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R. E. Talbert
University of Arkansas, Fayetteville

R. A. Wichert
University of Arkansas, Fayetteville

V. F. Carey III
University of Arkansas, Fayetteville

D. H. Johnson
University of Arkansas, Fayetteville

D. F. Ruff
University of Arkansas, Fayetteville

See next page for additional authors

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Field Evaluation of Herbicides on Small Fruit, Vegetable and Ornamental Crops 1991

R. E. Talbert
Professor
Department of Agronomy

R. A. Wichert
Research Assistant
Department of Agronomy

V. F. Carey III
Graduate Assistant
Department of Agronomy

D. H. Johnson
Graduate Assistant
Department of Agronomy

D. F. Ruff
Graduate Assistant
Department of Agronomy

J. A. Kendig
Graduate Assistant
Department of Agronomy

Arkansas Agricultural Experiment Station
Fayetteville, Arkansas 72701

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FIELD EVALUATION OF HERBICIDES ON SMALL FRUIT, VEGETABLE AND ORNAMENTAL CROPS 1991

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INTRODUCTION

The establishment of this field-testing procedure provides the chemical ustry, through its partial support, and the Arkansas Experiment Station h the opportunity to evaluate herbicide performance on small fruit, etable and ornamental crops grown under Arkansas conditions. This ort also provides a means for disseminating information to interested vate and public-service weed scientists.

Experiments were conducted at the Vegetable Substation at Kibler on umber, squash and watermelon. Additional experiments on watermelon were ducted near Jonesboro. Trials on snap beans were performed on private ms near Lowell. Experiments at the Main Experiment Station at etteville were conducted on bell pepper, cantaloupe, cole crops, endive, ons, tomatoes, squash, grapes and ornamentals. An experiment was also ducted at the University of Arkansas horticulture farm on blackberries.

The chemical names and formulations of the herbicides used in these eriments are listed in Appendix Table 1. A table for converting metric ts to English units can be found on page 60.

The soil at the Vegetable Substation was a Roxana silt loam with 0.5% anic matter and pH of 6.4. The soil at Jonesboro was a Dubbs fine sandy m with 0.9% organic matter and pH of 7.2. Soil at the Lowell location a Peridge silt loam with 1.5% organic matter and pH of 5.3. At the n Experiment Station in Fayetteville, all trials were conducted on a tina silt loam with 1.0% organic matter and pH of 5.6 except the cover p and squash trials, which were on a Pembroke silt loam with 0.9% anic matter and pH of 5.7, and the bensulide trial, which was conducted a Taloka silt loam with 1.3% organic matter and pH of 5.6. Unless ted, the experimental design for all experiments was a randomized plete block with four replications. Preplant-incorporated, preemergence l postemergence treatments were applied in 187 L/ha of water. All bicides were applied with a hand-held, carbon-dioxide pressurized ayer.

Treatments involving timing and incorporation were (1) preplant corporated (ppi), applied to the soil and incorporated prior to planting; preemergence (pre), applied to the soil surface soon after planting; preemergence prior to transplanting (pre-tp); (4) preemergence to weeds er-the-top of transplants (tp-pre); (5) postemergence (poe), applied er-the-top to emerged crops and weeds at various stages--determined ther by days after planting or by crop and weed growth stage; (6) post-rected (poe-dir), applied postemergence and directed to the base of the p plant; and (7) layby, applied post-directed after the last cultivation l preemergence to late-season weeds. Environmental conditions are sented for each application: air temperature (C); soil temperature at cm deep (C); soil surface moisture as wet, moist or dry; and percent lative humidity (RH) based on wet and dry bulb air temperatures.

Percentage of weed control by species was visually estimated: represents no effect, and 100 represents complete control. Ranges for w control are as follows: 70 to 79%, fair; 80 to 89%, good; and 90 to 10 excellent. Weed control less than 70% is considered to be poor. C injury was assessed by counts of the crop stand and visual estimation percent injury: 0 represents no effect, and 100 represents complete pl kill. Crop injury ratings of less than 30% indicate crop tolerance. C yields are reported in metric tons per hectare. Least Signific Difference (LSD) values at the 0.05 level of significance were calcula for each set of treatment means.

Climatological data for 1991 for the Vegetable Substation and the M Experiment Station are presented in Appendix Tables 2 and 3, respective Standardized Plant (Bayer) Codes as recognized by the Weed Science Soci of America for weeds appearing in this report are presented in Appen Table 4.

METHODS AND RESULTS

Pertinent experimental details and a brief discussion of the results these studies follow, and tabulated results are shown in Tables 1 to The following abbreviations are used in the tables: ai, active ingredie cm, centimeter; CO, crop oil concentrate; cot, cotyledon; cv, cultiv DAE, days after emergence; DF, dry flowable; dir, directed spray; followed by; g/L, grams per liter; kg/ha, kilograms per hectare; L/ liters per hectare; LSD, least significant difference; m, meter; mt/ metric tons per hectare; NS, not significant; pl/m, plants per meter row; TM, tank mix; V1, unifoliolate stage of legume; V2, 1st trifoliol stage of legume; V3, 2nd trifoliolate stage of legume; v/v, volume volume; WP, wettable powder; WA, wetting agent; WAE, weeks after emergen wk, week(s).

Bensulide, Screening, Fayetteville (Table 1).

Bensulide treatments were applied and incorporated either as a surf blend to a 2-cm depth with a hand rake or incorporated with a rototil set to a depth of 8 cm into 1- by 3.5-m plots on June 3 (air 27 C; soil C, dry; RH 80%). Weed species were planted in rows spaced 25 cm ap across the treatments on the same day. A 1-cm irrigation was then appli to activate the herbicide treatments.

At 3 weeks after application, bensulide at 5.6 kg/ha gave good excellent control of broadleaf signalgrass, large crabgrass, giant foxtai seedling johnsongrass and smooth pigweed. Bensulide at 2.8 kg/ha (one-ha the recommended use rate) gave good to excellent control of lar crabgrass, giant foxtail, seedling johnsongrass and smooth pigweed wh applied as a surface blend. Velvetleaf and entireleaf and pitt morningglory were not controlled by bensulide at the rates evaluate Surface blend and 8-cm incorporation of bensulide gave similar control goosegrass and smooth pigweed. Bensulide at 2.8 and 1.4 kg/ha applied a surface blend provided better control of broadleaf signalgrass, lar crabgrass, giant foxtail and seedling johnsongrass than the 8- incorporated treatments. Similar trends were observed at the 5.6-kg/ rate but were not significant. Deeper incorporation may be diluting t herbicide below the threshold of activity on these shallow-germinati weeds.

Cover Crops, Screening, Fayetteville (Table 2)

Rye (Secale cereale) was seeded at 237 kg/ha, crimson clover (Trifoli incarnatum) was seeded at 22 kg/ha, and a rye and clover mix was seeded

9 kg/ha and 11 kg/ha, respectively, into 3- by 3-m plots on November 1, 90. Paraquat at 1.1 kg/ha was applied as a preplant-burndown treatment May 30, 1991 (air 20 C; soil 20 C, wet; RH 85%). Trifluralin and nsulide were applied to conventionally tilled plots at 0.7 kg/ha and 7 /ha, respectively, and incorporated with a rototiller on June 7 (air 29 soil 31 C, wet; RH 63%). Tomato, cantaloupe, bell pepper and squash re transplanted into each plot on the same day. Plots were treated with rbaryl (Sevin®) at 1.1 kg/ha on a weekly basis for control of insects.

At 2 weeks after planting, weed control by cover crops was similar to at by trifluralin. By one month after planting, only carpetweed was ntrolled by the cover crops. In addition, annual rye also gave excellent ntrol of large crabgrass. Control of tumble pigweed with cover crops was ir. Only squash were harvested due to severe weed competition with the ner species.

ll Pepper (Capsicum annuum var. annuum), Fayetteville (Table 3).

Preplant-incorporated and preemergence treatments were applied, and ll peppers (cv. California Wonder) were transplanted into 2- by 1-m plots th four plants each on May 8 (air 19 C; soil 18 C, dry; RH 80%). stemergence treatments were applied on June 10 (air 18 C; soil 21 C, ist; RH 90%). Plots were harvested five times from June 18 to July 10. differences in maturity were observed, so the five harvests were mbined.

All treatments gave excellent control of large crabgrass and smooth gweed. Only MON-13211 treatments resulted in significant injury and eld reduction compared to the weed-free check. Yields of all other eatments were similar to the weed-free check and significantly greater an the weedy check.

le Crops, Fayetteville (Table 4).

Broccoli (Brassica oleracea Italica)(cv. Premium crop), cabbage rassica oleracea Capitata)(cv. Green Jewel) and cauliflower (Brassica eracea Botrytis)(cv. Alert) were transplanted into 1- by 4-m plots with x plants of each species per plot on March 25. Transplants were set in o rows 30 cm apart with 50 cm between plants within the row. Preplant-corporated and preemergence treatments were applied to the soil surface ior to transplanting, and napropamide was applied over-the-top of ansplants on the same day (air 28 C; soil 18 C, moist; RH 14%). Broccoli d cabbage were injured slightly, and cauliflower was injured severely by freeze on March 31. Postemergence treatments were applied over-the-top the 2- to 4-leaf and 4- to 6-leaf crabgrass stages on April 28 (air 20 soil 15 C, wet; RH 93%) and May 7 (air 11 C; soil 10 C, moist; RH 95%), spectively. Broccoli was harvested on May 21 and 28, cauliflower was rvested on May 24 and 28 and cabbage was harvested on May 28. Maturity fferences were not observed, so harvests were combined for each crop.

All treatments gave good to excellent control of large crabgrass, nbit, smooth pigweed and common lambsquarters. Pyridate caused minor lorosis of broccoli and cauliflower leaves. Yields of cole crops were t affected by herbicide treatments. Cauliflower yields were small and ghly variable due to freeze damage.

dive (Cichorium endiva), Fayetteville (Table 5).

Endive (cv. Florida Deep Hearted 65) plants were transplanted into ots 5 m by 2 rows spaced 1 m apart with 40 plants per plot on April 9. thoxydim was applied on April 23 (air 16 C; soil 14 C, wet; RH 73%) and y 8 (air 16 C; soil 16 C, dry; RH 89%). Endive was harvested on June 5.

Sethoxydim gave excellent control of large crabgrass and did not resu in crop injury or yield reduction.

Onions (Allium cepa Cepa), Fayetteville (Table 6).

Onions (cv. 1015Y Texas Super Sweet) were transplanted into 1- by 3 plots with 40 plants per plot on March 12. Transplants were set in t rows 30 cm apart with 15 cm between plants. The preemergence herbicid oxyfluorfen and DCPA were applied over-the-top after transplanting on Mar 13 (air 16 C; soil 16 C, moist; RH 81%). Postemergence treatments we applied over-the-top at the 2- to 4-leaf and 4- to 6-leaf crabgrass stag on April 19 (air 15 C; soil 14 C, wet; RH 70%) and May 2 (air 20 C; soil C, dry; RH 75%), respectively.

All preemergence treatments gave good to excellent control of lar crabgrass, henbit and sibara throughout the growing season. Fluazifop gave excellent control of large crabgrass. Pyridate and fluazifop applied in a tank mixture gave excellent control of all species. treatment resulted in onion injury. All herbicide treatments exce Enquick® yielded significantly higher than the weedy check.

Snap Beans (Phaseolus vulgaris), Herbicide Screening, Lowell (Table 7).

Snap beans (cv. 156) were planted on May 10 with 224 kg/ha of 15-30- fertilizer banded in the row. Plots were 6 m by 4 rows spaced 0.71 apart. Preplant-incorporated and preemergence treatments were applied the same day (air 19 C; soil 19 C, moist; RH 95%). Preplant treatment were incorporated with two passes of a disk set 10 cm deep at 8 kph. T cotyledon treatment was applied on May 16 (air 27 C; soil 30 C, dry; 79%). Postemergence V2 and V3 treatments were applied on May 28 (air 22 soil 26 C, wet; RH 95%) and June 1 (air 29 C; soil 33 C, dry; RH 73%) respectively. Plots were machine harvested June 30.

All treatments gave excellent control of large crabgrass and pigweeds except for sethoxydim applied alone, which did not control pigweeds. A treatments that included a postemergence herbicide gave good to excelle control of common ragweed and Pennsylvania smartweed. Treatments includi imazethapyr or bentazon gave good control of prickly sida. On imazethapyr treatments resulted in significant snap bean injury. N treatment resulted in yield reductions, and all treatments tended to yie higher than the weedy check.

Tomato (Lycopersicon esculentum), Fayetteville (Table 8).

Preplant-incorporated and preemergence treatments were applied, an tomatoes (cv. Traveler 76) were transplanted into 2- by 1-m plots with plants per plot on May 8 (air 19 C; soil 18 C, dry; RH 80%). Metribuzi was applied as a post-directed spray on June 10 (air 18 C; soil 21 C moist; RH 90%). Plots were harvested six times from July 10 to August 12 Maturity differences were not observed, so harvests were combined.

All treatments gave excellent control of large crabgrass and smoot pigweed. Plots treated with the standard treatment of trifluralin followe by metribuzin yielded significantly higher than the weedy check and simila to the weed-free check. Dithiopyr and MON-13211 applied post-transplan and preemergence to weeds resulted in significant injury and yiel reductions.

ttle Leaf Cucumber (Cucumis sativus), Kibler (Table 9).

Two rows of cucumber seeds spaced 0.6 m apart were planted in 1.8- by 5-m plots, and treatments were applied on May 2 (air 32 C; soil 31 C, y; RH 41%). A split plot design was used with herbicide treatment as the in plot and cultivar as the subplot. The cultivar 'Calypso' was used as herbicide-tolerant standard to compare with the 'Little Leaf' cultivar. cumbers were thinned to a density of 1 plant/1.35 m^2 on May 28. thoxydim was applied to all plots for grass control, and the entire test s hand weeded four times. Calypso cucumbers were harvested on June 17 d 29. Little Leaf cucumbers were harvested on June 29 and July 11.

At 3 weeks after planting, injury was observed on the Little Leaf ltivar from 2.7 kg/ha (two times the recommended use rate) of halfluralin. At 5 weeks after planting, the injury declined to non-gnificant levels; however, weed interference in the untreated and ptalam-treated plots reduced the size of Little Leaf and Calypso plants to 30%. Little Leaf and Calypso yields did not correlate to ethal-uralin rate or early injury. Yields were reduced by weed competition in e untreated and naptalam-treated plots as compared to higher-yielding eatments.

uash Cover Crop (Cucurbita maxima Duchesne), Fayetteville (Table 10).

Annual rye was seeded at 146 kg/ha into plots 6 m by 6.4 m on October 1990. Paraquat at 1.1 kg/ha was applied to all plots as a preplant-rndown treatment on April 23, 1991 (air 13 C; soil 10 C, wet; RH 85%). May 10, rye residues were left standing or mowed, and bensulide was plied and incorporated into conventionally tilled plots (air 29 C; soil C, wet; RH 63%). One row of winter squash (cv. NK-580) was transplanted to 3-leaf plants), and another row was seeded into each plot for a nsity of five plants in each row on the same day. Plots were treated ekly with carbaryl at 1.1 kg/ha for insect control. Plots were harvested August 8.

