DOMINUS FOR CUT FLOWER PRODUCTION

E.N. Rosskopf[1], J.C. Hong[1], N. Kokalis-Burelle[1], J. Holzinger[2], B. Booker[3], S. Yates-Yarbrough[3], and F. Sances[3]
[1]USDA-ARS, U.S. Horticultural Research Lab, Ft. Pierce, FL [2] Holzinger Flowers, Inc. Palm City, FL; [3]Florida Ag Research, Thonotosassa, FL

Fumigation with methyl bromide was the principal method of soilborne pest control in cut flower production. Many cut flower growers in Florida have ceased production, but those that remain are restricted in the fumigants that they are able to utilize due to proximity to potable water sources and occupied structures. While all fumigants and non-chemical soil disinfestation practices have been evaluated for cut flowers, none have resulted in a readily-available, economically feasible alternative. One potential exception is a biofumigant with the active ingredient allylisothiocyanate, registered as the commercial product Dominus® (Isagro, USA). Initial experiments with Dominus resulted in nematode control that was comparable to that achieved with methyl bromide, but weed control has been variable. Although there are several herbicides labeled for control of broadleaf and annual grass weeds in field grown ornamentals, few have been tested in combination with fumigant materials.

A series of experiments were performed to evaluate the effectiveness of Dominus, either applied alone or in combination with a limited number of herbicides. In the first experiment, replicated strip applications were made by commercial applicator using paired plots of 100 ft long by 13 feet wide. Methyl bromide was shank applied at 400 lb/A under Klerk's virtually-impermeable film 1.2 mil. IRF-135 was shank applied at 40 gal/A, covered with the same film. Both materials were shank-applied to 8" depth. The field was separated into multiple planting areas after plastic removal 30-45 days after fumigation, depending upon the planting schedule for each variety. Cut flower crops included snapdragons, delphiniums, lupine, dianthus, and sunflowers. Weed, nematode, and fungal plant pathogen assessments were conducted throughout the season. In the second trial, Dominus (30 g/A) was compared to a combination of organic acids (SPK, 1714 g/A), both drip applied, and a non-treated check. The experiment was conducted as a split plot with four herbicide treatments: no herbicide, Dimension® 2EW (1qt/A), Showdown® (100lb/A), and Snapshot® 2.5GT (100lb/A). Sunflower and snapdragon were established by direct-seeding and transplanting respectively. Herbicides were applied when snapdragons were 12 inches tall and sunflowers were at the 3 true leaf growth stage.

No root-knot nematode juveniles were detected in the post-treatment soil sampling of the first experiment. At mid-season of the first planting, there were no significant differences between any genera of plant parasitic or non-parasitic nematodes between Dominus and methyl bromide, with the numbers of all plant parasitic averaging fewer than 10 juveniles per g of soil. Disease was minimal and not significantly different between treatments with 1.5% incidence of wilt in snapdragons caused by *Sclerotium rolfsii* in Dominus-treated plots and 0.06% in the methyl bromide treatments. At first snapdragon harvest, there were no significant differences between root condition ratings and root galling. The roots from plants harvested from the Dominus treatment were significantly heavier than roots from methyl bromide (average of 6.96g/rt from Dominus vs. 5.99g/rt from methyl bromide). First larkspur harvest resulted in no differences between soil treatments. This was also the case for the first harvest of delphiniums, except for root galling in which the methyl bromide-treated plots had roots with slightly higher levels of galling

(1.0 vs 0.04 p=0.0082). First harvest lupines had significantly larger stems (8.6 cm vs 7.2 cm; p=0.02) in the Dominus-treated plots. There were no significant differences between any plant parasitic nematodes extracted from roots from snapdragons, larkspur, delphiniums, and lupines from the first planting, nor the second. Total number of marketable cut stems harvested from Dominus and methyl bromide-treated plots was not significantly different for any of the species tested, in either planting. Weed control was similar between the two treatments and neither provided control of Carolina geranium (*Geranium carolinianum*), although the difference was statistically significant (p=0.0375), with an average of 184/m^2 in Dominus plots and 127.3/m^2 in methyl bromide.

