet (%) <sup>Y</sup>
		Leaves (%)	Fruit (%)		
Non-treated .....	None .....	17.2	95.5 a	85.0 a	75.8 a
Luna Sensation at 5.8 fl oz .....	All.....	9.2	16.8 d	49.0 b	35.5 b
IKF-309 at 5 fl oz.....	All.....	11.4	39.8 c	33.7 c	35.0 b
IKF-309 at 5 fl oz plus Supreme Oil at 2 gal/100 gal..	All.....	13.0	65.8 b	34.3 c	24.8 b
IKF-309 at 5 fl oz plus OVS-90-NIS at 8 fl oz/100 gal	All.....	10.7	55.0 b	23.1 d	33.5 b

<sup>X</sup> Treatments were applied on 2 Apr (calyx to pink bud), 16 Apr (full bloom), 1 May (petal fall), 17 May (traditional 1<sup>st</sup> cover), 31 May (2<sup>nd</sup> cover), 14 Jun (3<sup>rd</sup> cover), and 28 Jun (4<sup>th</sup> cover) for a total of 7 applications.

<sup>Y</sup> Means followed by same letter do not differ significantly based on Fisher's protected LSD ( $P=0.05$ ). Means without letters are not significantly different.

Table 2. Measures of phytotoxicity on Golden Delicious apples.

Treatment & rate/A or /100 gal as indicated below	Time of application <sup>X</sup>	Leaf Yellowing (%) <sup>Y</sup>	Ring Russet (%) <sup>Y</sup>	Fruit Diameter to Height Ratio <sup>Y</sup>
Luna Sensation at 5.8 fl oz .....	All.....	0.1	4.5	1.0
IKF-309 at 5 fl oz.....	All.....	0.1	10.3	1.1
IKF-309 at 5 fl oz plus Supreme Oil at 2 gal/100 gal..	All.....	0.1	13.0	1.0
IKF-309 at 5 fl oz plus OVS-90-NIS at 8 fl oz/100 gal	All.....	0.1	7.5	1.1

<sup>X</sup> Treatments were applied on 2 Apr (calyx to pink bud), 16 Apr (full bloom), 1 May (petal fall), 17 May (traditional 1<sup>st</sup> cover), 31 May (2<sup>nd</sup> cover), 14 Jun (3<sup>rd</sup> cover), and 28 Jun (4<sup>th</sup> cover) for a total of 7 applications.

<sup>Y</sup> Means followed by same letter do not differ significantly based on Fisher's protected LSD ( $P=0.05$ ). Means without letters are not significantly different.