

Weed Control Strategies for Processing Onions

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From 2009-2011, we evaluated preemergence and postemergence herbicides applied at several rates and application times in small-plot weed control studies at the Intermountain Research and Extension Center (IREC). In 2012, Tulelake onion growers requested a larger-scale University study to evaluate promising herbicide treatments using commercial chemigation equipment at IREC and in Tulelake grower fields. Weed control data for kochia (the predominant weed at IREC), redroot pigweed, common lambsquarter, hairy nightshade, and clover was collected at IREC over the 4-year period. At grower sites, weed control data was collected for kochia, lambsquarter, redstem filaree, tumble mustard, hairy nightshade, and volunteer horseradish. DCPA (Dacthal), ethofumesate (multiple trade names), pendimethalin (Prowl H₂O), and sulfentrazone (Zeus) were evaluated preemergence. Oxyflurofen (Goal), bromoxynil (Buctril), dimethenamid-p (Outlook), and fluroxypyr (Starane) were evaluated postemergence. Experiment results are summarized in IREC progress reports. Reports can be viewed and downloaded at:

http://ucanr.edu/sites/Intermountain_REC/Research_Progress_Reports978/

Preemergence Weed Control Summary

DCPA and ethofumesate applied post-plant and pendimethalin applied at the loop stage reduced kochia density compared to the untreated control in multiple trials. Unfortunately, these preemergence treatments did not reduce kochia density enough for control to be considered effective without a follow-up postemergence treatment. Pendimethalin applied at the loop stage was a versatile herbicide treatment. By itself, pendimethalin controlled or suppressed several grass and broadleaf weeds. When pendimethalin applied at loop stage was combined with ethofumesate or DCPA applied post-plant, pendimethalin had an additive effect on weed control compared to ethofumesate or DCPA used alone. Ethofumesate control of common lambsquarter was especially enhanced when used in combination with pendimethalin. When DCPA was used in combination with pendimethalin, the DCPA rate could be reduced (from 5 pt/A to 2.5 pt/A) without decreasing kochia, lambsquarter, and pigweed control.

Postemergence Weed Control Summary

Oxyflurofen (GoalTender) applied alone at the 1.5 leaf stage followed by oxyflurofen + bromoxynil at the 2.5 leaf stage was a top-performing postemergence herbicide program in multiple trials. The 1.5 leaf-stage timing of the oxyflurofen application improved control of most weed species compared to delaying the first application of oxyflurofen until the 2.5 leaf stage. At the 2.5 leaf stage, oxyflurofen + bromoxynil provided better kochia control compared to oxyflurofen + dimethenamid-p or oxyflurofen alone. Fluroxypyr applied between the 3-5 leaf stages gave greater than 90% kochia control in cases where kochia escaped oxyflurofen +

bromoxynil treatment. Fluroxypyr is currently not labeled for use on onions in CA. In trials with high weed pressure, applying DCPA or ethofumesate post-plant and pendimethalin at loop stage greatly improved postemergence herbicide weed control. The pre-emergence herbicides provided a dual benefit in that they controlled several weeds before onions reached the 1.5 leaf stage, and they stunted growth of weed escapes making them more susceptible to postemergence herbicides.

Influence of Herbicides on Onion Yield

Weed competition decreased onion yield in trials with moderate to heavy weed pressure. Thus, herbicide treatments with the best weed control typically had the highest onion yield regardless of herbicide injury. In trials with low weed pressure, some herbicides caused injury that resulted in onion yield reduction. In one of two trials on sandy loam soil, ethofumesate applied post-plant or at the loop stage reduced onion yield; ethofumesate applied post-plant did not reduce onion yield in trials located on silty clay loam soil. DCPA applied post-plant and pendimethalin applied at the loop stage did not reduce onion yield on any soil type studied. Almost all postemergence herbicides injured onions (stunting, leaf curling, or chlorosis), but the injury was usually temporary and did not influence onion yield. One exception was oxyfluorfen + bromoxynil + dimethenamid-p applied as a three-way tank-mix at the 2.5 leaf stage. This treatment reduced onion yield in two of four trials at IREC.