Mowed and standing rye provided good control of all weeds early; wever, weed suppression declined over the growing season. By 5 weeks ter planting, weed control was maintained only in the conventional rbicide system. Squash was injured due to severe insect infestation in e rye plots. Insect damage combined with poor weed control resulted in v squash yield.

uash Cover Crop (Cucurbita maxima Duchesne), Kibler (Table 11).

Bensulide at 6.7 kg/ha was applied preplant-incorporated to convention-ly tilled plots, sorghum-sudan was seeded into cover-crop plots, and nter squash (cv. NK-530) was planted into each plot on June 19 (air 34 C; il 34 C, dry; RH 47%). Plots were 3 m by 9 m with 5 squash in each plot. July 2, when sorghum-sudan was 16-cm tall and squash was 14-cm tall, a cm band of sorghum-sudan was killed around the crop row with sethoxydim 0.34 kg/ha (air 24 C; soil 29 C, dry; RH 86%). Glyphosate at 0.84 kg/ha s used as a directed spray for control of sorghum-sudan in the row ddles on July 9 (air 23 C; soil 26 C, wet; RH 96%). Conventional plots re handweeded on July 9.

Bensulide at 6.7 kg/ha provided excellent control of large crabgrass d Palmer amaranth through 3 weeks after planting. Sethoxydim gave cellent control of large crabgrass in the row. Sorghum-sudan only ppressed (40 to 50%) large crabgrass and Palmer amaranth in the row ddles. Squash injury ratings and vine length measurements indicated that rghum-sudan as a cover crop reduced squash growth. Visual observations so indicated that insect damage and populations were higher in sorghum-dan plots than in conventional plots (data not shown).

Watermelon (Citrullus lanatus), Ethalfluralin layby, Kibler (Table 12).

A single row of watermelon (cv. Crimson Sweet) seed was planted in 3. by 9.1-m plots, and preemergence treatments were applied on May 2 (air C; soil 31 C, dry; RH 41%). Watermelon were thinned to a density of plant/6.7 m^2, and sethoxydim was applied to the entire experiment on May to control grasses. Layby treatments were applied on June 17 (air 34 soil 33 C, dry; RH 35%). Plots were cultivated on May 28 and June 16. T entire area was hand weeded on June 13.

Weed control was not significantly affected by layby ethalflural applications. However, there was a tendency for fewer weeds at harvest plots treated with layby applications. No crop injury was observed, a yields were not reduced by layby treatments.

Watermelon (Citrullus lanatus), Stale seedbed, Kibler (Table 13).

A single row of watermelon (cv. Crimson Sweet) seed was planted in 3.7 by 9.1-m plots, and preemergence treatments were applied to till (conventional) and untilled (stale) seedbeds on May 2 (air 32 C; soil 31 C dry; RH 41%). Watermelon were thinned to a density of 1 plant/6.7 m^2, a sethoxydim was applied to the entire experiment on May 28. Lay treatments were applied on June 17 (air 34 C; soil 33 C, dry; RH 35%) Plots were cultivated on May 28 and June 16. The entire area was ha weeded on June 13.

Preemergence treatments applied in combination with burndown herbicide did not control weeds. Good to excellent control of Palmer amaranth a grasses was maintained for 4 weeks in conventionally tilled plots treate with ethalfluralin at 1.68 kg/ha. At 8 weeks after planting, injury wa observed in napropamide-treated plots. Crop injury from weed interferenc also occurred in plots with poor weed control. Conventionally tilled plot treated preemergence with ethalfluralin were the highest yielding.

Watermelon (Citrullus lanatus), Jonesboro (Table 14).

Two rows of watermelon (cv. Crimson Sweet) seed were planted in 4.3- b 9.1-m plots, and preemergence treatments were applied on May 15 (air 24 C soil 27 C, wet; RH 80%). On June 15, watermelon were thinned to a densit of 1 plant/6.5 m^2, and the entire experiment was cultivated and treated wit sethoxydim to control grasses. All plots were hand weeded on June 20 Layby treatments were applied on June 21 (air 33 C; soil 31 C, wet; R 40%). Plots were harvested on July 29 and August 5.

Weed pressure was variable in the test area. Tank mix and sequentia herbicide applications generally provided the best control of commo cocklebur, carpetweed and Palmer amaranth. No significant crop injury wa observed. There were no statistical differences in total watermelo yields.

Watermelon (Citrullus lanatus), post-transplant, Jonesboro (Table 15).

Five-week-old watermelon (cv. Starbrite) were transplanted on May 10 i 4.3- by 9.1-m plots, and preemergence treatments were applied on May 1 (air 24 C; soil 27 C, wet; RH 80%). On June 15, watermelon were thinned t a density of 1 plant/6.5 m^2, and the entire experiment was cultivated an then treated with sethoxydim to control grasses. Layby treatments were applied on June 21 (air 33 C; soil 31 C, wet; RH 40%). Plots were harvested on July 16 and 29.

Weed pressure was variable in the test area, resulting in no signifi- differences in common cocklebur and pitted morningglory control. etweed control was acceptable (>70%) for all treatments except naptalam bensulide. Palmer amaranth was controlled by all treatments at 5 s after planting, but there were no differences in control by 10 weeks r planting. Watermelon yields of all plots were statistically similar.

kberry (Rubus spp.), Fayetteville (Table 16).

Blackberry (cv. Cherokee) plots, 3 m by 8 m, were sprayed with olachlor on May 14 (air 32 C; soil 32 C, moist; RH 72%). Plots were vested on June 13, 20 and 26. Maturity differences were not observed, ields from the three harvests were combined.

Metolachlor applied post-directed at late bloom did not result in crop ury or adversely affect yield.

pes (Vitis labrusca), Fayetteville (Table 17).

Grape (cv. Concord) plots, 3.0 m by 2.4 m with one plant each, were ayed with preemergence herbicides on May 5 (air 25 C; soil 28 C, wet; RH .

Dithiopyr at 2.2 kg/ha and the standard treatment of oryzalin plus ron were the only treatments that provided >85% control of horseweed. pes were not affected by the herbicide treatments, and all yields were ilar.

pes (Vitis labrusca), Fayetteville (Table 18).

Grape plots, 3 m by 4 m with 1 plant each of the cultivars Saturn, iance and Mars, were treated on May 14 (air 32 C; soil 32 C; RH 72%). ts were harvested on July 10.

Glufosinate gave excellent control of all weed species present at the e of application. Saturn and Reliance suckers were suppressed by fosinate. Glufosinate applied alone gave fair to good control of Mars kers. Small suckers (1 or 2 leaves) were generally controlled best. n glufosinate was applied in combination with oryzalin and diuron, trol of Mars suckers was reduced. No grape injury or yield reduction ulted from either treatment.

wood (Buxus spp.), Fayetteville (Table 19).

Boxwood liners (cv. Winter Gem)(15-cm) were transplanted on May 8. t size was 2 m by 2 m with four plants per plot. Bentazon was applied May 17 (air 21 C; soil 22 C, moist; RH 90%), May 27 (air 26 C; soil 31 moist; RH 83%), June 6 (air 23 C; soil 26 C, wet; RH 86%) and June 20 r 19 C; soil 21 C, wet; RH 100%).

Single or repeated bentazon applications did not result in boxwood ury. Multiple bentazon applications were necessary to control yellow sedge.

eopsis (Coreopsis lanceolata), Fayetteville (Table 20).

Coreopsis liners (cv. Lanceleaf) (10-cm) were transplanted on June 8. ts were 1 m by 2 m with four plants each. Sethoxydim was applied on e 18 (air 19 C; soil 21 C, moist; RH 95%) and July 18 (air 23 C; soil 23 moist; RH 96%).

Coreopsis injury was not observed as a result of either single repeated sethoxydim applications.

Dahlia (Dahlia merkii), Fayetteville (Table 21).

Dahlia bulbs were planted on May 8. Plot size was 2 m by 2 m with f plants per plot. Napropamide was applied post-transplant and preemerge to weeds on May 8 (air 22 C; soil 22 C, moist; RH 77%).

Dahlia were not injured by napropamide. Napropamide at 4.5 and kg/ha did not control yellow nutsedge or result in dahlia injury.

Hosta (Fankia undulata), Fayetteville (Table 22).

Hosta liners (20-cm dia.) were transplanted on May 8. Plot size wa m by 2 m with four plants per plot. Napropamide was applied po transplant and preemergence to weeds on May 8 (air 22 C; soil 22 C, moi RH 77%).

Napropamide at 4.5 and 9.0 kg/ha did not control yellow nutsedge result in hosta injury.

Container Ornamentals, Fayetteville (Table 23).

Daisy (Chrysanthium max.)(cv. Silver Princess)(13-cm dia.) and Whi Yarrow (Achillia millefolium) liners (10-cm dia.) were transplanted into L pots containing a composted pinebark medium on May 21 and fertilized wi 6 g of Sierra 17-6-12 Plus Minors® fertilizer. Plots consisted of containers each of daisy and yarrow. All containers were irrigated dai throughout the growing season. Metolachlor was applied on May 21 (air C; medium 26 C, wet; RH 91%). Daisy and yarrow were approximately 10-cm diameter each with 6 to 10 leaves.

Daisy plants were injured by the high rate of metolachlor 7.8E and both rates of metolachlor 5G. Yarrow plants were injured only by the kg/ha rate of metolachlor 5G.

Daisy, Fayetteville (Container) (Table 24).

Daisy (cv. Silver Princess) liners (13-cm dia.) were transplanted in 4-L pots containing a composted pinebark mix on May 29 and fertilized wi 6 g of Sierra 17-6-12 Plus Minors® fertilizer. Plots consisted of containers each with one plant. Oryzalin treatments were made on May (air 29 C; medium 38 C, wet; RH 77%). All containers were irrigated dai throughout the growing season.

Oryzalin at 2.24 or 4.48 kg/ha applied post-transplant and preemergen to weeds did not result in daisy injury.

Hosta, Fayetteville (Container)(Table 25).

Hosta liners (10-cm dia.) were transplanted into 4-L pots containing composted pinebark medium on May 21 and fertilized with 6 g of Sierra 17- 12 Plus Minors® fertilizer. Plot size was 5 containers, each with o plant. All containers were irrigated daily throughout the growing seaso Napropamide treatments were applied on May 21 (air 24 C; medium 26 C, we RH 91%).

Napropamide at 4.5 or 9.0 kg/ha applied post-transplant and preemer-ce to weeds did not result in hosta injury.

dflowers, metolachlor, Fayetteville (Table 26).

Rudbeckia (Rudbeckia hirta) (cv. Black-eyed Susan) and White Yarrow n 6 to 10 leaves each were transplanted on June 8. Plot size was 1 m by with 4 plants of each species per plot. Metolachlor was applied post-nsplant and preemergence to weeds on June 8 (air 28 C; soil 27 C, moist; 51%).

Neither metolachlor formulation resulted in rudbeckia injury. Both blachlor formulations resulted in significant stunting of yarrow.

dflowers, Fayetteville (Table 27).

Rudbeckia (cv. Black-eyed Susan) and White Yarrow with 6 to 10 leaves n were transplanted on May 15. Plot size was 1 m by 3 m with 4 plants each species per plot. Post-transplant treatments were applied preemer-ce to weeds on May 15 (air 24 C; soil 24 C, moist; RH 92%). Postemer-ce treatments were applied on May 29 (air 23 C; soil 26 C, moist; RH).

All treatments gave excellent control of large crabgrass. Oryzalin atments resulted in slight injury to rudbeckia and yarrow, and isoxaben atments severely injured rudbeckia and yarrow.

dflowers (Screening), Fayetteville (Table 28).

Wildflowers (Appendix Table 5) were hand planted into rows 30 cm long spaced 25 cm apart on June 3. Preemergence treatments were applied on e 4 (air 27 C; soil 29 C, moist; RH 75%).

California poppy, lanceleaf coreopsis, perennial lupine, red mexican , scarlet flax and corn flower were tolerant to DCPA. Painted daisy, celeaf coreopsis, red mexican hat and blanket flower were tolerant to ropamide. Blue flax, lanceleaf coreopsis, perennial lupine and scarlet x were tolerant to EPTC. Perennial lupine and scarlet flax were erant to metolachlor. No species tolerated simazine or terbacil. celeaf coreopsis, perennial lupine, cornflower and ox-eye daisy were erant to pendimethalin. Blue flax, California poppy and lanceleaf eopsis were tolerant to oryzalin.

dy Ornamentals, Fayetteville (Table 29).

Two 25-cm liners of azalea (cv. Hino Crimson) and crepe myrtle (cv. tennial Spirit) were transplanted into 2- by 2-m plots on May 8, and emergence treatments were applied (air 22 C; soil 21 C, moist; RH 72%). tazon treatments were applied postemergence to yellow nutsedge with 3 to eaves on May 17 (air 21 C; soil 21 C, moist; RH 90%), May 27 (air 26 C; l 31 C, moist; RH 79%), June 6 (air 23 C; soil 26 C, wet; RH 86%) and e 20 (air 19 C; soil 21 C, moist; RH 99%). Chlorimuron postemergence atments were applied on June 6. By the middle of July, weed control had sipated, so plots were roto-tilled and hand weeded around the plants, preemergence treatments were reapplied on July 18 (air 23 C; soil 24 C, st; RH 96%). Azalea plants were killed by heat stress in July.

Chlorimuron and imazaquin applied preemergence gave good to excellent trol of yellow nutsedge through 5 weeks after application. Metolachlor) applied preemergence gave fair control of yellow nutsedge through 5 ks after application. All preemergence treatments significantly reduced

yellow nutsedge density. Escaping yellow nutsedge plants in the chlo muron- and imazaquin-treated plots were severely stunted and chlorot Four repeated applications of bentazon gave good to excellent yel nutsedge control. No injury was observed on azalea or crepe myrtle up 6 weeks after preemergence applications. However, at 10 and 17 wee crepe myrtles were severely stunted by imazaquin applied preemergence.

Bedding Plants, Fayetteville (Tables 30 and 31).

Twenty-one types of commonly used ornamental bedding plants (Appen Table 6) were transplanted into 2- by 4.5-m plots, and post-transpl treatments were applied preemergence to weeds on May 15 (air 19 C; soil C, wet; RH 90%). Postemergence treatments were applied on May 27 (air C; soil 31 C, wet; RH 79%) and June 15 (air 25 C; soil 25 C, dry; RH 70 Plots were irrigated as needed.

All bedding plants evaluated showed excellent tolerance to postemergence grass herbicides, sethoxydim and clethodim (Table 3 Tolerance to post-directed glyphosate and glufosinate treatments depen upon the accuracy of application. Species with an upright growth prof generally exhibited less injury than species with prostrate growth hab due to less contact with spray. However, all plants directly contac with either glyphosate or glufosinate were severely injured. Agerat aster, geranium, hibiscus, vinca and zinnia showed tolerance to preemergence treatments. In addition, ornamental peppers, petuni alyssum, coreopsis, dahlia, dianthus, impatiens and marigolds were toler to dithiopyr at rates of 4.5 kg/ha or less. Celosia, nicotinia, b salvia, salvia and snapdragons also showed marginal tolerance to dithiopy being injured only at the higher rates. All species except hibiscus, wh showed only marginal tolerance to pendimethalin, were tolerant to pen methalin and metolachlor. Celosia and snapdragons showed only margi tolerance to Rout®, and impatiens, nicotinia, ornamental peppers petunias were severely injured.

