The Effects of Small Grain Herbicides on Wheat and Barley Growth

Steve Orloff, Steve Wright, Lalo Banuelos, and Rob Wilson*
**UC Cooperative Extension, Siskiyou County, 1655 South Main St. Yreka, CA 96097*
Email: sborloff@ucdavis

Wheat is an important crop throughout most of the agricultural areas of California. Weed control is a significant problem for small grain producers and nearly all fields are treated for weeds each year. Several new small grain herbicides have been developed, some of which are commonly used in other areas of the country. Some of these herbicides may have a fit California but have not been used commercially because producers and pest control advisors are not familiar with them or they are concerned about the possibility of crop injury. Research is needed to evaluate many of the newer herbicides that are used successfully in other production areas.

Most grain fields contain both broadleaf and grassy weeds. This usually necessitates the use of two different herbicides. Ordinarily the application timing for grass and broadleaf herbicides is different. This presents a problem for producers, who for cost reasons, would like to control all weeds in a single herbicide application. Usually the grass herbicide application timing is earlier because small grasses are easier to control. The broadleaf herbicide is often applied later due to crop safety concerns. So, if a grower wishes to combine grass and broadleaf herbicides and treat early, he or she runs the risk of injuring the crop. Conversely, if the grower chooses to combine herbicides and treat at the later application timing, the grower runs the risk of poor weed control (the grass weeds may have become too large to be effectively controlled) or reducing crop yield from prolonged weed competition. In addition some of the grass herbicides require separate applications at least 7 to 14 days apart to avoid antagonism. More information is needed regarding crop safety of different herbicides. This is especially the case when herbicide tank mixes are used. Therefore, research is needed to evaluate new herbicides and herbicide tank mixes to determine their crop safety and effect on yield when applied at different growth stages.

Field experiments were conducted in both the San Joaquin Valley and Northern California. Herbicides that were evaluated included 2, 4-D, Clarity, MCPA, Shark, Osprey, ET, Axial, Puma, Atlantis, and p ryoxsulam (Simplicity). Many of these were applied alone and in tank-mix combinations. Two application timings were evaluated (an early application at the 2-4 leaf stage and a later application at the early tillering stage before canopy closure). In the trial conducted at the Intermountain Research and Extension Center (IREC) in Tulelake we evaluated the crop injury to two spring wheat varieties (Yecora rojo and Alpowa) and a spring barley variety (Metcalfe). Trials were also established at the West Side Research and Extension Center (WSREC) and with cooperating growers in the Tulare County to evaluate crop injury and weed control with the herbicides listed above.

There were hard frosts after both herbicide application dates that may have compounded the herbicide injury in the Tulelake trial. This is a common occurrence in this cold environment and herbicides need to be evaluated under these conditions. Yecora rojo and barley showed far more injury symptoms than did the wheat variety Alpowa. Injury was greatest with Osprey,

Atlantis and pryoxsulam (Simplicity) on barley (Figures 1 and 2). This is understandable, as none of these herbicides are registered for this use. Puma also caused significant injury to the barley. The injury was greater with the early application at the intermountain location but not in the Central Valley. At the Central Valley locations, combinations of ET or Shark with Axial tended to cause more injury than when these herbicides were used alone. However, the injury rarely exceeded a rating of 20 percent, and was nearly gone after a few weeks. Early season injury did not translate into a significant yield decrease at either location (see Figure 3 for Central Valley yield results). Barley yield in the intermountain area was significantly decreased with the application of the compounds that are not registered for use on barley. The early application of 2,4-D caused twisted wheat spikes and tended to reduce yield slightly.

Early applications were more effective for wildoat control in the Central Valley study where weeds were present and control evaluated. An early application is not always superior and growers should monitor the wild oat growth stage relative to the wheat growth stage to properly time herbicide applications. Wildoat was controlled with Axial and Puma alone and in tank mixes. Simplicity and Osprey controlled wildoat at the early but not the late application timing. Wild oat control with Simplicity at the later application timing was improved with the use of a crop oil concentrate or adding ammonium sulfate over just using a non-ionic surfactant.

With new herbicides and application timings we are getting closer to achieving complete weed control (grasses and broadleaves) without severe injury in a single application. However, we are not quite there yet with currently available herbicides and with existing label restrictions on tank mixes. More research and perhaps more herbicide products are needed to ultimately achieve this goal.

