
Report on Vegetable Herbicide Roundtable Discussion

Approximately 30 weed scientists from Canada and the United States attended the second Vegetable Herbicides Roundtable Discussion held February 12, 2003 at the annual meeting of the Weed Science Society of America. The purpose of the discussion was to create a forum for minor crop weed scientists to share information on weed management in minor crops and to generate ideas for new research. Fred Salzman and Marija Arsenovic organized and led the discussion, which was organized by crop and/or crop group.

In this report on the roundtable discussion, the PR number is included if IR-4 has received a request for the use. Updates, if appropriate, are also included. If there is no PR number associated with a use in the report, then IR-4 has not received a request for that use.

Root and Tuber Vegetables:

Garden beet - Options for weed control in garden beets that were discussed included s-metolachlor, dimethenamid-p and triflurosulfuron-methyl. The use of s-metolachlor (06629) and dimethenamid-p (06662) on garden beet will be covered by residue studies conducted by the registrant. Syngenta is conducting the residue studies with s-metolachlor for Crop Subgroup 1B, and BASF conducted residue studies with dimethenamid-p on sugar beet which was used to request a tolerance on garden beet. The Notice of Filing for dimethenamid-p on garden beet was published in March 2003. Both uses are also ongoing performance projects with IR-4. Unfortunately, inconsistent results were observed with both herbicides at different locations. Robin Bellinder/NY reported no yield reduction with s-metolachlor and dimethenamid-p applied pre or post-emergence. However, some early stunting occurred with both herbicides. Significant injury may occur with s-metolachlor when applied together with clopyralid. Lynn Brandenberger/OK noticed some stunting with s-metolachlor on beet greens when applied pre-emergence. Corey Ransom/OR reported that triflurosulfuron methyl is an excellent sugar beet herbicide, especially when combined with Betamix. Triflurosulfuron-methyl on garden beet received a "C" priority at the last Food Use Workshop.

Carrot - Potential herbicides in carrots are imazamox, flumioxazin, butafenacil, and oxyfluorfen. Robin Bellinder reported that imazamox is safe on carrot. Fred Salzman explained that the EPA published an exemption from tolerance for imazamox on all RACs on February 14, 2003 and that the registrant could add new crops to the label if they had good crop safety data. Corey Ransom reported that imazamox has a long carry over period, and it injured sugar beets and onions in Oregon. Steve Fennimore/CA and Robin Bellinder stated that butafenacil looks good in carrots. The registrant, Syngenta, is currently pursuing a tolerance in cotton as a defoliant. Flumioxazin looks promising in Oregon when applied pre-emergence. Bernie Zandstra /MI, evaluated the flumioxazin use in carrots in the last two years. Flumioxazin tolerance on carrot was good in the first year of experiment

but in the second year injury occurred. Bernie thinks that flumioxazin can be too injurious on carrots. Steve Fennimore stated that pre-emergence application with flumioxazin in carrots did not provide good weed control. Bernie Zandstra noted that oxyfluorfen applied pre-emergence at 0.03 to 0.06 lb ai/A controlled pigweed and purslane in Michigan and was safe on carrots.

Rutabaga & Turnip (roots and tops) - Dimethenamid-p in rutabaga (07697) was assigned a "C" priority at the last Food Use Workshop. The manufacturer, BASF, has requested crop safety data, but to date none has been received. Sulfentrazone on turnip (07915) was evaluated in Oregon, and good crop tolerance was obtained. However, Roger Batts/NC reported that data from North Carolina in 2002 showed unacceptable crop injury with sulfentrazone and marginal injury with s-metolachlor on turnip.

Horseradish - John Masiunas/IL, reported that growers in the Midwest are interested in a postemergence, over-the-top use of carfentrazone in horseradish. Carfentrazone on horseradish (07505) is a "C" priority. In addition, a Section 18 for sulfentrazone on horseradish was requested in Illinois.