All treatments resulted in excellent control of large crabgrass pigweed species except sethoxydim and clethodim, which failed to contr the pigweed species. Low rates of isoxaben and dithiopyr gave excell weed control, so increasing the rates of isoxaben and dithiopyr and us isoxaben premixes (Snapshot® 80DF and Shapshot® 2.5 G) did not improve we control. Hoe times (Table 31) indicated that the residual control provid by most of the treatments had dissipated by 8 weeks after applicatio Total hoe times for the year on all treated plots were similar and we significantly less than the time required to keep the weed-free check ha weeded.

SUMMARY

Bensulide applied as a surface blend or preplant-incorporated ga excellent control of grasses and small-seeded broadleaved weeds. Bensuli also showed potential for use at lower-than-label-recommended rates control large crabgrass, giant foxtail, seedling johnsongrass and smoo pigweed when applied as a surface blend. Generally as the bensulide ra decreased, the advantages of surface blending bensulide as compared incorporating 8 cm deep became more evident.

The use of rye and rye and clover mixes as cover crops did not appe to adversely affect squash, tomatoes, cantaloupe or winter squas However, insect problems were magnified, and weed control by cover cro lasted only 4 weeks. Sorghum-sudan planted with squash tended to inhib squash growth. No weed control benefit was observed, and squash b problems were intensified.

The standard treatment of trifluralin followed by DCPA gave excellent ntrol of large crabgrass and smooth pigweed in bell peppers. The new rbicides dithiopyr and MON-13211 also gave excellent weed control, but N-13211 resulted in significant injury and yield reduction.

In cole crops, combinations of the standard herbicides trifluralin, nsulide, oxyfluorfen, napropamide, sethoxydim and DCPA gave excellent ntrol of henbit, large crabgrass, smooth pigweed and common lambs-arters. Pyridate also showed excellent potential for postemergence weed ntrol in cole crops.

Sethoxydim showed excellent potential as a postemergence herbicide for ass control in endive.

The standard onion herbicides, oxyfluorfen and DCPA, gave excellent ntrol of large crabgrass, henbit and sibara. Combinations of fluazifop-P d pyridate also showed excellent potential for broad-spectrum postemer-nce weed control in onions.

In snap beans, preplant-incorporated and preemergence herbicide mbinations of trifluralin, metolachlor, EPTC and imazethapyr controlled rge crabgrass and smooth pigweed. In addition, EPTC and imazethapyr gave cellent control of Pennsylvania smartweed and prickly sida. Fomesafen plied postemergence alone or in combination with bentazon and sethoxydim clethodim provided excellent weed control.

The standard tomato treatment of trifluralin followed by metribuzin ve excellent control of large crabgrass and smooth pigweed. The new rbicides dithiopyr and MON-13211 also gave excellent weed control; wever, both significantly injured or killed tomatoes and caused severe eld reductions.

Ethalfluralin applied at rates ranging from 0.67 to 2.69 kg/ha did not fect the yields of Calypso or Little Leaf cucumbers. In watermelons, halfluralin generally provided satisfactory weed control when applied eemergence. Ethalfluralin applied preemergence followed by ethalfluralin a layby treatment did not adversely affect watermelon and tended to crease the duration of weed control. Weed control in stale-seedbed plots s unsatisfactory.

Metolachlor applied at late bloom did not injure blackberry. The andard preemergence herbicides oryzalin plus diuron gave good weed ntrol in grapes. Dithiopyr also showed some potential for use as a eemergence herbicide in grapes. Glufosinate and combinations of ufosinate plus oryzalin plus diuron gave excellent postemergence control weeds in grapes and showed some potential for early control of grape ckers.

Napropamide showed potential for use as a preemergence herbicide in hlia and hosta. Oryzalin showed potential for weed control in daisy. lorimuron and metolachlor in combination with bentazon gave excellent ntrol of yellow nutsedge in woody ornamentals. Metolachlor, oryzalin d fluazifop-P showed potential for use in rudbeckia and yarrow. thiopyr, isoxaben alone or in combination with oryzalin or trifluralin, yfluorfen, pendimethalin, metolachlor, sethoxydim and clethodim showed tential for use in several ornamental bedding plants. Dithiopyr showed e greatest range of tolerant ornamental species. DCPA, napropamide, TC, metolachlor, pendimethalin and oryzalin showed potential for eemergence use in wildflower plantings. For use in general landscape intenance, minimal rates of residual-preemergence herbicides should be ed at transplanting and repeated in 8 to 10 weeks. Herbicides such as yphosate, glufosinate, sethoxydim and clethodim can be used to supplement ese treatments.

Table 1. Bensulide: Effect of incorporation depth and rate on weed control, Fayetteville, 1991.

Treatment description	Weed control after 2 weeks[1]											
	BRAPP	DIGSA	ELEIN	SETFA	SORHA	ABUTH	AMACH	IPOHG	IPOLA	SEBEX	SIDSP	XANST
(kg ai/ha)	(%)											
Weedy check	0	0	0	0	0	0	0	0	0	0	0	0
Surface blend incorporation[2]												
Bensulide, 5.6, ppi	86	98	90	98	90	6	100	6	20	0	6	0
Bensulide, 2.8, ppi	74	93	84	89	85	11	100	0	5	3	0	0
Bensulide, 1.4, ppi	54	93	63	49	69	0	96	0	5	0	0	0
Incorporated to an 8-cm depth[2]												
Bensulide, 5.6, ppi	48	84	81	50	59	0	100	0	6	0	0	0
Bensulide, 2.8, ppi	40	54	58	31	45	0	98	0	5	0	0	0
Bensulide, 1.4, ppi	28	46	46	31	30	0	93	0	0	0	0	0
LSD (0.05)	22	26	22	28	18	NS	6	NS	NS	NS	NS	NS

Treatment description	Weed control after 3 weeks[1]											
	BRAPP	DIGSA	ELEIN	SETFA	SORHA	ABUTH	AMACH	IPOHG	IPOLA	SEBEX	SIDSP	XANST
(kg ai/ha)	(%)											
Weedy check	0	0	0	0	0	0	0	0	0	0	0	0
Surface blend incorporation[2]												
Bensulide, 5.6, ppi	88	90	43	100	99	26	94	8	4	0	8	0
Bensulide, 2.8, ppi	60	91	45	100	94	18	84	0	10	0	8	0
Bensulide, 1.4, ppi	35	78	13	48	91	0	59	0	0	0	0	0
Incorporated to an 8-cm depth[2]												
Bensulide, 5.6, ppi	68	99	56	85	90	0	96	0	0	0	0	0
Bensulide, 2.8, ppi	14	60	0	38	63	0	80	0	5	0	0	0
Bensulide, 1.4, ppi	0	53	15	5	38	0	65	0	0	0	0	0

Table 1. Continued.

[1] Weed control ratings were taken at 2 and 3 weeks after application. BRAPP = broadleaf signalgrass; DIGSA = large crabgrass; ELEIN = goosegrass; SETFA = giant foxtail; SORHA = johnsongrass; ABUTH = velvetleaf; AMACH = smooth pigweed; IPOHG = entireleaf morningglory; IPOLA = pitted morningglory; SEBEX = hemp sesbania; SIDSP = prickly sida; XANST = common cocklebur.

[2] Surface blend treatments were lightly incorporated with a hand rake prior to planting, and incorporated treatments were incorporated with a single pass of a rototiller set to a depth of 8 cm.

Table 2. Cover Crop: Evaluation of rye and clover for weed control in vegetable production systems, Fayetteville, 1991[1].

Treatment description[2]	Weed control[3] 2 wk DIGSA	MOLVE	AMAAL	CYPES	POROL	4 wk DIGSA	MOLVE	AMAAL	CYPES	POROL
(kg ai/ha)	(%)									
Bensulide, 6.72, ppi fb sethoxydim, 0.28 + CO (Agri-Dex, 1% v/v), poe	68	5	65	52	56	84	0	78	38	30
Trifluralin, 0.84, ppi fb sethoxydim, 0.28 + CO (Agri-Dex, 1% v/v), poe	86	95	88	76	84	66	99	86	48	75
Crimson clover	75	92	79	74	95	35	99	74	15	68
Annual rye	92	90	92	65	92	93	80	86	50	72
Rye / clover mix	88	95	80	68	91	75	99	74	39	72
LSD (0.05)	25	20	NS	NS	23	38	7	NS	NS	24

Treatment description[2]	Crop injury[3] 2 wk tomato	pepper	cantaloupe	squash	4 wk tomato	pepper	cantaloupe	squash	Yield squash
(kg ai/ha)	(%)								(mt/ha)
Bensulide, 6.72, ppi fb sethoxydim, 0.28 + CO (Agri-Dex, 1% v/v), poe	--	--	0	0	--	--	0	0	3
Trifluralin, 0.84, ppi fb sethoxydim, 0.28 + CO (Agri-Dex, 1% v/v), poe	0	0	--	--	7	7	--	--	--
Crimson clover	0	0	0	2	0	2	5	15	0.1
Annual rye	0	0	0	2	0	7	0	10	3
Rye / clover mix	0	0	0	0	0	2	0	4	9
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS	12	9

[1] DIGSA = large crabgrass; MOLVE = carpetweed; AMAAL = tumble pigweed; CYPES = yellow nutsedge; POROL = common purslane.
[2] Paraquat at 1.1 kg ai/ha was applied 1 week prior to planting as a preplant burndown treatment.
[3] Ratings were taken 2 and 4 weeks after planting vegetables.

Table 3. Bell Peppers: Evaluation of dithiopyr and MON-13211 for phytotoxicity and weed control, Fayetteville, 1991[1].

Treatment description	Weed control[2] 2 wk DIGSA	2 wk AMACH	3 wk DIGSA	3 wk AMACH	6 wk DIGSA	6 wk AMACH	Crop injury[2] 2wk	Crop injury[2] 3wk	Crop injury[2] 6wk	Yield	
(kg ai/ha)	(%)									(g/pepper)	(mt/ha)
Weedy check	0	0	0	0	0	0	0	0	0	55	3
Weed-free check	100	100	100	100	100	100	0	3	0	64	11
Trifluralin, 0.5, ppi fb DCPA, 6.0, poe (4 weeks after transplanting to bare soil)	96	100	98	99	93	91	0	1	0	64	13
Dithiopyr, 0.55, pre-tp	100	100	100	99	91	79	0	15	0	59	12
Dithiopyr, 1.1, pre-tp	99	100	100	100	99	93	0	6	0	63	12
MON-13211, 0.55, pre-tp	100	100	100	100	100	100	0	16	9	60	6
MON-13211, 1.1, pre-tp	100	100	100	100	100	100	0	46	43	37	4
LSD (0.05)	4	1	2	2	5	10	NS	15	18	NS	5

[1] Average weed size at the time of postemergence application: DIGSA (large crabgrass) = 5 cm with 5 leaves; AMACH (smooth pigweed) = 7 cm with 5 leaves.
[2] Ratings were taken 2, 3 and 6 weeks after preplant-incorporated and preemergence applications. The 6-week rating corresponds to 1 week after the postemergence application.
[3] Combination of 5 harvests.

Table 4. Cole Crops: Evaluation of herbicides for weed control and phytotoxicity, Fayetteville, 1991[1,2].

	Weed control[3]															
	3 wk	6 wk		7 wk				8 wk				9 wk			
Treatment description	LAMAM	DIGSA	LAMAM	DIGSA	LAMAM	AMACH	CHEAL	DIGSA	LAMAM	AMACH	CHEAL	DIGSA	LAMAM	AMACH	CHEAL
(kg ai/ha)	(%)														
Weed-free check	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Weedy check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifluralin, 1.1, ppi	100	100	96	100	91	100	85	100	88	100	88	100	78	100	70
Trifluralin, 1.1, ppi fb pyridate, 1.0, poe (2-4 lf)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Trifluralin, 1.1, ppi fb pyridate, 1.0, poe (4-6 lf)	100	100	98	100	85	100	83	100	98	100	90	99	100	100	71
Trifluralin, 1.1, ppi fb pyridate, 1.0, poe (2-3 lf) fb pyridate, 1.0, poe (4-6 lf)	100	100	100	100	99	100	100	100	100	100	100	98	100	100	95
Bensulide, 6.7, ppi fb oxyfluorfen, 0.42, pre-tp	100	100	100	100	100	100	100	100	100	100	100	98	100	100	95
Napropamide, 2.2, tp-pre	100	100	93	100	81	100	98	100	95	100	98	100	74	100	100
Oxyfluorfen, 0.56, pre-tp fb sethoxydim, 0.21 + CO (Agri-Dex®, 1% v/v), poe (4-6 lf)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Oxyfluorfen, 0.28 + DCPA, 5.0, TM, pre-tp	100	100	100	100	100	100	100	100	100	100	100	100	100	100	90
LSD (0.05)	1	1	6	1	10	1	8	1	8	1	4	4	12	1	16

continued

Table 4. Continued.

Treatment description (kg ai/ha)	Crop injury[3] 3 wk BROC.	3 wk CABB.	3 wk CAUL.	6 wk BROC.	6 wk CABB.	6 wk CAUL.	7 wk BROC.	7 wk CABB.	7 wk CAUL.	8 wk BROC.	8 wk CABB.	8 wk CAUL.	9 wk BROC.	9 wk CABB.	9 wk CAUL.	Yield[4] BROC.	Yield[4] CABB.	Yield[4] CAUL.
	(%)															(mt/ha)		
Weed-free check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.7	23.1	0.8
Weedy check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.6	19.6	0.7
Trifluralin, 1.1, ppi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.2	---[5]	0.4
Trifluralin, 1.1, ppi fb pyridate, 1.0, poe (2-4 lf)	12	0	0	10	0	0	17	0	13	3	0	0	0	0	0	3.1	---[5]	0.5
Trifluralin, 1.1, ppi fb pyridate, 1.0, poe (4-6 lf)	0	0	0	0	0	0	0	0	0	5	3	6	3	0	5	3.9	---[5]	2.6
Trifluralin, 1.1, ppi fb pyridate, 1.0, poe (2-3 lf) fb pyridate, 1.0, poe (4-6 lf)	5	1	0	3	0	0	11	0	10	9	3	3	4	0	5	3.6	---[5]	1.3
Bensulide, 6.7, ppi fb oxyfluorfen, 0.42, pre-tp	15	9	0	0	0	0	4	0	0	0	0	0	0	0	0	3.4	20.8	0.18
Napropamide, 2.2 tp-pre	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.3	22.8	2.2
Oxyfluorfen, 0.56, pre-tp fb sethoxydim, 0.21 + CO (Agri-Dex, 1% v/v), poe (4-6 lf)	21	18	0	0	0	0	0	0	0	0	8	0	0	0	0	4.6	12.6	1.3
Oxyfluorfen, 0.28 + DCPA, 5.0, TM, pre-tp	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	3.3	22.9	0.1
LSD (0.05)	11	9	NS	4	NS	NS	4	NS	2	4	NS	3	NS	NS	NS	NS	NS	1.6

continued

Table 4. Continued.