In the second experiment, early weed populations were only affected by the fumigant treatment and not by the herbicides. Specific weeds that were differentially impacted by the soil treatment included carpetweed (*Mollugo verticillata* p=0.0467), goosegrass (*Elusine indica* p=0.0183), and horseweed (*Conyza canidensis* p=0.0008). Total percentage of weed cover was also influenced by fumigant (p=0.0008, see Figure 1). No phytotoxicity was observed in the sunflower crop, but there was a significant interaction (p=0.0102) between soil fumigant treatment and herbicide effect on snapdragon phytotoxicity, with the greatest impact occurring in Dominus and SPK soil treatments combined with the herbicides Showcase and Snapshot. In the untreated soil, Showcase also had a significantly greater negative impact on snapdragon than the other herbicides in that treatment (Figure 2). For late season weed control, there was also a significant interaction between soil treatment and herbicide (p=0.0238) on total percentage of weed coverage of the bed (Figure 3). There were no significant differences between soil treatments or herbicides with regard to sunflower yield (Figure 4), but there was a significant interaction between the effects of soil treatment and herbicide on snapdragon yield (p=0.0019, Figure 5). Showcase, a combination of trifluralin (2.0%), isoxaben (0.25%), and oxyfluorfen (0.25%) had a highly significant negative impact on snapdragons in all three soil treatments. Snapshot, containing trifluralin (2%) and isoxaben (0.5%) had the greatest negative impact on snapdragons when combined with Dominus and SPK. Dimension, active ingredient dithiopyr (24%), had a more negative impact on yield when combined with SPK or the untreated soil. The greatest yield of snapdragons resulted from the use of Dominus with no herbicide application.

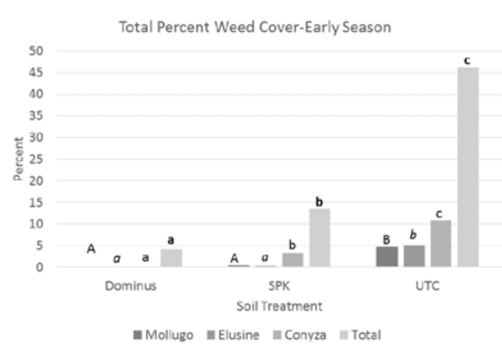

Figure 1. Early season weed coverage in snapdragon and sunflower beds. Soil treatment was significant for three weed species and total weed coverage.

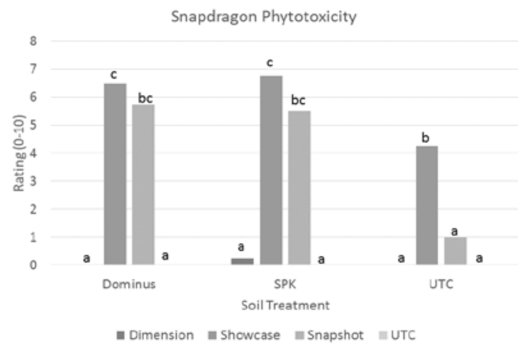

Figure 2. Phytotoxicity of snapdragon was impacted by a significant interaction between soil treatment and herbicide selection.

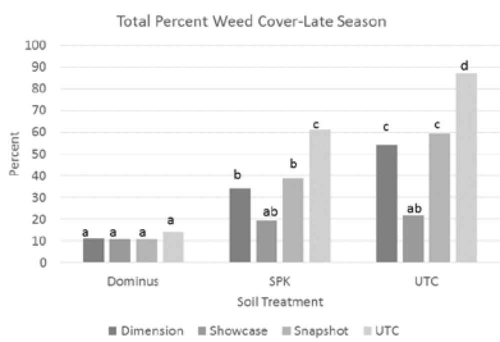

Figure 3. Late season weed control was impacted by an interaction between soil fumigant treatment and herbicide.

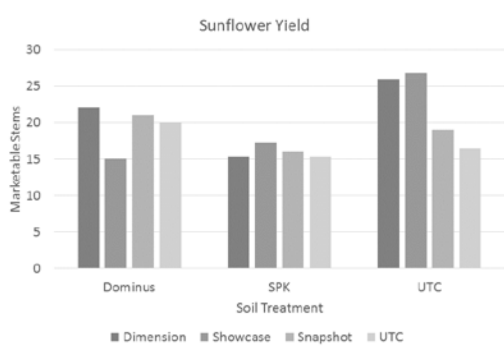

Figure 4. No significant differences were found between sunflower yields obtained.

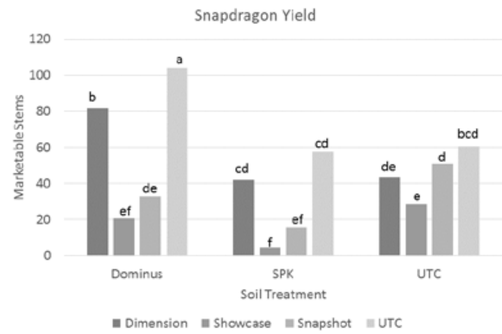

Figure 5. There was a significant interaction between soil treatment and herbicide on snapdragon yield.