Potato - Several herbicides are available for weed control in potato. However, many weed scientists stated again that there is a need for halosulfuron-methyl to control nutsedge in potato. Halosulfuron-methyl in potato (07281) was an IR-4 performance study in 2000 and 2002. Unfortunately, results obtained in 2000 were inconsistent and additional data are requested before a final decision is made. Bill Stall/FL reported that red potato varieties are more sensitive to halosulfuron than white potato varieties. In addition, Bill noted that higher injury occurred when the insecticide Temik was applied together with halosulfuron. In Oregon, a Section 18 for use of sulfentrazone in potato was requested. Sulfentrazone/potato (07723) was an IR-4 project that was transferred to the registrant for completion and submission to the EPA. Prohexadione calcium in potato (08061) is a new request. This product is needed to reduce vine growth and for disease management in potato. BASF, the registrant, has requested performance data but none has been received.

Sweet potato - David Monks/NC stated that they have good data with halosulfuron-methyl on sweet potato in North Carolina. S-metolachlor (05413) and flumioxazin (08710) use in sweet potato will be covered by potato. Flumioxazin and s-metolachlor data in sweet potato have been received from Louisiana; however, additional data are requested.

Bulb vegetables - IR-4 received only a few requests for weed control in bulb vegetables. Bernie Zandstra stated there is a need for an effective pre-emergence herbicide, such as pendimethalin, to control weeds in onions. Roger Batts and Corey Ransom reported that dimethenamid-p applied pre-emergence looked very good in dry bulb onion. IR-4 submitted

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a dimethenamid-p/dry bulb onion (06337) petition to the EPA, and a Notice of Filing was published on March 12, 2003. The petition is based on an early post-emergence application. Flumioxazin applied post-emergence in dry bulb onions is very safe according to Bernie Zandstra, Robin Bellinder, and Roger Batts. Flumioxazin/dry bulb onion (07389) is an IR-4 residue study initiated in 2001. Corey Ransom reported that flumioxazin and bromoxynil are very safe to leek in Oregon. Bromoxynil/leek (06058) is an IR-4 residue study for which the petition is currently being written.

Leafy vegetables:

Spinach - Spinach remains a crop in which there are few herbicide options. Ro-Neet (cycloate) is the only herbicide for fresh market spinach. Fred Salzman provided an update on cycloate. The company that holds the Ro-Neet label has filed for bankruptcy. At this time it is unknown if another company will buy and hold the Ro-Neet label.

IR-4 has submitted a petition for the use of s-metolachlor on spinach (01217), and a tolerance for the use of clopyralid in spinach (05434) was established in September, 2002. A narrow weed spectrum with quinclorac in spinach was obtained in North Carolina and Oregon. Tim Miller/WA is planning to evaluate napropamide for weed control in spinach. Robin Bellinder has tested ethametsulfuron (DuPont) on spinach in the greenhouse.

Celery - Few herbicides are available for celery. IR-4 received requests for the use of DCPA, flumioxazin and carfentrazone-ethyl in celery. Prometryn is registered for use in celery at 2.0 lbs ai/A in Michigan. Bernie Zandstra is proposing to increase the prometryn rate in celery (08862) from 2.0 to 4.0 lbs ai/A and would like to add a second, postemergence, application at 2.0 lbs ai/A.

Swiss chard - IR-4 has submitted a non-data petition for s-metolachlor/Swiss chard (06391) to the EPA. Bernie Zandstra reported that s-metolachlor applied pre-emergence injured Swiss chard in Michigan.

Head & Stem Brassica and Leafy Brassica

Several herbicide options in *Brassica* crops were discussed. Carfentrazone-ethyl (shielded/hooded application) on broccoli, cabbage and cauliflower are FMC residue studies, and IR-4 will submit the petitions to EPA. Dimethenamid-p in broccoli (08563), cabbage (08565), cauliflower (08564), collards (08566), kale (08567), and mustard greens (08066) are potential projects and crop safety data are important in obtaining registrant support. Pendimethalin on Brussels sprouts (06506), Chinese cabbage (napa) (06507), cauliflower (06504), chinese cabbage (bok choy) (06773), collards (01988), and kale (01989) are performance projects. These crops will be covered by a tolerance on the *Brassica* leafy vegetable crop group (Crop Group 5). Once the tolerance is estab-