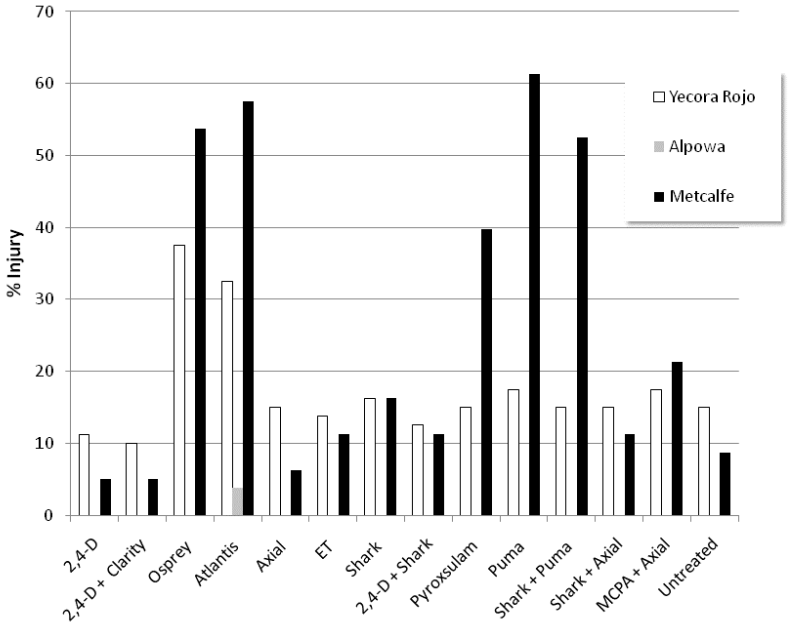

Figure 1. Effect of herbicide treatment on crop injury to Yecora rojo wheat, Alpowa wheat and Metcalfe barley in the Intermountain Region when applied at the early application timing (3 leaf stage).

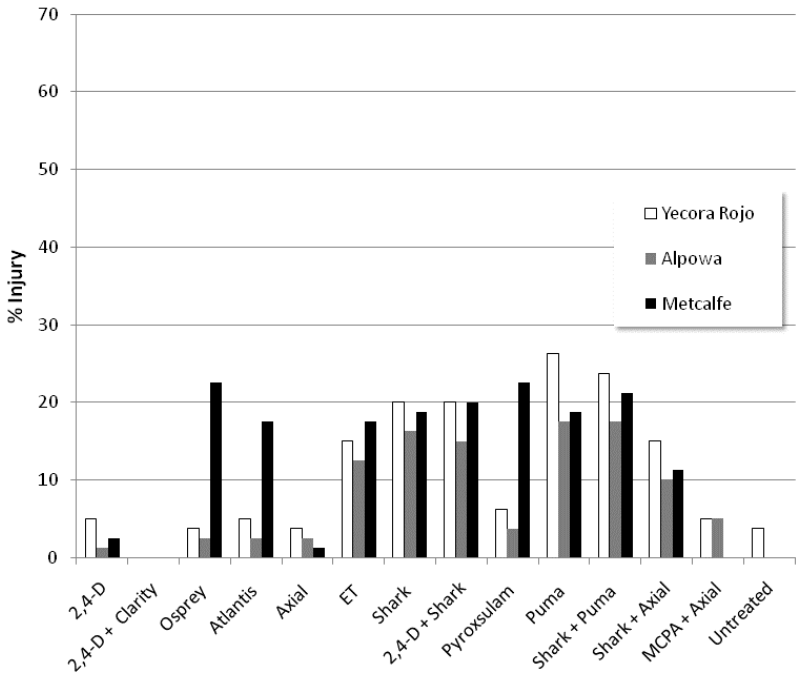

Figure 2. Effect of herbicide treatment on crop injury to Yecora rojo wheat, Alpowa wheat and Metcalfe barley in the Intermountain Region when applied at the late application timing (6-8 leaf stage).

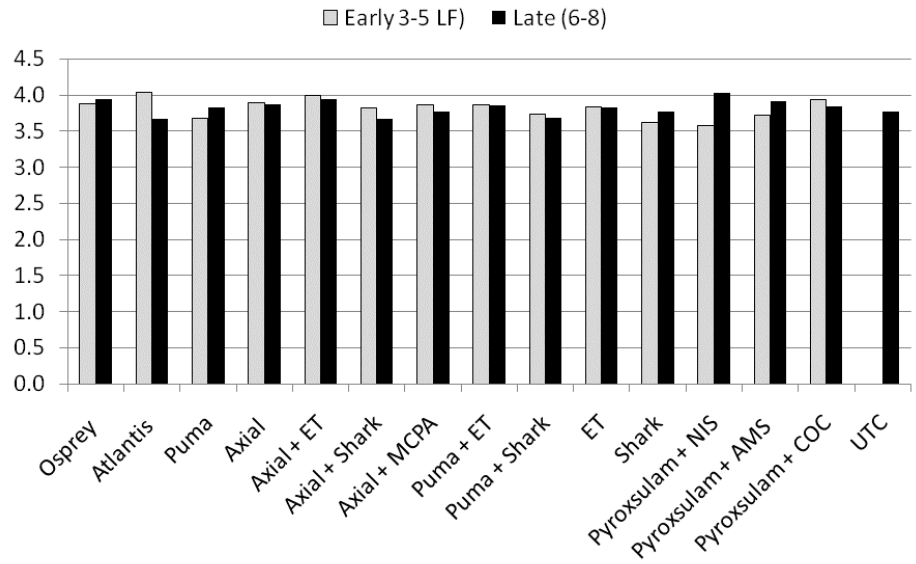

Figure 3. Effect of herbicide treatment and timing on wheat yield (UC West Side Research and Extension Center, Fresno County. 2011).