[1] Average weed sizes at the postemergence applications: 2- to 4-lf: AMACH (smooth pigweed) = 4 cm with 6 leaves; CHEAL (common lambsquarters) = 6 cm with 5 leaves; DIGSA (large crabgrass) = 4 cm with 3 leaves; LAMAM (henbit) = 4 cm with 5 leaves. 4- to 6-lf: AMACH = 10 cm with 10 leaves; CHEAL = 8 cm with 6 leaves; DIGSA = 6 cm with 6 leaves; LAMAM = 8 cm with 6 leaves.

[2] Weed density on May 6 = 414/m^2; weed distribution: 5% AMACH; 3% CHEAL; 52% DIGSA; 40% LAMAM.

[3] Ratings were taken 3, 6, 7, 8 and 9 weeks after preplant-incorporated and preemergence treatments. The 6-, 7-, 8-, and 9-week ratings correspond to 2, 3, 4, and 5 weeks after the 2- to 3-lf treatments. The 8- and 9-week ratings correspond to 1 and 2 weeks after the 4- to 6-lf postemergence applications.

[4] Maturity differences were not observed, and harvests were combined.

[5] Yields were inadvertently lost.

Table 5. Endive: Evaluation of sethoxydim for phytotoxicity and weed control, Fayetteville, 1991[1,2,3].

Treatment description	Weed control[4] 3 wk DIGSA	Weed control[4] 3 wk AMACH	Crop injury[4] 2 wk	Crop injury[4] 3 wk	Crop injury[4] 4 wk	Yield
(kg ai/ha)	(%)					(mt/ha)
Control	0	0	0	0	0	31
Sethoxydim, 0.3 + CO (BAS 064005, 1% v/v), poe fb sethoxydim, 0.3 + CO (BAS 064005, 1% v/v), poe (applied 15 days later)	100	0	0	0	0	32
LSD (0.05)	1	NS	NS	NS	NS	NS

[1] After the 4-week rating, treatments were maintained weed-free until harvest

[2] Average weed sizes at the postemergence applications: 1st application: no weeds were present; 2nd application: DIGSA (large crabgrass) = 4 cm with 5 leaves, AMACH (smooth pigweed) = 4 cm with 5 leaves.

[3] Weed density on May 8 = 320/m^2; weed distribution: 88% DIGSA; 12% AMACH.

[4] Ratings were taken 2, 3 and 4 weeks after the first application. The 3-week and 4-week ratings correspond to 1 week and 2 weeks after the second application.

Table 6. Onions: Evaluation of herbicides for weed control and phytotoxicity, Fayetteville, 1991[1,2].

Treatment description	Weed control[3]												Crop injury[3]				Yield	
	5 wk			6 wk			7 wk			10 wk								
	DIGSA	LAMAM	SIBVI	DIGSA	LAMAM	SIBVI	DIGSA	LAMAM	SIBVI	DIGSA	LAMAM	SIBVI	5wk	6wk	7wk	10wk		
(kg ai/ha)	(%)																(mt/ha)	(g/onion)
Weed-free check	0	0	0	100	100	100	100	100	100	100	100	100	0	0	0	0	19	180
Weedy check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	108
Fluazifop-P, 0.21 + WA (X-77®, 0.25% v/v), poe (2-3 lf)	0	0	0	54	0	0	95	0	0	99	0	0	0	0	0	0	10	102
Flauzifop-P, 0.21 + WA (X-77®, 0.25% v/v), poe (4-6 lf)	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	10	106
Fluazifop-P, 0.21 + pyridate, 1.0, TM, poe (2-3 lf)	0	0	0	100	100	93	100	100	94	98	98	100	0	0	0	0	19	172
Fluazifop-P, 0.21 + pyridate, 1.0, TM, poe (4-6 lf)	0	0	0	0	0	0	0	0	0	98	90	91	0	0	0	0	15	132
Fluazifop-P, 0.21 + pyridate, 1.0, TM, poe (2-3 lf) fb fluazifop-P, 0.21 + pyridate, 1.0, TM, poe (4-6 lf)	0	0	0	99	100	94	100	100	99	98	100	99	0	0	0	0	14	130
Oxyfluorfen, 0.56, tp-pre	99	100	100	96	100	100	78	100	90	95	77	98	14	0	0	5	17	156
DCPA, 10.0, tp-pre	100	99	93	96	100	90	100	97	75	100	100	90	9	0	0	0	12	132
Oxyfluorfen, 0.28 + DCPA, 5.0, TM, tp-pre	100	100	100	100	100	100	100	100	100	93	100	97	14	0	0	0	17	161
Enquik®, 46.7 l/ha, poe (4-6 lf)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	114
Enquik®, 93.5 l/ha, poe (4-6 lf)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	96
LSD (0.05)	2	1	2	6	1	5	4	4	4	4	4	4	7	NS	NS	NS	5	38

Table 6. Continued.

[1] Average weed sizes at the postemergence applications: 2- to 4-lf: DIGSA (large crabgrass) = 1.5 cm with 2 leaves; LAMAM (henbit) = 2 cm with 10 leaves; SIBVI (sibara) = 8 cm in diameter; 4- to 6-lf: DIGSA = 13 cm with 5 leaves; LAMAM = 8 cm; SIBVI = 12 cm.

[2] Weed density on May 2 = 327/m^2; weed distribution: 80% DIGSA; 13% LAMAM; 7% SIBVI.

[3] Ratings were taken 5, 6, 7 and 10 weeks after preemergence treatments, which corresponds to 0, 1, 2 and 5 weeks after the 2- to 4-lf applications. The 10-week rating corresponds to 3 weeks after the 4- to 6-lf postemergence application.

Table 7. Snap Beans: Evaluation of herbicides for weed control and phytotoxicity, Lowell, 1991[1,2].

Treatment description (kg ai/ha)	Weed control[3] 4 wk DIGSA	AMASP	AMBEL	POLLA	SIDSP	5 wk DIGSA	AMASP	AMBEL	POLLA	SIDSP	6 wk DIGSA	AMASP	AMBEL	POLLA	SIDSP	Crop injury[3] 4wk	5wk	6wk	Yield
	(%)																		(mt/ha)
Weed free check	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0	0	0	5.4
Weedy check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.3
Trifluralin, 0.56, ppi	98	86	5	23	0	100	84	5	25	8	100	93	0	25	0	0	0	0	4.5
Metolachlor, 1.7, pre	100	93	5	13	0	100	91	8	23	10	100	84	0	5	5	0	0	0	4.8
Trifluralin, 0.56 + EPTC, 2.7, TM, ppi	98	98	52	96	75	100	89	46	95	76	96	91	54	65	36	8	0	3	4.7
Trifluralin, 0.56 + imazethapyr, 0.07, TM, ppi	100	100	75	75	75	100	100	80	95	75	100	100	70	75	80	30	35	26	4.0
Trifluralin, 0.56, ppi fb imazethapyr, 0.07, pre	100	97	43	98	50	100	99	60	100	57	99	96	50	83	87	3	3	0	5.6
Trifluralin, 0.56, ppi fb imazethapyr, 0.07 + WA (X-77®, 0.25% v/v), V2	98	99	58	99	79	100	100	98	98	98	100	100	93	93	88	29	21	19	2.5
Trifluralin, 0.56, ppi fb fomesafen, 0.21 + WA (X-77®, 0.25% v/v), V2	95	100	100	98	88	95	100	100	100	69	99	100	99	100	73	0	0	0	5.7
Trifluralin, 0.56, ppi fb fomesafen, 0.42, + WA (X-77®, 0.25%, v/v), V2	95	94	98	100	90	98	98	98	100	80	95	95	98	100	66	3	0	0	5.6
Trifluralin, 0.56, ppi fb bentazon, 0.42, V2	100	100	97	100	98	100	100	98	100	100	100	100	83	97	83	16	5	5	4.4
Trifluralin, 0.56, ppi fb bentazon, 0.84, V2	98	93	93	98	100	100	100	95	100	96	90	95	90	98	91	14	0	0	5.1

Table 7. Continued.

Treatment description	Weed control[3] 4 wk DIGSA	AMASP	AMBEL	POLLA	SIDSP	5 wk DIGSA	AMASP	AMBEL	POLLA	SIDSP	6 wk DIGSA	AMASP	AMBEL	POLLA	SIDSP	Crop injury[3] 4wk	5wk	6wk	Yield
(kg ai/ha)	(%)																		(mt/ha)
Trifluralin, 0.56, ppi fb fomesafen, 0.11 + bentazon, 0.22 + WA (X-77®, 0.25% v/v), TM, V2	93	100	100	99	79	100	100	99	94	63	90	95	95	78	44	6	5	3	5.0
Trifluralin, 0.56, ppi fb fomesafen, 0.21 + bentazon, 0.42 + WA (X-77®, 0.25% v/v), TM, V2	99	100	100	100	99	98	100	100	100	98	96	100	98	95	85	9	9	0	4.8
Sethoxydim, 0.22 + CO (Agri-Dex®, 1% v/v), V2	99	10	0	3	0	100	18	0	0	0	100	0	0	0	0	0	0	0	4.5
Fomesafen, 0.42 + sethoxydim, 0.22 + WA (X-77®, 0.25% v/v), TM, V2	98	100	98	100	88	100	100	100	100	48	100	100	99	100	66	8	0	0	5.7
Bentazon, 0.84, + sethoxydim, 0.22 + CO (Agri-Dex®, 1% v/v), TM, V2	100	100	100	100	100	100	96	98	100	100	99	85	93	88	79	23	15	5	4.8
Fomesafen, 0.11 + bentazon, 0.21 + sethoxydim, 0.22, + WA (X-77®, 0.25% v/v), TM, V2	98	100	100	99	76	100	100	98	100	73	100	100	96	98	73	8	4	0	5.4
Fomesafen, 0.21 + bentazon, 0.42 + sethoxydim, 0.22 + WA (X-77®, 0.25% v/v), TM, V2	99	100	98	100	100	100	100	99	100	100	100	100	97	100	96	20	4	3	4.8

continued

Table 7. Continued.

Treatment description (kg ai/ha)	Weed control[3] 4 wk DIGSA	AMASP	AMBEL	POLLA	SIDSP	5 wk DIGSA	AMASP	AMBEL	POLLA	SIDSP	6 wk DIGSA	AMASP	AMBEL	POLLA	SIDSP	Crop injury[3] 4wk	5wk	6wk	Yield
	(%)																		(mt/ha)
Fomesafen, 0.21 + bentazon, 0.42 + sethoxydim, 0.22 + CO (Agri-Dex®, 1%, v/v), TM, V2	100	100	100	100	100	100	100	100	100	100	100	100	99	100	93	14	5	3	5.7
Imazethpyr, 0.07 + sethoxydim, 0.22 + CO (Agri-Dex®, 1% v/v), TM, V2	91	100	81	91	70	98	100	96	96	76	100	100	84	83	55	38	18	3	3.8
Fomesafen, 0.21 + WA (X-77®, 0.25% v/v), V2 fb sethoxydim, 0.22 + CO (Agri-Dex®, 1% v/v), V3	40	95	98	96	71	100	100	100	100	64	100	100	100	100	65	4	3	0	4.9
Fomesafen, 0.11 + bentazon, 0.21 + WA (X-77®, 0.25% v/v), TM, V2 fb sethoxydim, 0.22 + CO (Agri-Dex®, 1% v/v), V3	92	100	96	98	68	98	100	100	100	75	100	98	100	95	65	1	0	0	5.1
Fomesafen, 0.21 + bentazon, 0.42 + WA (X-77, 0.25% v/v), TM, V2 fb sethoxydim, 0.22 + CO (Agri-Dex®, 1% v/v), V3	93	100	100	100	98	98	100	100	100	100	100	100	100	100	90	21	3	5	4.4

continued

Table 7. Continued.

Treatment description	Weed control[3] 4 wk					5 wk					6 wk					Crop injury[3]			Yield
	DIGSA	AMASP	AMBEL	POLLA	SIDSP	DIGSA	AMASP	AMBEL	POLLA	SIDSP	DIGSA	AMASP	AMBEL	POLLA	SIDSP	4wk	5wk	6wk	
(kg ai/ha)	(%)																		(mt/ha)
Imazethapyr, 0.07 + WA (X-77, 0.25% v/v), V2 fb sethoxydim, 0.22 + CO (Agri-Dex®, 1%, v/v), V3	78	86	34	63	48	100	100	90	94	88	100	100	76	94	71	16	5	3	3.9
Imazethapyr, 0.07 + WA (X-77®, 0.25%, v/v), cot	100	100	98	100	100	100	100	100	100	100	100	100	95	99	96	40	36	28	4.0
LSD (0.05)	15	9	23	16	30	4	11	17	17	30	5	7	17	27	28	11	13	9	1.5

[1] Average weed sizes at the time of V2 applications: DIGSA (large crabgrass) = 4 cm with 4 leaves; AMASP (pigweed species) = 3 cm with 5 leaves; AMBEL (common ragweed) = 5 cm with 4 leaves; POLLA (pale smartweed) = 5 cm with 3 leaves; SIDSP (prickly sida) = 2 cm with 1 leaf.

[2] Weed density on May 28 = 330/m^2; weed distribution: 27% DIGSA, 31% AMAPA (Palmer amaranth), 24% AMACH (smooth pigweed), 20% AMBEL, 4% POLLA, 16% SIDSP.

[3] Ratings were taken 4, 5 and 6 weeks after preplant-incorporated and preemergence treatments, which corresponds to 1, 2 and 3 weeks after V2 treatments and 0, 1 and 2 weeks after V3 treatments.

Table 8. Tomato: Evaluation of dithiopyr and MON-13211 for phytotoxicity and weed control, Fayetteville, 1991[1].

Treatment description	Weed control[2] 2 wk DIGSA	2 wk AMACH	3 wk DIGSA	3 wk AMACH	6 wk DIGSA	6 wk AMACH	Crop injury[2] 2wk	Crop injury 3wk	Crop injury 6wk	Yield (g/tomato)	Yield (mt/ha)
(kg ai/ha)	(%)										
Weedy check	0	0	0	0	0	0	0	0	0	97	24
Weed-free check	100	100	100	100	100	100	0	0	0	118	105
Trifluralin, 0.5, ppi fb metribuzin, 0.25, dir	100	100	98	100	100	100	0	8	0	121	112
Dithiopyr, 0.55, pre-tp	100	98	94	90	75	60	10	38	55	86	25
Dithiopyr, 1.1, pre-tp	100	100	100	100	100	84	21	60	98	79	10
MON-13211, 0.55, pre-tp	100	100	100	100	100	95	39	69	98	--	0
MON-13211, 1.1, pre-tp	100	100	100	100	100	100	55	90	100	103	5
LSD (0.05)	1	2	7	4	27	13	8	19	20	NS	37

[1] Average weed size at the time of postemergence application: DIGSA (large crabgrass) = 5 cm with 5 leaves; AMACH (smooth pigweed) = 7 cm with 5 leaves.
[2] Ratings were taken 2, 3 and 6 weeks after preplant incorporated and preemergence applications. The 6-week rating corresponds to 1 week after the postemergence application.

Table 9. Cucumbers: Little Leaf and Calypso cucumber tolerance to herbicides, Kibler, 1991[1].