lished, crop safety data will be needed before these crops can be added to the label. At this time, the EPA will not review any new pendimethalin crop tolerance petitions until they review additional data that are being prepared by the registrant. Tim Miller and Lynn Brandenberger reported injury from pendimethalin on direct seeded cabbage. Robin Bellinder stated that the maximum use rate of pendimethalin in transplanted cabbage is 0.5 lbs ai/A. A question was raised about the status of oxyfluorfen on seeded broccoli (08806). The registrant will support oxyfluorfen use in seeded *Brassica* crops only if good crop safety data are provided. Syngenta requested crop safety data for s-metolachlor use on mustard greens (02255), but little data has been received.

IR-4 has requests for the use of sulfentrazone in cauliflower (08064), Chinese cabbage (napa) (08065), collards (07912), and kale (07914). Marginal to acceptable crop tolerance was reported in Oregon and Arkansas. Lynn Brandenberger reported that sulfentrazone caused injury in many *Brassica* crops in research plots in Oklahoma. Tim Miller stated that some minor injury on cauliflower leaves occurred in Washington. In Florida and North Carolina, no injury was reported from sulfentrazone in mustard greens. IR-4 is conducting residue studies to provide a tolerance for the *Brassica* leafy vegetable crop group (Crop Group 5). Sulfentrazone/cabbage (06522) was submitted to the EPA in 2001. Residue studies for sulfentrazone/broccoli (07724) and mustard greens (07581) were initiated in 2001.

Edible legumes

Dimethenamid-p on snap bean (08069) requires crop safety data before a residue study can be initiated. Acceptable to marginal tolerance was reported in NY, MI, and AR in field data collected from 1999 to 2001 when dimethenamid-p was applied preemergence on snap beans. In 2002, field trials conducted in NY, OK, and AR with dimethenamid-p and flufenacet did not show any injury. Flufenacet on snap bean (08070) is a residue study initiated in 2003. Excellent crop tolerance to dimethenamid-p (08071) and flufenacet (08072) on southern pea were recorded in AR, while some injury occurred with flufenpyr-ethyl (08589). Valent has requested flufenpyr-ethyl phytotoxicity data on snap bean (08595) and southern pea. Fred Salzman pointed out that once good crop safety data for imazamox on southern pea are received, it can be forwarded to the registrant so that the crop can be added to the label. Section 18 requests for the use of fomesafen in snap beans (03472) in New York and Illinois have been made. Ron Talbert/AR is testing Blazer Ultra/acifluorfen salt to control weeds in southern pea (06301).

Tomato and Pepper

Researchers stated that only a few herbicides are available for weed control in peppers. Products that have potential are flumioxazin (08321), sulfentrazone (08048), and flufenacet

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(08044). Flumioxazin/pepper and flumioxazin/tomato (08320) are residue studies that have been initiated in 2003. The use pattern is an application between the crop rows with a shielded/hooded sprayer in order to prevent crop injury. Oxyfluorfen on peppers (A4133), for use east of the Rocky Mountains, is also a 2003 residue study. Tom Lanini/CA reported that sulfosulfuron and rimsulfuron (06310) applied broadcast, postemergence in tomato looked excellent. Rimsulfuron is labeled for use on tomato. Rimsulfuron on pepper (06363) was dropped at the Food Use Workshop in 2000. Sulfosulfuron applied early post in tomato in California looked excellent and controlled nightshade species. Doug Doohan/OH pointed out that nothing is labeled for weed control in jalapeno and banana peppers. Clomazone has excellent tolerance on jalapeno peppers (03606) in Ohio and is registered for this use; however, FMC does not distribute clomazone in the northern part of the state.

