Determine the Benefits of Caneburning to Red Raspberry in the Pacific Northwest

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Abstract

Chemical primocane management has become a common practice among Pacific Northwest raspberry growers. Given changes in cultivars, herbicides, and machine harvesters since its development during the 1970s, a study was initiated in 2010 to determine whether cane burning current Pacific Northwest raspberry cultivars still is a useful practice to improve berry harvest. The first trial was conducted with 'Coho' and 'Meeker' near Bow, WA and the second trial with 'Meeker and 'Cascade Bounty' at the Washington State University Mount Vernon NWREC.

In the first trial, weed control with terbacil ranged from 88.8% to 97.4% in August, while control with oxyfluorfen or carfentrazone ranged from 51.3% to 70.3%. Carfentrazone initially suppressed primocane regrowth more than oxyfluorfen, but this became less obvious over time. In the second trial, oxyfluorfen suppressed initial primocane regrowth more in 'Cascade Bounty', while carfentrazone reduced primocane growth more in 'Meeker'. There was a trend toward higher yield when a given cultivar was treated with carfentrazone or oxyfluorfen in either trial, but the increases were not statistically significant. However, when cultivar yields from the first trial were analyzed together, raspberries treated with oxyfluorfen alone or mixed with terbacil produced significantly more fruit (5402 and 5581 kg/ha, respectively) than non-treated raspberries (3989 kg/ha). Similarly, when cultivar yields were analyzed together in the second trial, both oxyfluorfen and carfentrazone increased berry yield (8000 kg/ha and 7321 kg/ha) compared to non-treated raspberries (6142 kg/plot). 'Meeker' was the top yielding cultivar overall, producing 5737 kg/ha berries in the first trial and 8107 kg/ha in the second trial, compared to 4369 kg/ha for 'Coho' and 6214 kg/ha for 'Cascade Bounty'.

Introduction

Red raspberry (*Rubus idaeus*) is a perennial species with a biennial bearing habit. Primocanes are shoots that are produced the first year and in most cultivars they are vegetative. Primocanes survive through the winter, after which they flower, fruit and die. These reproductive canes are called floricanes. Both types of canes begin growth at the same time in the spring and compete with each other for resources.

Caneburning is the chemical removal of the first primocanes in the spring (Crandall et al., 1980). As a result of reduced primocane growth, floricanes receive more resources and produce more berries (Norton, 1980). Caneburning is also thought to decrease labor cost for pruning and training primocanes during the dormant season and increase the berry picking efficiency (Miller et al., 2008).

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Materials and Methods

The first trial was conducted with red raspberry cultivars, 'Meeker' and 'Coho' on two farmer fields near Burlington, WA. Carfentrazone, oxyfluorfen and terbacil were direct-applied at 0.47 L/ha, 2.34 L/ha and 1.68 kg/ha, respectively, to 10-cm primocaness using a tractor-mounted sprayer at 76 kPa on April 5 and 6, 2010. 'Coho' plots were approximately 91.5 m long by 1.5 m wide, while 'Meeker' plots were approximately 160 m long by 1.5 m wide. In the second trial, red raspberry cultivars, 'Meeker' and 'Cascade Bounty' were treated with carfentrazone and oxyfluorfen at 0.47 and 2.34 l/ha, respectively, at WSU Mount Vernon NWREC on April 12, 2010, when primocanes averaged 15 cm in height. Applications were made using a CO_2-pressurized, two-nozzle backpack sprayer delivering 205.7 l/ha at 207 kPa. Plots were 9.1 m long by about 1.5m wide.

Data collection

Primocane growth, weed control and berry yield were monitored in the first trial through growing season; primocane growth and berry yield were monitored in the second trial. All plots were machine harvested about three times every week from late June to mid August.

Data Analysis

Both experiments were randomized complete block designs; the first trial had three replicates, while the second had five. Data were analyzed with a general linear model and mixed-effects model procedure using SAS software. Means were separated using Tukey's procedure ($P<0.05$).

Results

In the first trial, terbacil gave 89% to 95% weed control in 'Meeker' and 'Coho', respectively, in August (Figure 1). In 'Meeker', weed control with oxyfluorfen exceeded control with carfentrazone (70% and 60%, respectively) in August; there was no difference between these herbicides in 'Coho' (52% and 51%, respectively). Weed control with terbacil alone or in combination with carfentrazone or oxyfluorfen was greater than 89% in both cultivars all season, while the initially high level of control with carfentrazone and oxyfluorfen decreased to 70% or below by August (data not shown). Primocane regrowth was suppressed more by carfentrazone initially than oxyfluorfen, but this became less obvious over time (Figure 2). In the second trial, oxyfluorfen suppressed primocane regrowth more in 'Cascade Bounty', while carfentrazone reduced primocane growth more in 'Meeker' (Figure 3).

There was a trend toward higher yield when a given cultivar was treated with carfentrazone or oxyfluorfen in either trial, but the increases were not statistically significant. However, when cultivar yields from the first trial were analyzed together, raspberries treated with oxyfluorfen alone or mixed with terbacil produced more fruit (5402 and 5581 kg/ha, respectively) than non-treated raspberries (3989 kg/ha). Similarly, when cultivar yields were analyzed together in the second trial, both oxyfluorfen and carfentrazone increased berry yield (8000 kg/ha and 7321 kg/ha) over non-treated raspberries (6142 kg/ha) (Firgure 4).