Treatment description	Cucumber injury[2]				Yield			
	3wk		5wk		Harvest 1		Harvest 2	
	LLf[1]	Calypso	LLf	Calypso	LLf	Calypso	LLf	Calypso
(kg ai/ha)	(%)				(mt/ha)			
Untreated check	0	0	23	30	5.5	2.7	4.0	5.3
Naptalam, 4.48, pre	0	0	28	30	6.9	4.0	5.8	6.1
Bensulide, 6.72, pre	0	0	0	3	14.2	6.0	6.7	9.3
Ethalfluralin, 0.67, pre	3	0	0	3	11.5	6.1	7.9	8.4
Ethalfluralin, 1.01, pre	1	0	0	8	9.7	4.7	5.8	8.7
Ethalfluralin, 1.34, pre	1	1	8	15	13.2	5.5	7.3	10.1
Ethalfluralin, 2.02, pre	4	3	8	8	11.1	6.2	6.0	10.2
Ethalfluralin, 2.69, pre	19	4	15	18	10.2	5.1	7.2	9.2
LSD (0.05)	10		16		2.9			

[1] LLf: Little Leaf cucumber.
[2] Ratings were taken 3 and 5 weeks after preemergence applications.

Table 10. Cover crops: Evaluation of rye for weed control in winter squash, Fayetteville, 1991[1].

Treatment description[2]	Weed control[3]																	
	3 wk							6 wk[4]				8 wk						
								row		middle		row			middle			
	DIGSA	ANVCR	POROL	AMAAL	ELEIN	PANDI	CYPES	DIGSA	AMAAL	DIGSA	AMAAL	DIGSA	AMAAL	CYPES	DIGSA	AMAAL	CYPES
(kg ai/ha)	(%)																	
Weedy check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bensulide, 6.7, ppi	90	99	89	83	95	93	76	100	100	88	0	100	100	100	82	12	0
Standing rye	94	98	98	94	96	89	93	34	65	74	79	20	28	0	20	28	0
Mowed rye	86	98	86	86	93	91	58	72	73	33	29	49	33	0	49	33	0
LSD (0.05)	9	5	8	9	13	7	53	27	20	31	29	48	44	NS	48	NS	NS

Treatment description[2]	Crop injury							
	3 wk		6 wk		8 wk		Yield	
	transplant	seeded	transplant	seeded	transplant	seeded	transplant	seeded
(kg ai/ha)	(%)						(mt/ha)	
Weedy check	0	0	2	25	47	35	0.1	0
Bensulide, 6.7, ppi	0	0	0	0	0	0	4.0	0
Standing rye	20	20	50	48	80	77	0.6	0
Mowed rye	0	0	31	5	58	52	1.3	0
LSD (0.05)	NS	NS	27	28	46	37	2.3	NS

[1] DIGSA = large crabgrass; ANVCR = spurred anoda; POROL = common purslane; AMAAL = tumble pigweed; ELEIN = goosegrass; PANDI = fall panicum; CYPES = yellow nutsedge.
[2] Paraquat was applied 2 weeks prior to planting as a preplant burndown treatment.
[3] Ratings were taken 3, 6 and 8 weeks after planting.
[4] Due to differences in weed control as a result of rye disturbance during planting, ratings for weed control within the crop row (row) and between crop rows (middle) were evaluated separately.

Table 11. Cover crop: Evaluation of sorghum-sudan for weed control in squash, Kibler, 1991[1].

Treatment description	Weed control[2] 2 wk		3 wk[3] row		3 wk[3] middle		Squash injury			Squash height		
	DIGSA	AMAPA	DIGSA	AMAPA	DIGSA	AMAPA	2wk	3wk	4wk	2wk	3wk	4wk
(kg ai/ha)	(%)						(%)			(cm)		
Bensulide, 6.7, ppi	40	52	100	100	100	100	0	0	0	14	42	46
Sorghum-sudan[4]	22	30	100	0	45	48	0	16	45	14	28	32
LSD (0.05)	NS	NS	NS	1	30	20	NS	8	21	NS	7	8

[1] DIGSA = large crabgrass; AMAPA = Palmer amaranth.

[2] Ratings were taken 2, 3 and 4 weeks after planting.

[3] Due to differences in weed control in the crop row (row) and between the crop rows (middle) weed control was evaluated separately.

[4] A 50-cm band of sethoxydim at 0.34 kg ai/ha + CO (Agri-Dex, 1% v/v) was applied postemergence when sorghum-sudan was at the 3-leaf stage. Sorghum-sudan between the rows was treated with glyphosate at 0.87 kg ai/ha 1 week later.

Table 12. Watermelons: Evaluation of over-the-top, layby ethalfluralin treatments for weed control and phytotoxicity, Kibler, 1991[1].

Treatment description[2]	Weed control[3] AMAPA 8 wk[4]	AMAPA 8 wk[5]	AMAPA 12 wk	Grasses 8 wk	Crop injury[3] 8 wk	Yield (mt/ha)	Yield (no/ha)	Yield (kg/melon)
	(%)							
Ethalfluralin, 1.68, pre (check)	63	70	17	63	0	22	3897	6.0
Ethalfluralin, 1.68, pre, fb ethalfluralin, 0.84, layby	70	80	43	40	13	20	2498	8.2
Ethalfluralin, 1.68, pre, fb ethalfluralin, 1.68, layby	83	100	70	67	0	23	3997	5.9
Ethalfluralin, 1.68, pre, fb ethalfluralin, 3.36, layby	83	100	53	90	0	27	5296	5.4
LSD (5%)	NS	NS	NS	NS	NS	NS	NS	1.7

[1] Weed density on May 28 was 130/m^2; weed distribution: 98% AMAPA (Palmer amaranth), 2% variable stand of ERBGR (southwestern cupgrass), SORHA (johnsongrass), ELEIN (goosegrass).
[2] Sethoxydim was applied to all treatments at 5 weeks after planting for grass control.
[3] Ratings were taken 8 and 12 weeks after planting.
[4] Eight-week AMAPA ratings of plants that germinated with the crop.
[5] Eight-week AMAPA ratings of newly germinated (5-cm) plants.

Table 13. Watermelons: Evaluation of conventional and stale seedbed treatments for weed control and phytotoxicity, Kibler, 1991[1].

Treatment description[2]	Weed control[3] AMAPA 4 wk	AMAPA 8 wk[4]	AMAPA 8 wk[5]	AMAPA 12 wk	Grasses 4 wk	Grasses 8 wk	Crop injury[3] 4 wk	Crop injury[3] 8 wk	Yield (mt/ha)	Yield (no/ha)	Yield (kg/melon)
	(%)										
Conventional seedbed preparation:											
Weedy check	0	17	47	13	100	67	0	70	8.6	1499	4.1
Naptalam, 2.8 + bensulide, 5.6, TM, pre	23	50	55	30	100	68	0	30	6.6	1349	4.8
Ethalfluralin, 1.68, pre	88	76	60	20	100	83	0	0	22.1	2773	8.1
Napropamide, 2.24, pre	34	47	70	33	100	70	0	33	6.0	1199	4.1
Napropamide, 4.48, pre	28	58	75	28	100	70	0	28	6.0	1124	5.9
Napropamide, 2.24, pre, fb napropamide, 2.24, ot, layby	--	58	83	35	--	80	--	43	6.6	1649	3.7
Napropamide, 2.24 + clomazone, 0.28, TM, pre	57	57	80	50	100	80	0	20	10.7	1799	6.0
Napropamide, 2.24 + ethalfluralin, 1.68, TM, pre	94	89	63	45	100	73	0	0	17.6	2548	6.8
Ethalfluralin, 1.68, pre 1-m band, atrazine, 1.12, pre, directed off of 1-m band	83	63	67	17	100	60	17	0	18.0	2498	7.2
Ethalfluralin, 1.68, pre, fb DCPA, 11.2, ot layby	--	65	78	40	--	76	--	3	14.7	2023	7.2
Stale seedbed preparation:											
Glyphosate, 0.84 + naptalam, 2.8 + bensulide, 5.6, TM, pre	37	60	67	13	13	33	0	63	1.3	400	3.1
Glyphosate, 0.84 + ethalfluralin, 1.68, TM, pre	73	53	60	18	78	68	0	35	6.6	1274	5.1
Glyphosate, 0.84 + napropamide, 2.24, TM, pre	53	48	68	23	50	55	0	35	4.8	974	5.0
Paraquat, 0.56 + naptalam, 2.8 + bensulide, 5.6, TM, pre	73	58	65	33	60	58	0	15	10.8	1948	5.2
Paraquat, 0.56 + ethalfluralin, 1.68, TM, pre	59	48	60	18	53	60	0	33	6.1	1349	4.4
Paraquat, 0.56 + napropamide, 2.24, TM, pre	70	50	75	28	63	68	0	23	5.9	1499	4.3
LSD (5%)	28	22	16	NS	14	23	5	22	8.7	NS	2.0

Continued.

Table 13. Continued.

[1] Weed density on May 28 was 180/m^2; weed distribution: 98% AMAPA (Palmer amaranth), 2% variable stand of ERBGR (southwestern cupgrass), SORHA (johnsongrass), ELEIN (goosegrass).
[2] Sethoxydim was applied to all treatments at 5 weeks after planting for grass control.
[3] Ratings were taken 4, 8 and 12 weeks after planting.
[4] Eight-week AMAPA ratings of plants that germinated with the crop.
[5] Eight-week AMAPA ratings of newly germinated (5-cm) plants.

Table 14. Watermelons: Evaluation of herbicide treatments for weed control and phytotoxicty, Jonesboro, 1991[1].

Treatment description[2]	Weed control[3]										Crop injury			Yield		
	XANST			MOLVE		IPOLA			AMAPA							
	3wk	5wk	10wk	3wk	5wk	3wk	5wk	10wk	5wk	10wk	3wk	5wk	10wk	(mt/ha)	(no/ha)	(kg/melon)
	(%)															
Weedy check	0	0	0	0	0	0	0	0	0	0	0	0	9	26.5	4951	5.4
Weed-free check	100	93	99	100	76	100	99	100	99	99	0	19	16	45.0	7180	6.3
Napropamide, 4.48, pre	55	61	88	100	86	58	78	100	100	100	8	9	18	33.2	6250	5.3
Napropamide, 2.24, pre fb napropamide, 2.24, ot, layby	78	84	100	90	86	13	63	95	98	96	15	10	8	35.7	7024	5.1
Napropamide, 2.24 + clomazone, 0.28, TM, pre	95	93	98	100	83	50	75	95	98	96	10	15	11	32.3	5347	6.0
Napropamide, 2.24 + ethalfluralin, 1.68, TM, pre	78	70	95	100	96	78	91	100	100	99	15	13	11	40.2	6460	6.2
Naptalam, 2.24 + bensulide, 4.48, TM, pre (banded on drill) fb ethalfluralin, 1.68, poe-dir, layby	78	38	90	50	10	58	30	100	100	96	10	10	10	28.0	4679	6.0
Naptalam, 2.24 + bensulide, 4.48, TM, pre (banded on drill) fb napropamide, 2.24, ot, layby	85	38	88	15	10	75	30	83	100	99	3	30	14	27.3	5283	5.2
Naptalam, 2.24 + bensulide, 4.48, pre	20	33	74	45	0	70	10	90	65	98	0	10	10	36.1	6618	5.5
Ethalfluralin, 1.68, pre	45	0	76	85	40	68	30	100	98	98	10	10	8	31.1	4500	6.9
LSD (5%)	44	34	NS	39	25	NS	51	NS	31	NS	NS	NS	NS	NS	NS	NS

[1] Weed density on June 3 was 120/m^2; weed distribution: MOLVE (carpetweed) = 90%; variable stands of XANST (common cocklebur), IPOLA (pitted morningglory) and AMAPA (Palmer amaranth) = 10%.

[2] Sethoxydim was applied to all treatments at 5 weeks after planting for grass control.

[3] Ratings were taken at 3, 5 and 10 weeks after planting.

Table 15. Watermelons: Evaluation of herbicides applied post-transplant, over-the-top for weed control and phytotoxicity, Jonesboro, 1991[1].

Treatment description[2]	Weed control[3] DIGSA 3wk	MOLVE 3wk	MOLVE 5wk	XANST 5wk	XANST 10wk	IPOLA 5wk	IPOLA 10wk	AMAPA 5wk	AMAPA 10wk	Crop injury 3wk	Crop injury 5wk	Crop injury 10wk	Yield (mt/ha)	Yield (no/ha)	Yield (kg/melon)
	(%)														
Weedy check	0	0	0	0	0	0	0	0	0	0	0	0	25.5	2953	8.6
Weed-free check	100	70	80	87	97	88	95	98	100	0	7	10	26.3	3004	8.8
Napropamide, 4.48, pre	100	80	85	68	73	20	27	100	77	13	30	3	25.5	2937	8.7
Napropamide, 2.24, pre fb napropamide, 2.24, ot, layby	100	97	83	58	75	53	60	100	95	0	13	0	36.0	4085	8.8
Napropamide, 2.24 + clomazone, 0.28, TM, pre	100	100	87	63	85	43	27	100	98	0	15	20	34.9	3945	8.9
Napropamide, 2.24 + ethalfluralin, 1.68, TM, pre	67	67	90	85	85	87	87	93	100	0	22	12	25.9	3412	7.6
Naptalam, 2.24 + bensulide, 4.48, TM, pre (banded on drill) fb ethalfluralin, 1.68, poe-dir, layby	100	57	38	70	90	87	80	100	100	0	8	17	36.9	3504	10.5
Naptalam, 2.24 + bensulide, 4.48, TM, pre (banded on drill) fb napropamide, 2.24, ot, layby	100	40	47	58	58	60	37	98	93	0	2	20	38.6	5065	7.6
Naptalam, 2.24 + bensulide, 4.48, pre	100	73	40	80	93	33	30	100	100	7	17	7	34.0	4051	8.4
Ethalfluralin, 1.68, pre	100	67	75	40	53	57	13	100	67	0	7	7	42.1	5459	7.7
LSD (5%)	31	NS	38	NS	NS	NS	NS	7	NS	NS	NS	NS	NS	NS	NS

[1] Weed density on June 3 was 120/m^2; weed distribution: DIGSA (large crabgrass) = 10%; MOLVE (carpetweed) = 90%; variable stands of XANST (common cocklebur), IPOLA (pitted morningglory) and AMAPA (Palmer amaranth).

[2] Sethoxydim was applied to all treatments at 5 weeks after planting for grass control.

Table 16. Blackberry: Evaluation of metolachlor for phytotoxicity, Fayetteville, 1991.

Treatment description (kg ai/ha)	Crop injury[1] 2 wk (%)	Yield[2] (mt/ha)
Control	0	2.27
Metolachlor, 2.24, poe-dir	0	2.17
Metolachlor, 4.48, poe-dir	0	2.57
LSD (0.05)	NS	NS

[1] Ratings were taken 2 weeks after post-directed applications.
[2] There were no differences in maturity, so harvests were combined for total yield.

Table 17. Grapes: Evaluation of dithiopyr and MON-13211 for phytotoxicity and weed control, Fayetteville, 1991.

Treatment description (kg ai/ha)	ERICA control[1,2] 6 wk	Crop injury[2] 2 wk	Crop injury[2] 6 wk	Yield (mt/ha)
	(%)	(%)	(%)	
Weedy check	0	0	0	13
Dithiopyr, 0.55, pre	43	0	0	15
Dithiopyr, 1.1, pre	58	0	0	12
Dithiopyr, 2.2, pre	86	0	0	19
MON-13211, 0.55, pre	17	0	0	18
MON-13211, 1.1, pre	40	0	0	19
MON-13211, 2.2, pre	30	0	0	12
Oryzalin, 2.2 + diuron, 2.8, TM, pre	97	0	0	14
LSD (0.05)	47	NS	NS	NS

[1] ERICA = horseweed.
[2] Ratings were taken 2 and 6 weeks after preemergence applications.