Syngenta has conducted trifloxysulfuron/tomato (08718) residue studies and the tomato registration is on the EPA 2003 Work Plan. Tom Lanini reported that trifloxysulfuron used on transplanted and direct seeded tomato looks good in California. Robin Bellinder and David Monks confirmed that trifloxysulfuron use in transplanted tomato looks promising. In Florida, Bill Stall reported that some initial injury (bleaching) on leaves occurred when trifloxysulfuron was applied post-transplant in tomato.

The registrant, Syngenta, has asked IR-4 to put the fomesafen/tomato (08082) request on hold. Robin Bellinder and John Masiunas reported that fomesafen, applied pre-emergence, is safe on tomato. However, fomesafen applied post-emergence in tomato caused flowering delay for several weeks but no reduction in yield.

Doug Doohan reported that tomato has good tolerance to thifensulfuron according to data generated by Darren Robinson, Ridgetown, Ontario, Canada.

Cucurbits:

Several weed control options in cucurbits were discussed. IR-4 initiated a sulfentrazone/cantaloupe (08445) residue study in 2002. Efficacy and phytotoxicity trials for sulfentrazone/muskmelon (07911) and sulfentrazone/watermelon (07917) were conducted in 2002. Additional crop safety data would assist the registrant in writing the label once the tolerance for sulfentrazone on the melon subgroup (Crop Subgroup 9A) is granted. The sulfentrazone request for use in cucumbers (08049) was withdrawn, and the requests for use in summer squash (07916) and pumpkin

(06538) are not supported by FMC. A residue study for sulfentrazone on winter squash was initiated by IR-4 but cancelled due to severe injury in two attempts to conduct field trials at two different sites. Bernie Zandstra suggested re-considering sulfentrazone use in cucurbits as he believes low rates of sulfentrazone are safe to the crop and provide good pigweed control in Michigan. Robin Bellinder, Bernie Zandstra and John Masiunas will evaluate sulfentrazone at 0.1 and 0.2 lbs ai/A in cucurbits in 2003. John Masiunas reported that sulfentrazone could cause injury on pumpkins in Illinois. S-metolachlor/cantaloupe (A6178) is a residue study in 2003. Lynn Brandenberger pointed out that s-metolachlor on cantaloupe applied at low rates looks good.

Clomazone is very safe to cucurbits in California; however, it is not registered for use in cucurbits in California despite the national tolerance on cucurbit vegetables (Crop Group 9). Flumioxazin/cucumber (08317) and flumioxazin/squash (08318) were each given a B priority at the most recent Food Use Workshop. A flumioxazin/cantaloupe (08316) residue study is being initiated in 2003. The registrant, Valent, will only support an application between the crop rows and the crop is grown with plastic mulch. Several researchers have observed severe crop injury when flumioxazin is applied broadcast pre-emergence. Dimethenamid-p/winter squash (06596) is an active residue study initiated in 2002 to provide data for a regional label in Oregon and Washington. Tim Miller stated that some initial injury from dimethenamid-p on winter squash occurred in the residue trial at the Mt. Vernon, WA research station, while dimethenamid-p was safe on winter squash at another location. Tim also reported that growers in Washington state would accept initial injury with dimethenamid-p on winter squash. In addition, residue studies have been initiated in 2003 for oxyfluorfen/cucumber (A3711) use east of the Rocky Mountains; and oxyfluorfen/summer squash (A3712) and oxyfluorfen/cantaloupe (A3710) use east of the Mississippi River. Other potential herbicides for weed control in cucurbits are carfentrazone-ethyl/cucumber (08510), pumpkin (08512), summer squash (08511), pyriithiobac/cantaloupe (07583), watermelon (07535), cucumber (07536), summer squash (07537), pumpkin (07480), rimsulfuron/cantaloupe (07721), and flufenacet/watermelon (08045). The carfentrazone-ethyl uses are residue studies conducted by FMC as part of the reduced data set proposal and will allow for preplant burndown applications followed by applications between plant rows with a shielded/hooded sprayer. IR-4 will submit the carfentrazone petitions to EPA. The registrant of pyriithiobac, DuPont, must submit additional plant metabolism studies before new uses can be added to the label.

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