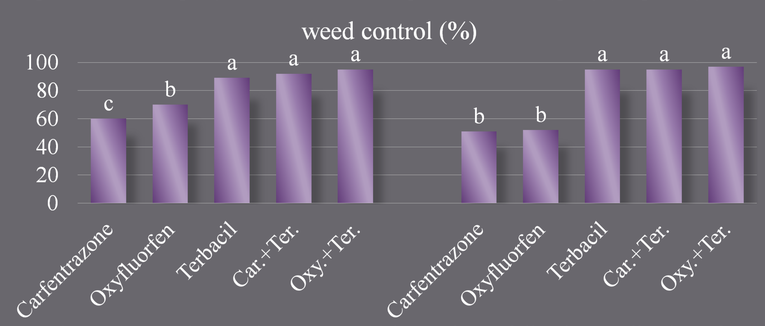

Figure 1. Weed control on August 18 in raspberry following application of primocane suppression herbicides shortly after emergence (Trial 1).

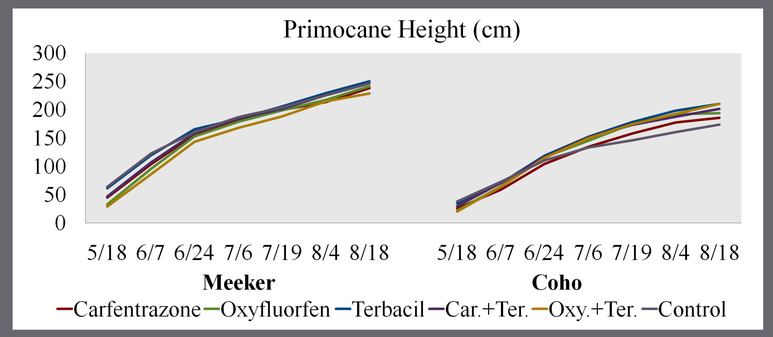

Figure 2. Season-long growth of primocanes after treatment with primocane suppression herbicides shortly after emergence in 2010 (Trial 1).

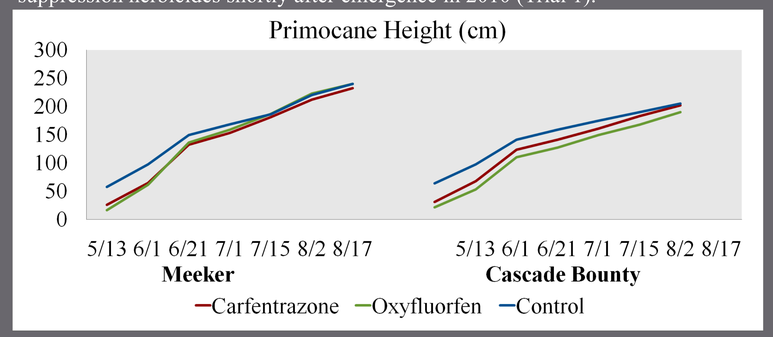

Figure 3. Season-long growth of primocanes after treatment with primocane suppression herbicides shortly after emergence in 2010 (Trial 2).

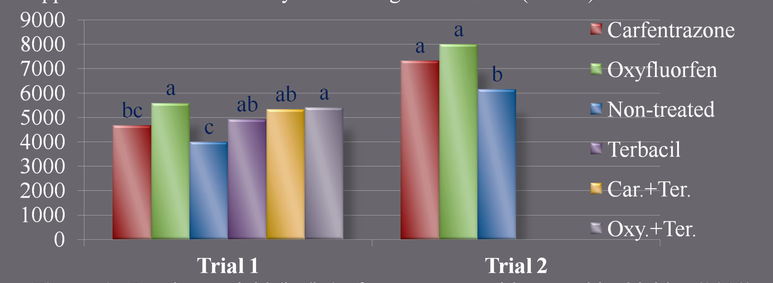

Figure 4. Raspberry yield (kg/ha) after treatment with several herbicides (2010).

Discussion

Weed control with carfentrazone and oxyfluorfen in 'Coho' was lower than in 'Meeker' in Trial 1, probably due to root disease in 'Coho', resulting in a visibly thinner canopy that became less competitive with weeds through the summer. Our first year data indicate that caneburning can increase raspberry yield, but that individual cultivars may not respond significantly to those treatments. These trials will continue in 2011 and 2012, so that results of multi-year treatments to raspberry plants can be evaluated.

References

Crandall, P.C., Chamberlain, J.D. and Garth, J.K.L. 1980. The effects of chemical primocane suppression on growth, yield, and chemical composition of red raspverry. J. Amer. Soc. Hort. Sci. 105: 194-196.

Norton, R.A. 1980. Red raspberry primocane control research and practice in the Pacific Northwest. Acta Horticulturae 112:191-193

Miller, T.W., Klauer, S.F. and Nicholson, M. 2008. Effects of primocane suppression programs on weed management and productivity of 'Meeker' red raspberry. Acta Hort 777:267-274