Table 18. Grapes: Evaluation of glufosinate for phytotoxicity and weed control, Fayetteville, 1991[1].

Treatment description	Sucker control[2]								
	2 wk			3 wk			4 wk		
	Saturn	Reliance	Mars	Saturn	Reliance	Mars	Saturn	Reliance	Mars
(kg ai/ha)	(%)								
Control	0	0	0	0	0	0	0	0	0
Glufosinate, 0.84, poe-dir	29	30	71	23	3	82	10	0	85
Glufosinate, 0.84 + oryzalin, 2.2 + diuron, 2.2, TM, poe-dir	10	43	40	23	47	53	62	43	40
LSD (0.05)	NS	NS	25	NS	NS	40	36	NS	21

Treatment description	Weed control[2]													Crop Injury[2,3]	Yield		
	1 wk[2]				2 wk			3 wk				4 wk			Saturn	Reliance	Mars
	ERICA	LACSE	OEOLA	VICVI	ERICA	LACSE	VICVI	ERICA	LACSE	OEOLA	VICVI	ERICA	LACSE				
(kg ai/ha)	(%)														(mt/ha)		
Control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	3
Glufosinate, 0.84, poe-dir	100	99	100	100	100	100	100	100	100	100	100	100	100	0	8	6	4
Glufosinate, 0.84 + oryzalin, 2.2 + diuron, 2.2, TM, poe-dir	99	90	100	94	100	100	100	100	100	100	100	100	100	0	5	6	7
LSD (0.05)	2	2	40	3	1	1	1	1	1	1	1	1	1	NS	NS	NS	NS

[1] Average weed sizes at the time of postemergence applications: ERICA (horseweed) = 50 cm; LACSE (prickly lettuce) = 40 cm; OEOLA (cutleaf eveningprimrose) = 40 cm dia.; VICVI (common vetch) = 60 cm; suckers: Saturn = 10-100 cm with 5-15 leaves; Reliance = 10-100 cm with 5-15 leaves; Mars = 10-100 cm with 5-15 leaves.

[2] Ratings were taken 1, 2, 3 and 4 weeks after application.

[3] No crop injury was observed for the varieties evaluated during the rating period, so results were averaged over variety and time.

Table 19. Boxwood: Evaluation of bentazon for weed control and phytotoxicity, Fayetteville, 1991[1].

Treatment description	CYPES control[2]					CYPES density[3]	Injury[2]				
	2 wk	3 wk	4 wk	6 wk	9 wk	6 wk	2 wk	3 wk	4 wk	6 wk	9 wk
(kg ai/ha)	(%)					(#/m²)	(%)				
Weedy check	0	0	0	0	0	1158	0	0	0	0	0
Bentazon, 1.12 + CO (Agri-Dex®, 1% v/v), poe (1 wk, 4 wk, 7 wk)[4]	0	0	24	53	94	893	0	0	0	0	0
Bentazon, 1.12 + CO (Agri-Dex®, 1% v/v), poe (1 wk, 3 wk, 4 wk, 7 wk)[4]	0	0	25	56	75	1027	0	0	0	0	0
LSD (0.05)	NS	NS	NS	30	14	NS	NS	NS	NS	NS	NS

[1] CYPES = yellow nutsedge.
[2] Ratings were taken 2, 3, 4, 6 and 9 weeks after planting.
[3] Density counts were made 6 weeks after planting.
[4] Bentazon treatments were made 1, 3, 4 and 7 weeks after planting.

Table 20. Coreopsis: Evaluation of sethoxydim for phytotoxicity, Fayetteville, 1991.

Treatment description	Injury[1]	
	1 wk	5 wk
(kg ai/ha)	(%)	
Weedy check	0	0
Sethoxydim[2], 0.56 + CO (Agri-Dex®, 1% v/v), poe	0	0
Sethoxydim, 1.12 + CO (Agri-Dex®, 1% v/v), poe	0	0
Sethoxydim, 0.56 + CO (Agri-Dex®, 1% v/v), poe fb sethoxydim, 0.56 + CO (Agri-Dex®, 1% v/v), poe (30 days later)	0	0
LSD (0.05)	NS	NS

[1] Injury ratings were taken 1 and 5 weeks after the first sethoxydim application. The 5-week rating corresponds to 2 weeks after the second sethoxydim application.
[2] Poast Plus® was used as the source of sethoxydim.

Table 21. Dahlia: Evaluation of napropamide for weed control and phytotoxicity, Fayetteville, 1991[1].

Treatment description	CYPES control[2]				CYPES density[3]	Injury[2]			
	2 wk	3 wk	4 wk	6 wk	4 wk	2 wk	3 wk	4 wk	6 wk
(kg ai/ha)	(%)				(pl/m^2)	(%)			
Weedy check	0	0	0	0	112	0	0	0	0
Napropamide, 4.5, tp-pre	0	0	10	0	161	0	0	0	0
Napropamide, 9.0, tp-pre	0	0	16	5	228	0	0	0	0
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS

[1] CYPES = yellow nutsedge.
[2] Ratings were taken 2, 3, 4 and 6 weeks after application.
[3] Density counts were made 4 weeks after application.

Table 22. Hosta: Evaluation of napropamide for weed control and phytotoxicity, Fayetteville, 1991[1].

Treatment description	Weed control[2]						Crop density[3]	Injury[2]			
	CYPES				AMAAL						
	2 wk	3 wk	4 wk	6 wk	2 wk	3 wk	4 wk	2 wk	3 wk	4 wk	6 wk
(kg ai/ha)	(%)						(pl/m^2)	(%)			
Weedy check	0	0	0	0	0	0	169	0	0	0	0
Napropamide, 4.5, tp-pre	0	0	0	0	100	100	77	0	0	0	0
Napropamide, 9.0, tp-pre	0	0	23	0	100	100	265	0	0	0	0
LSD (0.05)	NS	NS	15	NS	1	2	NS	NS	NS	NS	NS

[1] CYPES = yellow nutsedge; AMAAL = tumble pigweed.
[2] Ratings were taken 2, 3, 4 and 6 weeks after application.

Table 23. Container Ornamentals: Evaluation of metolachlor for phytotoxicity on daisy and yarrow, Fayetteville, 1991.

Treatment description	Injury[1]										Plants/Plot[2]	
	Daisy					Yarrow						
	1 wk	2 wk	3 wk	4 wk	6 wk	1 wk	2 wk	3 wk	4 wk	6 wk	Daisy	Yarrow
(kg ai/ha)	(%)											
Control	0	0	0	0	0	0	0	0	0	0	5	5
Metolachlor (7.8E), 4.48, tp-pre	0	0	0	1	13	0	0	0	5	5	4.5	5
Metolachlor (7.8E), 8.96, tp-pre	0	0	0	8	23	0	0	0	4	0	4.5	5
Metolachlor (5G), 4.48, tp-pre	0	0	0	5	25	0	0	0	28	25	4	5
Metolachlor (5G), 8.96, tp-pre	0	0	0	23	58	0	0	0	24	23	4	4.5
LSD (0.05)	NS	NS	NS	NS	31	NS	NS	NS	6	9	NS	NS

[1] Injury ratings were taken 1, 2, 3, 4 and 6 weeks after application.
[2] Recorded 6 weeks after treatment.

Table 24. Daisy: Evaluation of oryzalin for phytotoxicity on container-grown daisy, Fayetteville, 1991.

Treatment description	Injury[1]			
	1 wk	2 wk	3 wk	5 wk
(kg ai/ha)	(%)			
Control	0	0	0	0
Oryzalin, 2.24, tp-pre	0	0	0	0
Oryzalin, 4.48, tp-pre	0	0	0	0
LSD (0.05)	NS	NS	NS	NS

[1] Ratings were taken 1, 2, 3 and 5 weeks after treatment.

Table 25. Hosta: Evaluation of napropamide for phytotoxicity on container-grown hosta, Fayetteville, 1991.

Treatment description	Injury[1]				
	1 wk	2 wk	3 wk	4 wk	6 wk
(kg ai/ha)	(%)				
Control	0	0	0	0	0
Napropamide, 4.5, tp-pre	0	0	0	0	0
Napropamide, 9.0, tp-pre	0	0	0	0	0
LSD (0.05)	NS	NS	NS	NS	NS

[1] Ratings were taken 1, 2, 3, 4 and 6 weeks after treatment.

Table 26. Wildflowers: Evaluation of metolachlor for phytotoxicity on rudbeckia and yarrow, Fayetteville, 1991.

Treatment description	Injury[1]			
	Rudbeckia		Yarrow	
	2 wk	5 wk	2 wk	5 wk
(kg ai/ha)	(%)			
Control	0	0	0	0
Metolachlor (8E), 4.48, tp-pre	0	0	8	13
Metolachlor (8E), 8.96, tp-pre	0	0	23	43
Metolachlor (5G), 4.48, tp-pre	0	0	18	26
Metolachlor (5G), 8.96, tp-pre	0	8	5	30
LSD (0.05)	NS	NS	13	13

[1] Injury ratings were taken 2 and 5 weeks after [illegible].

Table 27. Wildflowers: Evaluation of herbicides for weed control and phytotoxicity, Fayetteville, 1991[1].

Treatment description	DIGSA control		Injury[2]								Stand counts[3]	
			Rudbeckia				Yarrow					
	2 wk	4 wk	2 wk	4 wk	5 wk	8 wk[4]	2 wk	4 wk	5 wk	8 wk[4]	Rudbeckia	Yarrow
(kg ai/ha)	(%)										(pl/plot)	
Weedy check	0	0	0	0	0	0	0	0	0	0	4.0	4.0
Fluazifop-P, 0.42 + WA (X-77®, 0.25% v/v), poe	--	100	0	0	0	0	0	0	0	0	4.0	4.0
Fluazifop-P, 0.84 + WA (X-77®, 0.25% v/v), poe	--	100	13	5	18	5	0	3	8	15	3.3	3.8
Isoxaben, 0.56, tp-pre	100	100	53	28	63	8	65	40	88	90	1.5	0.8
Isoxaben, 1.12, tp-pre	100	100	59	58	79	40	85	100	98	--	1.3	0.0
Isoxaben, 2.24, tp-pre	100	100	68	68	78	20	88	95	98	--	1.3	0.0
Oryzalin, 2.24, tp-pre	100	100	15	10	18	0	18	18	23	18	3.0	3.0
Oryzalin, 4.48, tp-pre	100	100	23	23	45	23	20	26	25	33	2.3	3.8
LSD (0.05)	1	1	26	20	25	25	21	24	23	27	0.9	0.9

[1] DIGSA (large crabgrass) size at the fluazifop-P application was 1-5 cm with 2-4 leaves.
[2] Ratings were taken at 2, 4, 5 and 8 weeks after the tp-pre applications. The 4-, 5- and 8-week ratings correspond to 2, 3 and 6 weeks after the postemergence applications.
[3] Stand counts were taken 8 weeks after the tp-pre applications.
[4] The 8-week rating is based only on surviving plants.

Table 28. Evaluation of selected herbicides for phytotoxicity to wildflowers, Fayetteville, 1991.

Treatment description	Injury[1]								
	Painted daisy	Blue Flax	California Poppy	Lanceleaf Coreopsis	Perennial Lupine	Red Mexican Hat	Scarlet Flax	Tall Evening Primrose	Blanket Flower
	(%)								
Weed-free check	0	0	0	0	0	0	0	0	0
DCPA, 11.2, pre	33	43	0	7	7	0	10	33	100
Napropamide, 2.2, pre	0	55	75	0	60	0	50	50	0
EPTC, 3.3, pre	37	23	50	10	0	93	13	100	90
Metolachlor, 2.2, pre	87	53	90	40	7	87	27	100	87
Simazine, 2.2, pre	100	100	100	100	100	100	100	100	100
Pendimethalin, 1.1, pre	30	33	17	7	7	100	63	33	50
Terbacil, 1.1, pre	100	100	100	100	100	100	93	100	100
Oryzalin, 2.2, pre	67	73	27	7	10	70	63	43	50
LSD (0.05)	66	55	22	33	32	23	41	76	87

Treatment description	Injury[1]							
	Chicory	Corn-flower	Lemon Mint	Ox-eye Daisy	Black-eyed Susan	Prairie Coneflower	Blazing Star	White Yarrow
	(%)							
Weed-free check	0	0	0	0	0	0	0	0
DCPA, 11.2, pre	57	0	100	67	80	83	67	60
Napropamide, 2.2, pre	75	45	50	100	100	100	50	90
EPTC, 3.3, pre	47	33	100	100	100	100	100	100
Metolachlor, 2.2, pre	87	50	100	100	100	100	67	100
Simazine, 2.2, pre	100	100	100	100	100	100	100	100
Pendimethalin, 1.1, pre	67	23	65	7	100	67	33	67
Terbacil, 1.1, pre	100	100	100	100	100	100	100	100
Oryzalin, 2.2, pre	67	67	100	100	100	100	100	100
LSD (0.05)	44	39	49	38	28	44	68	55

Table 29. Woody Ornamentals: Yellow nutsedge control programs in woody ornamentals, Fayetteville, 1991.

Treatment description	Weed control[2] CYPES 3wk	4wk	5wk	6wk	10wk	17wk	DIGSA 6wk	CYPES density[2] 3wk	6wk	10wk	17wk	Azalea injury[2] 3wk	4wk	5wk	6wk	Crepe myrtle injury[1] 3wk	4wk	5wk	6wk	10wk	17wk
(kg ai/ha)	(%)							(plants/m^2)				(%)				(%)					
Control	0	0	0	0	0	0	0	687	930	925	164	0	0	0	0	0	0	0	0	0	0
Metolachlor (5G), 6.72, tp-pre[3]	66	73	73	50	28	98	98	297	231	213	2	0	10	6	0	0	0	0	0	0	0
Metolachlor (5G), 6.72, tp-pre fb bentazon, 1.12 + CO (Agri-Dex, 1% v/v), poe (3-4 lf) (2 wk, 4 wk, 5 wk, 7 wk)[4]	70	73	78	86	80	99	96	277	116	126	2	0	0	0	1	0	0	0	0	0	0
Chlorimuron, 0.036, tp-pre[3]	86	79	83	74	34	96	60	158	174	328	14	0	0	0	0	0	0	0	4	0	0
Chlorimuron, 0.062, tp-pre[3]	93	93	95	85	70	99	70	213	134	239	0	0	0	3	3	0	0	0	6	0	0
Chlorimuron, 0.036, tp-pre[3] fb bentazon, 1.12 + CO (Agri-Dex, 1% v/v), poe (3-4 lf) (2 wk, 4 wk, 5 wk, 7 wk)[4]	85	86	86	81	69	73	60	217	210	307	94	0	15	0	4	0	0	0	4	0	0
Chlorimuron, 0.036, tp-pre[3] fb chlorimuron, 0.036, poe (5 wk)[4]	84	80	71	76	92	94	51	253	223	96	22	0	8	0	3	0	0	0	6	0	0
Bentazon, 1.12 + CO (Agri-Dex, 1% v/v), poe (3-4 lf) (2 wk, 4 wk, 5 wk, 7 wk)[4]	0	30	43	63	94	45	8	574	152	55	140	0	0	3	3	0	0	0	3	0	0
Imazaquin, 0.43, tp-pre[3]	94	88	75	69	40	97	95	144	482	343	17	0	20	5	5	0	0	0	8	74	60
LSD (0.05)	14	13	12	19	12	28	19	168	202	113	97	NS	NS	NS	NS	NS	NS	NS	5	12	2

[1] CYPES = yellow nutsedge; DIGSA = large crabgrass.
[2] Weed control ratings, crop injury ratings and weed counts were taken 3, 4, 5, 6, 10 and 17 weeks after the preemergence treatments were first applied.
[3] Plots were hand weeded and preemergence treatments were reapplied on July 18, which corresponds to 10 weeks after the first preemergence application.
[4] Postemergence treatments were applied at 2, 4, 5 or 7 weeks after preemergence treatments.

