

## CONTROL OF DIFFICULT WEEDS IN STRAWBERRY PRODUCTION IN NON-FUMIGATED AREAS

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Weeding costs in production strawberries range from \$300 to \$700 per acre in Southern California even with methyl bromide fumigation. Alternative fumigants are less effective than methyl bromide in controlling yellow nutsedge (*Cyperus esculentus*) and, when applied to beds via drip these fumigants do not control weeds in the furrows. Additionally, due to regulatory restrictions, both organic production and non-fumigated buffer zones in conventional production are increasing. These non-fumigated areas serve as weed reservoirs that require control measures. Yet another increasing problem is with weeds with wind dispersed seed which establish in strawberry planting holes and furrows throughout the season. One of the common wind dispersed species – horseweed (*Conyza canadensis*) has been recently reported to be resistant to glyphosate.

Our studies focused in three areas: 1) control of yellow nutsedge in non-fumigated strawberry, 2) furrow weed control, and 3) control of wind-dispersed weeds.

Yellow nutsedge control. An RCB experiment with five replications was conducted at Oxnard, CA to compare emergence of yellow nutsedge in beds covered with black PVC mulch alone and beds were Novovita paper (recycled newspapers, gypsum) was laid under mulch. In fall and winter the combination of paper and plastic completely eliminated yellow nutsedge germination that otherwise germinated through plastic at a density of 0.5 plants/ft<sup>2</sup>/week. However, in spring when the paper disintegrated due to contact with wet soil and when soil temperature increased above 60F the nutsedge resumed germination at a rate of 0.25-1.5 plants/ft<sup>2</sup>/week in all treatments. This indicates that paper with greater water resistance or/and protected from contact with wet soil may be needed for a season-long nutsedge control.

In a separate study we buried pots with nutlets (cuttings) and tubers of yellow nutsedge into strawberry beds, applied sulfentrazone (Spartan 4F at 0.25 lb a.i. /acre) and laid clear mulch 30 days prior to transplanting. Sulfentrazone did not injure strawberry but did not prevent nutsedge germination from tubers or nutlets.

### Furrow weed control.

A large scale RCB study with three replication at Camarillo, CA compared flumioxazin (Chateau at 0.375 lbs a.i. /acre) and oxyfluorfen (GoalTender at 1 pint/acre)+napropamid (Devrinol) applied to furrows 30d pre-transplant. Both herbicide treatments reduced weed densities (primarily wind-blown weeds) 84-

95% at 4 weeks after application, about 68% at 8 weeks, and reduced weeding time 50% or more compared to nontreated control.

Herbicide evaluation for control of fleabane (*Conyza bonariensis*) and sowthistle (*Sonchus spp.*) This RCB experiment with four replications evaluated flumioxazin (Chateau at 0.375 lbs a.i. /acre) and oxyfluorfen (GoalTender 1pint/acre) for fleabane and sowthistle control at Santa Paula, CA. Weed seed were collected locally, mixed with sand and dispersed manually on moist bed tops to simulate natural deposition. Herbicides were applied the next day, the beds were immediately covered by clear mulch and strawberry was transplanted 30 d later. Both Chateau and GoalTender controlled sowthistle near 100% and did not injure strawberry. Fleabane failed to germinate until 12 weeks after strawberry transplanting and was not controlled by either herbicide at that time. In this and in previous studies we have observed that wind-blown weeds continuously reinfest the strawberry planting holes and furrows as they blow in from the surrounding areas, thus destruction of outside seed sources is essential in minimizing weeding expenses.

In additional RCB experiment with four replications at Santa Paula, CA we evaluated weed control and crop safety of Chateau (0.094 lb/acre) applied to furrows or over the bed top during strawberry fruiting in March, 2007. Chateau provided complete control of burning nettle (*Urtica urens*), little mallow (*Malva parviflora*) and nettleleaf goosefoot (*Chenopodium murale*) in furrows and did not injure strawberry. However, when applied over the bed top, Chateau damaged strawberry fruit and foliage resulting in significant fruit losses for 3 weeks after application. This indicates that Chateau may be useful for in-season weed control but caution should be exercised to prevent herbicide drift to strawberry plants during furrow application.

Overall, this weed management program identified cost-effective management tools for difficult to control weeds in California strawberries. We continue investigation of paper combinations with plastic mulch and other mechanical barriers for season-long control of yellow nutsedge in production strawberry.