# Evaluation of Select Pre-Emergent Herbicides on Non-Bearing Crops

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## Introduction

This study was conducted as part of the IR-4 Project to investigate herbicide phytotoxicity on two growth stages of apple (*Malus* sp.) and aronia (*Aronia melanocarpa*).

Competition from weeds impacts the growth rate and overall health of container and field-grown crops, especially during establishment. Methods to control weeds include cultural, biological, and chemical control. However, it is the latter that generally is most effective and the most economical way to reduce weeds around the base of the crops. Good weed control from preemergent herbicides is dependent on placement, timing of application, and safety of the product.

## Materials and Methods

Apple and aronia were potted in one gallon containers filled with Fafard Mix 52 amended with 19-4-8 Harrell's 5- to 6-month controlled release fertilizer at 8 lb/cubic yard (medium rate). Plants were grown outdoors in full sun. Irrigation was applied immediately after planting and as needed throughout the season. Treatments consisted of two herbicides applied at three rates at two different growth stages: Biathlon [oxyfluorfen + prodiamine (2.75 lb ai, 5.5 lb ai, and 11.0 lb ai)] and Tower [dimethenamid-p (0.98 lb ai, 1.97 lb ai, and 3.94 lb ai)]. Herbicides were applied June 2, 2017, (1 day after potting), and again six weeks after initial application (July 27, 2017). Plants were irrigated with a half inch of water, 1 to 2 hours after herbicide application and all herbicide applications were applied to dry foliage. The trial was conducted using a completely randomized design with 10 single plant replications.

## Results and Discussion

At planting, *Malus* seedlings exhibited a slight leaf discoloration. While there were symptoms visible following application of Biathlon, there were no differences statistically from the non-treated (Table 1). Following initial application, plants receiving the 2x rate had a few curling leaves compared with the nontreated.

Tower EC applied over the top of newly transplanted *Aronia* caused leaf discoloration (purple spotting). Symptoms were apparent one week after treatment and persisted throughout the season. However, plants treated with the low rate (1x) were not severe; whereas, the 2x and 4x rates of Tower were compared with the 1x rate. Overall size of plants appeared to decrease as rate of Tower increased but the difference was only visual, not statistically different.

Results from the trial suggest the preemergent herbicides selected for this trial can cause slight to moderate injury on newly planted nonbearing crops. However, overall growth is generally not impacted. Caution should be taken if using these preemergent herbicides to avoid leaf injury and always follow label recommendations.

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**Table 1. Evaluation of select pre-emergent herbicides on recently planted, non-bearing crops.**

| | | | Phytotoxicity[z] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | First application[y] | | | | Second application[x] | | | | Growth |
| Treatment | Rate | (lb ai) | 1 WAT[w] | 2 WAT | 4 WAT | 6 WAT | 1 WAT | 2 WAT | 4 WAT | 6 WAT | indices (cm)[v] |
| | | | | | | *Malus* sp. | | | | | |
| Non-treated | 0× | 0 | 0.9 a[u] | 0.4a | 2.0a | 1.5a | 1.9a | 1.9a | 2.0a | 3.1a | 84.6a |
| oxyfluorfen + prodiamine | 1× | 2.75 | 0.9a | 0.7a | 1.8a | 1.6a | 2.7a | 2.9a | 3.6a | 4.2a | 74.4a |
| oxyfluorfen + prodiamine | 2× | 5.5 | 0.4a | 0.4a | 1.2a | 2.0a | 3.2a | 3.1a | 3.6a | 4.6a | 70.3a |
| oxyfluorfen + prodiamine | 4× | 11.0 | 1.0a | 0.5a | 1.6a | 1.3a | 2.3a | 3.1a | 3.4a | 4.0a | 76.2a |
| | HSD | | 1.1 | 0.9 | 1.4 | 2.3 | 2.3 | 2.3 | 2.3 | 1.8 | 22.0 |
| | | | | | | *Aronia melanocarpa* | | | | | |
| Non-treated | 0× | 0 | 0.0c | 0.1c | 0.3b | 0.0b | 0.9c | 0.9b | 0.8b | 0.9a | 127.3a |
| dimethenamid-p | 1× | 0.98 | 2.2b | 2.0b | 0.7b | 0.9ab | 1.8bc | 0.9b | 1.0ab | 0.9a | 126.1a |
| dimethenamid-p | 2× | 1.97 | 3.6b | 3.5a | 2.7a | 1.6ab | 3.2ab | 2.5ab | 2.7a | 3.4a | 115.2a |
| dimethenamid-p | 4× | 3.94 | 5.8a | 4.3a | 2.9a | 2.0a | 4.4a | 3.2a | 2.4ab | 2.4a | 107.1a |
| | HSD | | 1.5 | 1.5 | 1.7 | 1.8 | 1.7 | 1.8 | 1.7 | 2.2 | 24.9 |

[z]Phytotoxicity: 0 to 10 scale (0 = no injury; 10 = complete kill).
[y]First application: June 2, 1 day after transplanting.
[x]Second application: July 27.
[w]WAT: weeks after treatment.
[v]Growth indices: (Height + width + perpendicular width) ÷ 3.
[u]Means (within a column) with the same letters are not statistically different according to the Tukey's Honestly Significant Difference Test α=0.05.