Table 30. Bedding plants: Evaluation of herbicides for weed control and phytotoxicity, Fayetteville, 1991[1].

Treatment description	Injury[2]														
	Ageratum (cv. Blue Danube)					Alyssum (cv. New Carpet of Snow)					Aster (cv. Double Blue)				
	1wk	2wk	4wk	6wk	10wk	1wk	2wk	4wk	6wk	10wk	1wk	2wk	4wk	6wk	10wk
(kg ai/ha)	(%)														
Weed-free check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isoxaben, 0.8, pre	10	7	17	27	0	100	73	100	100	100	0	0	72	43	77
Isoxaben, 1.1, pre	0	7	10	30	0	91	67	100	100	100	0	0	73	37	30
[Isoxaben, 0.55 + oryzalin, 1.65 (Snapshot® 80DF, 2.2), pre]	0	0	3	0	0	87	10	100	100	100	0	0	30	0	10
[Isoxaben, 0.83 + oryzalin, 2.48 (Snapshot® 80DF, 3.3), pre]	0	0	0	10	0	73	30	98	100	100	0	0	72	7	17
[Isoxaben, 0.84 + trifluralin, 3.36 (Snapshot® 2.5G, 4.2), pre]	0	5	14	20	0	70	23	100	100	100	0	0	38	8	53
[Isoxaben, 1.12 + trifluralin, 4.48 (Snapshot® 2.5G, 5.6), pre]	0	3	7	10	0	87	10	95	100	100	0	0	28	10	47
Dithiopyr, 1.1, pre	0	0	0	0	0	45	20	78	60	33	0	0	59	25	8
Dithiopyr, 2.2, pre	0	0	0	0	0	45	3	94	65	75	0	0	34	0	45
Dithiopyr, 4.5, pre	0	3	3	10	8	88	28	95	100	100	0	0	29	25	43
[Oxyfluorfen, 1.12 + oryzalin, 2.24 (Rout®, 3.36), pre]	20	28	5	3	0	68	58	50	10	0	0	0	60	0	8
Pendimethalin, 2.2, pre	0	0	0	0	0	30	0	48	20	0	0	0	27	10	23
Metolachlor (Pennant® 5G), 4.5, pre	0	0	0	0	10	7	3	7	0	0	0	0	17	0	43
Sethoxydim, 0.21 + CO (Agri-Dex®, 1% v/v), poe[3]	0	0	0	5	0	0	0	10	0	0	0	0	23	0	0
Sethoxydim, 0.31 + CO (Agri-Dex®, 1% v/v), poe[3]	0	0	0	0	0	8	0	19	4	20	0	0	39	0	15
Clethodim, 0.14 + WA (X-77®, 0.25% v/v), poe[3]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
Glyphosate, 0.83, poe-dir[3]	0	0	6	0	0	45	0	62	48	45	0	0	29	58	53
Glufosinate, 0.82, poe-dir[3]	0	0	0	0	0	50	0	20	0	0	0	0	49	0	70
LSD (0.05)	NS	8	6	14	NS	34	22	23	28	34	NS	NS	28	33	38

Table 30. Continued.

Treatment description (kg ai/ha)	Injury[2] Celosia (cv. Kewpie Red) 1wk	2wk	4wk	6wk	10wk	Coreopsis (cv. lanceleaf) 1wk	2wk	4wk	6wk	10wk	Dahlia (cv. Figaro) 1wk	2wk	4wk	6wk	10wk
	(%)														
Weed-free check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isoxaben, 0.8, pre	23	0	33	82	87	50	16	58	23	10	7	0	52	40	100
Isoxaben, 1.1, pre	25	3	67	71	100	13	3	37	37	33	0	0	30	70	100
[Isoxaben, 0.55 + oryzalin, 1.65 (Snapshot® 80DF, 2.2), pre]	7	3	30	40	87	60	43	90	73	0	0	0	20	0	87
[Isoxaben, 0.83 + oryzalin, 2.48 (Snapshot® 80DF, 3.3), pre]	13	3	50	70	100	10	0	31	20	30	13	0	17	47	77
[Isoxaben, 0.84 + trifluralin, 3.36 (Snapshot® 2.5G, 4.2), pre]	5	3	34	45	83	5	20	23	0	0	8	0	10	18	60
[Isoxaben, 1.12 + trifluralin, 4.48 (Snapshot® 2.5G, 5.6), pre]	13	0	42	57	95	37	3	40	37	33	0	0	5	17	97
Dithiopyr, 1.1, pre	0	0	8	0	15	0	0	14	0	0	0	0	0	0	50
Dithiopyr, 2.2, pre	0	0	24	23	53	0	0	0	0	0	0	0	3	0	0
Dithiopyr, 4.5, pre	0	0	16	13	65	0	0	0	0	0	0	0	5	5	50
[Oxyfluorfen, 1.12 + oryzalin, 2.24 (Rout®, 3.36), pre]	25	10	58	48	23	33	30	13	0	0	13	13	3	5	15
Pendimethalin, 2.2, pre	0	0	10	0	20	0	3	0	0	0	0	0	0	13	20
Metolachlor (Pennant® 5G), 4.5, pre	0	0	7	7	10	0	0	0	0	0	0	0	3	0	0
Sethoxydim, 0.21 + CO (Agri-Dex®, 1% v/v), poe[3]	0	0	3	0	0	8	0	3	0	0	0	0	3	0	0
Sethoxydim, 0.31 + CO (Agri-Dex®, 1% v/v), poe[3]	0	0	4	0	0	0	0	0	0	0	0	0	3	0	0
Clethodim, 0.14 + WA (X-77®, 0.25% v/v), poe[3]	0	0	0	0	8	0	0	0	0	0	0	0	0	13	0
Glyphosate, 0.83, poe-dir[3]	0	0	8	0	68	0	0	69	75	75	0	0	14	10	75
Glufosinate, 0.82, poe-dir[3]	10	0	16	13	80	23	0	48	33	75	8	0	4	0	75
LSD (0.05)	14	23	23	22	33	29	27	27	31	37	NS	NS	12	29	44

Continued.

Table 30. Continued.

Treatment description	Injury[2]														
	Dianthus (cv. Fantasia)					Geranium (cv. Pinwheel Red)					Hibiscus (cv. Southern Belle)				
	1wk	2wk	4wk	6wk	10wk	1wk	2wk	4wk	6wk	10wk	1wk	2wk	4wk	6wk	10wk
(kg ai/ha)	(%)														
Weed-free check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isoxaben, 0.8, pre	27	0	40	47	100	0	3	43	33	10	0	3	7	0	0
Isoxaben, 1.1, pre	30	0	50	50	67	0	3	23	37	33	7	3	10	10	0
[Isoxaben, 0.55 + oryzalin, 1.65 (Snapshot® 80DF, 2.2), pre]	10	3	32	37	67	7	0	12	0	0	33	20	62	13	0
[Isoxaben, 0.83 + oryzalin, 2.48 (Snapshot® 80DF, 3.3), pre]	17	0	27	23	42	0	0	7	0	20	10	7	23	17	0
[Isoxaben, 0.84 + trifluralin, 3.36 (Snapshot® 2.5G, 4.2), pre]	38	5	58	74	65	0	0	8	0	23	0	5	23	0	0
[Isoxaben, 1.12 + trifluralin, 4.48 (Snapshot® 2.5G, 5.6), pre]	13	0	10	17	50	0	3	7	7	10	3	3	25	0	27
Dithiopyr, 1.1, pre	22	0	0	0	0	0	0	15	0	0	0	0	0	0	0
Dithiopyr, 2.2, pre	0	0	0	0	0	0	3	29	5	8	5	3	13	5	0
Dithiopyr, 4.5, pre	5	0	20	8	60	8	0	34	23	20	5	5	8	5	0
[Oxyfluorfen, 1.12 + oryzalin, 2.24 (Rout®, 3.36), pre]	0	3	3	5	0	0	5	11	0	8	38	38	25	0	0
Pendimethalin, 2.2, pre	0	5	33	33	67	0	0	7	0	0	20	7	37	40	17
Metolachlor (Pennant® 5G), 4.5, pre	0	0	0	0	30	0	3	35	13	10	10	10	7	0	0
Sethoxydim, 0.21 + CO (Agri-Dex®, 1% v/v), poe[3]	8	0	8	0	0	0	0	5	0	0	3	0	0	0	0
Sethoxydim, 0.31 + CO (Agri-Dex®, 1% v/v), poe[3]	8	0	8	0	0	0	0	10	0	0	3	0	5	0	0
Clethodim, 0.14 + WA (X-77®, 0.25% v/v), poe[3]	0	0	0	0	10	0	0	0	0	15	0	0	0	5	0
Glyphosate, 0.83, poe-dir[3]	0	0	35	43	75	8	0	7	0	0	0	0	9	0	0
Glufosinate, 0.82, poe-dir[3]	23	0	31	0	50	8	0	18	0	15	18	0	8	0	0
LSD (0.05)	NS	4	30	33	48	10	4	22	22	30	13	8	12	12	14

Table 30. Continued.

Treatment description	Injury[2]														
	Impatiens (cv. Super Elfin Orange)					Marigold (cv. Pineapple Crush)					Marigold (cv. Red Hero)				
	1wk	2wk	4wk	6wk	10wk	1wk	2wk	4wk	6wk	10wk	1wk	2wk	4wk	6wk	10wk
(kg ai/ha)	(%)														
Weed-free check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isoxaben, 0.8, pre	47	12	78	67	87	33	3	62	53	43	37	13	60	53	10
Isoxaben, 1.1, pre	33	13	77	70	97	13	0	27	43	20	47	13	53	63	33
[Isoxaben, 0.55 + oryzalin, 1.65 (Snapshot® 80DF, 2.2), pre]	33	3	65	53	73	10	0	7	0	0	0	0	10	7	0
[Isoxaben, 0.83 + oryzalin, 2.48 (Snapshot® 80DF, 3.3), pre]	10	0	50	27	20	0	0	49	53	43	7	2	43	37	0
[Isoxaben, 0.84 + trifluralin, 3.36 (Snapshot® 2.5G, 4.2), pre]	5	3	55	40	40	0	0	3	3	8	15	5	13	13	20
[Isoxaben, 1.12 + trifluralin, 4.48 (Snapshot® 2.5G, 5.6), pre]	7	0	22	17	10	7	0	0	10	0	7	0	30	30	10
Dithiopyr, 1.1, pre	0	0	25	0	8	0	0	0	0	0	8	3	5	0	0
Dithiopyr, 2.2, pre	0	0	13	5	0	0	0	0	0	0	0	0	0	0	0
Dithiopyr, 4.5, pre	8	5	24	13	18	5	0	5	8	0	0	0	0	0	0
[Oxyfluorfen, 1.12 + oryzalin, 2.24 (Rout®, 3.36), pre]	75	100	100	100	100	25	0	30	23	0	40	20	39	20	0
Pendimethalin, 2.2, pre	0	0	58	27	23	0	0	3	13	0	0	0	7	13	13
Metolachlor (Pennant® 5G), 4.5, pre	0	0	33	10	0	0	0	10	20	0	0	2	10	0	43
Sethoxydim, 0.21 + CO (Agri-Dex®, 1% v/v), poe[3]	0	0	13	0	0	0	0	0	0	0	5	0	0	0	0
Sethoxydim, 0.31 + CO (Agri-Dex®, 1% v/v), poe[3]	0	0	20	0	10	0	0	5	0	0	0	0	0	0	0
Clethodim, 0.14 + WA (X-77®, 0.25% v/v), poe[3]	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0
Glyphosate, 0.83, poe-dir[3]	0	0	20	0	10	0	0	0	8	0	0	0	8	0	0
Glufosinate, 0.82, poe-dir[3]	0	0	28	8	23	0	0	3	0	0	0	0	15	13	25
LSD (0.05)	27	5	22	18	30	14	NS	20	18	20	17	31	30	24	33

Continued.

Table 30. Continued.

Treatment description	Injury[2]														
	Nicotinia (cv. Nicki Red)					Ornamental Peppers (cv. Fire Works)					Petunia (cv. Red Cloud)				
	1wk	2wk	4wk	6wk	10wk	1wk	2wk	4wk	6wk	10wk	1wk	2wk	4wk	6wk	10wk
(kg ai/ha)	(%)														
Weed-free check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isoxaben, 0.8, pre	77	20	100	100	100	27	12	55	73	43	27	0	17	30	10
Isoxaben, 1.1, pre	50	3	98	100	100	43	23	65	67	67	23	3	13	37	10
[Isoxaben, 0.55 + oryzalin, 1.65 (Snapshot® 80DF, 2.2), pre]	43	10	100	100	100	27	12	42	30	20	13	0	40	27	0
[Isoxaben, 0.83 + oryzalin, 2.48 (Snapshot® 80DF, 3.3), pre]	40	3	91	77	67	30	10	40	27	30	23	0	18	13	10
[Isoxaben, 0.84 + trifluralin, 3.36 (Snapshot® 2.5G, 4.2), pre]	31	10	95	95	100	18	12	33	58	30	0	5	8	8	0
[Isoxaben, 1.12 + trifluralin, 4.48 (Snapshot® 2.5G, 5.6), pre]	47	0	100	100	100	27	3	27	40	23	3	3	3	10	20
Dithiopyr, 1.1, pre	0	0	19	0	30	0	0	0	0	0	0	3	8	0	8
Dithiopyr, 2.2, pre	0	0	53	48	73	8	0	20	3	8	0	0	8	0	0
Dithiopyr, 4.5, pre	10	3	78	90	100	10	3	39	31	25	15	3	56	50	50
[Oxyfluorfen, 1.12 + oryzalin, 2.24 (Rout®, 3.36), pre]	85	61	95	98	25	95	73	95	100	100	13	96	100	75	100
Pendimethalin, 2.2, pre	7	0	47	13	0	0	7	10	0	0	25	7	23	0	17
Metolachlor (Pennant® 5G), 4.5, pre	0	0	7	13	10	10	7	23	13	0	10	0	8	0	0
Sethoxydim, 0.21 + CO (Agri-Dex®, 1% v/v), poe[3]	0	0	0	0	0	0	0	3	0	0	0	0	5	0	0
Sethoxydim, 0.31 + CO (Agri-Dex®, 1% v/v), poe[3]	0	0	0	0	0	0	0	5	0	0	0	0	4	0	0
Clethodim, 0.14 + WA (X-77®, 0.25% v/v), poe[3]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
Glyphosate, 0.83, poe-dir[3]	0	0	8	18	18	3	0	24	25	15	0	0	33	13	25
Glufosinate, 0.82, poe-dir[3]	15	0	10	8	18	0	0	3	0	0	8	0	28	25	45
LSD (0.05)	26	12	19	19	37	17	12	27	32	36	NS	5	26	29	37

Table 30. Continued.

