Breaking Bindweed: Have We Met Our Match? Lynn M. Sosnoskie, Ph.D. Project Scientist, UC-Davis, Plant Sciences, MS-4, One Shields Avenue, Davis, CA 95616 @LynnSosnoskie on Twitter Phone: 229-326-2676

Processing tomato production in California has changed, dramatically, over the last half-century. Improved cultivars, conversion from seeded to transplanted production, commercialization of the mechanical harvester, and the steady adoption of drip irrigation have helped to expand the size and economic value of the industry. In 2013, California led the nation in the production of processing tomatoes in terms of hectares planted and harvested (105,000 ha), total yield (10 million metric tons), and total value of production ($918 million). The adoption of drip irrigation also reduced in-crop weed densities (small-seeded annual species) and the need for subsequent cultivation. One weed that has been less impacted by the swith to drip systems is field bindweed (*Convovulous arvensis*), a deep-rooted and drought-tolerant perennial that can be difficult to control once it has become established.

Field studies were conducted in 2013 and 2014 to evaluate the efficacy of currently registered PPI, PRE and POST herbicides for field bindweed management in processing tomatoes in California**.** Results show that bindweed cover was reduced >50% in early-planted tomatoes, relative to the control (0 to 30% cover up to 6 WAT), when using trifluralin, alone, or in combination with rimsulfuron, *S*-metolachlor or sulfentrazone (0 to 10% cover up to 6 WAT). Similar trends were observed with respect to field bindweed density. Pre-plant applications of glyphosate to emerged bindweed in late-planted tomatoes, coupled with PPI/PRE herbicide applications, reduced weed cover (1 to 13% up to 6 WAT) by more than half when compared to plots treated with residual herbicides, alone (1 to 43% up to 6 WAT). Similar trends were also observed for weed density in late-planted tomatoes. Herbicide tank-mixes and sequential herbicide treatments can broaden the spectrum of weeds controlled in processing tomato, including field bindweed emerging from seed. However, the most simple and cost-effective approach for managing field bindweed emerging from perennial structures may be to combine glyphosate treatments before final bed preparation and later transplanting dates in tomato fields with heavy field bindweed infestations.

The successful control of deep-rooted perennials, such as field bindweed, is dependent upon herbicides reaching latent root and shoot buds. The majority of root/rhizome biomass for field bindweed is located within the top 2 feet of the soil profile, although some vertical roots can reach depths of more than 10 feet. Conversely, Treflan and other residual herbicides registered for use in processing tomatoes are usually incorporated into the top 2 to 3 inches of the soil profile. Because of their shallow placement, these herbicides may not suppress bindweed vines that are emerging from deeply buried rhizomes. In 2015, we undertook a similar study in processing tomatoes. Specifically, our research was focused on describing how sub-surface applications of trifluralin interacted with surface applied herbicides (trifluralin, *S*-metolachlor, and sulfentrazone with respect to field bindweed control. Results from our study show that broadcast (trifluralin to the entire width of the bed) sub-surface herbicide applications can significantly reduce field bindweed cover relative to the untreated check (no sub-surface trifluralin) or banded (trifluralin applied, sub-surface, only to the outermost 6 inches of the bed)

treatments. When averaged over PPI and PRE herbicides, field bindweed cover in the broadcast treatment ranged from 7 to 36%, whereas bindweed cover in the banded and the trifluralin-free (sub-surface) plots ranged from 10 to 50%. An evaluation of the data achieved from these trials suggests that we do have herbicides that are able to suppress field bindweed in processing tomato systems, however, the efficacy of these products are likely to vary with respect to both placement and activation strategy.

Continuing research is being conducted to evaluate the how the type and timing of herbicide applications affect in-crop perennial bindweed control.