Treatment description	Injury[2]														
	Petunia (cv. Snow Cloud)					Blue Salvia (cv. Blue Rhea)					Salvia (cv. Red Pillar)				
	1wk	2wk	4wk	6wk	10wk	1wk	2wk	4wk	6wk	10wk	1wk	2wk	4wk	6wk	10wk
(kg ai/ha)	(%)														
Weed-free check	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
Isoxaben, 0.8, pre	0	13	43	53	67	86	60	100	100	100	97	70	100	100	100
Isoxaben, 1.1, pre	17	0	50	33	0	67	37	100	100	100	100	93	100	100	100
[Isoxaben, 0.55 + oryzalin, 1.65 (Snapshot® 80DF, 2.2), pre]	57	0	38	0	33	43	17	93	100	100	100	85	100	100	100
[Isoxaben, 0.83 + oryzalin, 2.48 (Snapshot® 80DF, 3.3), pre]	23	0	43	13	30	27	33	88	100	100	100	100	100	100	100
[Isoxaben, 0.84 + trifluralin, 3.36 (Snapshot® 2.5G, 4.2), pre]	0	0	21	5	0	23	3	78	86	98	35	20	91	95	100
[Isoxaben, 1.12 + trifluralin, 4.48 (Snapshot® 2.5G, 5.6), pre]	7	0	40	27	20	50	3	88	98	100	63	26	95	100	100
Dithiopyr, 1.1, pre	0	0	14	0	0	0	3	8	0	0	0	8	33	0	72
Dithiopyr, 2.2, pre	15	0	3	8	0	0	5	34	10	0	0	3	18	13	75
Dithiopyr, 4.5, pre	30	3	29	15	40	0	45	68	63	73	0	3	48	8	90
[Oxyfluorfen, 1.12 + oryzalin, 2.24 (Rout®, 3.36), pre]	100	60	78	58	50	36	0	25	0	0	33	26	34	0	0
Pendimethalin, 2.2, pre	17	13	20	0	0	0	0	53	30	0	0	8	35	17	33
Metolachlor (Pennant® 5G), 4.5, pre	10	0	52	13	0	0	0	0	0	0	0	0	20	13	10
Sethoxydim, 0.21 + CO (Agri-Dex®, 1% v/v), poe[3]	8	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Sethoxydim, 0.31 + CO (Agri-Dex®, 1% v/v), poe[3]	0	0	8	0	0	0	0	3	3	0	0	0	4	0	15
Clethodim, 0.14 + WA (X-77®, 0.25% v/v), poe[3]	0	0	0	0	15	0	0	0	0	0	0	0	0	0	35
Glyphosate, 0.83, poe-dir[3]	5	0	13	8	23	0	0	15	20	10	0	0	8	10	35
Glufosinate, 0.82, poe-dir[3]	10	0	23	8	23	0	0	6	0	19	8	0	18	0	38
LSD (0.05)	19	20	38	32	44	23	19	21	22	23	16	12	18	15	39

Continued.

Table 30. Continued.

Treatment description (kg ai/ha)	Injury[2] Snapdragon (cv. Tahitii) 1wk	2wk	4wk	6wk	10wk	Vinca (cv. Bright Eyes) 1wk	2wk	4wk	6wk	10wk	Zinnia (cv. Yellow Marvel) 1wk	2wk	4wk	6wk	10wk
	(%)														
Weed-free check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isoxaben, 0.8, pre	27	36	88	93	100	0	0	32	27	23	7	13	33	30	0
Isoxaben, 1.1, pre	55	53	97	100	100	10	0	23	20	27	0	3	23	30	0
[Isoxaben, 0.55 + oryzalin, 1.65 (Snapshot® 80DF, 2.2), pre]	53	33	75	77	77	7	0	13	13	47	13	0	30	20	0
[Isoxaben, 0.83 + oryzalin, 2.48 (Snapshot® 80DF, 3.3), pre]	33	18	83	100	97	17	0	33	37	43	0	3	12	10	0
[Isoxaben, 0.84 + trifluralin, 3.36 (Snapshot® 2.5G, 4.2), pre]	25	13	81	73	98	15	3	24	25	25	0	5	20	8	0
[Isoxaben, 1.12 + trifluralin, 4.48 (Snapshot® 2.5G, 5.6), pre]	43	10	88	87	77	0	3	18	10	10	7	7	13	23	10
Dithiopyr, 1.1, pre	0	3	5	8	0	0	0	0	0	0	0	5	5	0	0
Dithiopyr, 2.2, pre	18	19	30	23	40	0	0	0	0	0	0	3	0	0	0
Dithiopyr, 4.5, pre	35	5	70	35	80	10	8	18	10	10	0	0	0	0	0
[Oxyfluorfen, 1.12 + oryzalin, 2.24 (Rout®, 3.36), pre]	65	85	64	30	38	0	25	3	0	0	23	23	15	18	0
Pendimethalin, 2.2, pre	20	17	8	7	10	0	0	0	0	0	0	3	10	0	0
Metolachlor (Pennant® 5G), 4.5, pre	27	7	10	20	0	0	0	10	0	0	0	3	0	0	0
Sethoxydim, 0.21 + CO (Agri-Dex®, 1% v/v), poe[3]	1	0	0	0	0	0	0	0	0	0	0	0	5	0	0
Sethoxydim, 0.31 + CO (Agri-Dex®, 1% v/v), poe[3]	5	0	10	0	0	0	0	3	0	0	0	0	4	0	0
Clethodim, 0.14 + WA (X-77®, 0.25% v/v), poe[3]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glyphosate, 0.83, poe-dir[3]	15	0	28	38	50	0	0	13	22	25	0	0	3	0	0
Glufosinate, 0.82, poe-dir[3]	18	0	8	0	23	13	0	20	0	0	0	0	0	0	0
LSD (0.05)	28	18	23	30	38	NS	NS	28	NS	NS	NS	17	17	18	5

Treatment description	Weed control					
	DIGSA			AMASP		
	2wk	4wk	10wk	2wk	4wk	10wk
	(%)					
Weed-free check	0	0	0	0	0	0
Isoxaben, 0.8, pre	100	98	100	100	100	80
Isoxaben, 1.1, pre	100	100	97	100	100	100
[Isoxaben, 0.55 + oryzalin, 1.65 (Snapshot® 80DF, 2.2), pre]	100	100	97	100	100	100
[Isoxaben, 0.83 + oryzalin, 2.48 (Snapshot® 80DF, 3.3), pre]	100	100	93	100	100	100
[Isoxaben, 0.84 + trifluralin, 3.36 (Snapshot® 2.5G, 4.2), pre]	99	100	100	100	100	100
[Isoxaben, 1.12 + trifluralin, 4.48 (Snapshot® 2.5G, 5.6), pre]	99	99	100	100	100	100
Dithiopyr, 1.1, pre	100	100	100	100	94	98
Dithiopyr, 2.2, pre	99	100	100	100	100	100
Dithiopyr, 4.5, pre	100	100	100	100	100	98
[Oxyfluorfen, 1.12 + oryzalin, 2.24 (Rout®, 3.36), pre]	100	100	90	83	100	100
Pendimethalin, 2.2, pre	98	100	75	100	100	57
Metolachlor (Pennant® 5G), 4.5, pre	100	100	77	100	100	80
Sethoxydim, 0.21 + CO (Agri-Dex®, 1% v/v), poe[3]	0	100	80	0	0	0
Sethoxydim, 0.31 + CO (Agri-Dex®, 1% v/v), poe[3]	0	100	100	0	0	0
Clethodim, 0.14 + WA (X-77®, 0.25% v/v), poe[3]	0	100	95	0	0	0
Glyphosate, 0.83, poe-dir[3]	0	76	96	0	98	96
Glufosinate, 0.82, poe-dir[3]	0	83	86	0	88	73
LSD (0.05)	22	4	16	12	5	24

[1] DIGSA = large crabgrass; AMASP = pigweed species.

[2] Injury and weed control ratings were taken 1, 2, 4, 6 and 10 weeks after the preemergence treatments. The 4-, 6- and 10-week ratings correspond to 2, 4 and 8 weeks after the first postemergence application. The 6- and 10-week injury ratings correspond to 2 and 6 weeks after the second postemergence application.

[3] Postemergence treatments were applied on 5-27-91 and 6-15-91.

Table 31. Bedding Plants: Time and cost spent handweeding, Fayetteville, 1990.

Treatment description	Hoe times[1]					Hoe costs[1,2]				
	4 wk	6 wk	8 wk	11 wk	Total	4 wk	6 wk	8 wk	11 wk	Total
(kg ai/ha)	minutes/10m^2					$/10m^2				
Weed-free check	30.5	5.1	8.5	21.8	65.9	2.54	0.43	0.71	1.81	5.49
Isoxaben, 0.8, pre	9.6	0.6	7.3	8.6	26.1	0.80	0.05	0.60	0.72	2.17
Isoxaben, 1.1, pre	3.6	1.0	7.4	12.3	24.2	0.30	0.08	0.61	1.02	2.01
[Isoxaben, 0.55 + oryzalin, 1.65 (Snapshot® 80DF, 2.2), pre]	1.0	0.6	7.3	8.0	16.9	0.08	0.05	0.60	0.67	1.41
[Isoxaben, 0.83 + oryzalin, 2.48 (Snapshot® 80DF, 3.3), pre]	2.3	0.1	7.9	6.5	16.8	0.19	0.10	0.66	0.54	1.40
[Isoxaben, 0.84 + trifluralin, 3.36 (Snapshot® 2.5G, 4.2), pre]	3.1	0.7	6.9	5.6	16.3	0.26	0.06	0.57	0.47	1.36
[Isoxaben, 1.12 + trifluralin, 4.48 (Snapshot® 2.5G, 5.6), pre]	4.0	0.3	4.8	5.6	14.6	0.33	0.02	0.40	0.47	1.22
Dithiopyr, 1.1, pre	6.9	0.5	4.3	5.9	17.5	0.58	0.04	0.35	0.49	1.46
Dithiopyr, 2.2, pre	6.2	0.4	4.3	5.9	16.7	0.52	0.03	0.35	0.49	1.39
Dithiopyr, 4.5, pre	3.3	0.6	4.3	4.8	13.8	0.28	0.05	0.41	0.41	1.15
[Oxyfluorfen, 1.12 + oryzalin, 2.24 (Rout®, 3.36), pre]	4.0	0.4	5.0	9.5	25.3	0.33	0.20	0.78	0.79	2.10
Pendimethalin, 2.2, pre	5.8	2.0	9.4	8.1	26.0	0.48	0.17	0.84	0.68	2.17
Metolachlor (Pennant® 5G), 4.5, pre	6.6	1.1	10.1	10.6	28.9	0.55	0.09	0.88	0.88	2.41
Sethoxydim, 0.21 + CO (Agri-Dex®, 1% v/v), poe[3]	13.5	3.1	10.5	12.3	36.1	1.12	0.26	0.60	1.02	3.01
Sethoxydim, 0.31 + CO (Agri-Dex®, 1% v/v), poe[3]	8.8	5.1	7.3	12.0	32.3	0.73	0.42	0.54	1.00	2.69
Clethodim, 0.14 + WA (X-77®, 0.25% v/v), poe[3]	0.0	21.3	6.5	11.6	39.9	0.0	1.77	0.59	0.97	3.33
Glyphosate, 0.83, poe-dir[3]	10.6	4.4	7.1	5.8	27.2	0.88	0.36	0.54	0.48	2.26
Glufosinate, 0.82, poe-dir[3]	16.5	4.8	9.0	9.9	40.1	1.38	0.39	0.75	0.82	3.34
LSD (0.05)	11.4	2.1	3.8	5.6	15.9	0.94	0.17	0.32	0.46	1.31

[1] Test plots were hand weeded 4, 6, 8 and 11 weeks after the preemergence treatments, which correspond to 2, 4, 6 and 9 weeks after the first postemergence

Designation and trade names	Chemical name and formulation
acifluorfen (Blazer®)	sodium 5-[2-chloro-4-(trifluoromethyl)phenoxy]-2-nitrobenzoate, 240 g/L
Agri-Dex®	---
atrazine (Aatrex®)	6-chloro-N-ethyl-N'-(1-methylethyl)-1,3,5-triazine-2,4-diamine, 90 DF
BAS 064005	---
bensulide (Prefar®)	O,O-bis(1-methylethyl) S-[2-phenylsulfonyl)amino]ethyl]phosphorodithioate, 480 g/L
bentazon (Basagran®)	3-(1-methylethyl)-(1H)-2,1,3-benzothiadiazin-4(3H)-one 2,2-dioxide, 480 g/L
chlorimuron (Classic®)	2-[[[[(4-chloro-6-methoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]benzoic acid, 25 DF
clethodim (Select®)	(E,E)-(+/-)-2-[1-[[(3-chloro-2-propenyl)oxy]imino]propyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one, 113 g/L
clomazone (Command®)	2-[(2-chlorophenyl)methyl]-4,4-dimethyl-3-isoxazolidinone, 480 g/L
DCPA (Dacthal®)	dimethyl 2,3,5,6-tetrachloro-1,4-benzenedicarboxylate, 75 WP
dithiopyr (Dimension®)	S,S-dimethyl 2-(difluoromethyl)-4-(2-methylpropyl)-6-(trifluoromethyl)-3,5-pyridinedicarbothioate, 120 g/L and 1% G
diuron (Karmex®)	N'-(3,4-dichlorophenyl)-N,N-dimethylurea, 80 WP
Enquik®	monocarbamide dehydrogen sulfate
EPTC (Eptam®)	S-ethyl dipropylcarbamothioate, 840 g/L
ethalfluralin (Curbit®)	N-ethyl-N-(2-methyl-2-propenyl)-2,6-dinitro-4-(trifluoromethyl)benzenamine, 360 g/L
fluazifop-P (Fusilade 2000®)	(R)-2-[4-[[5-(trifluoromethyl)-2-pyridinyl]oxy]phenoxy]propanoic acid, 120 g/L
fomesafen (Reflex®)	5-[2-chloro-4-(trifluoromethyl)phenoxy]-N-(methylsulfonyl)-2-nitrobenzamide, 240 g/L
glufosinate (Ignite®)	ammonium-DL-homoalanin-4-yl(methyl)phosphinate, 200 g/L
glyphosate (Roundup®)	N-(phosophonomethyl)glycine, 360 g/L
imazaquin (Scepter®)	2-[4,5-dihydro-4-4-methyl-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-quinolinecarboxylic acid, 180 g/L
imazethapyr (Pursuit®)	(+/-)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-ethyl-3-pyridinecarboxylic acid, 240 g/L
isoxaben (Gallery®)	N-[3-(1-ethyl-1-methylpropyl)-5-isoxazolyl]-2,6-dimethoxybenzamide, 75 DF
metolachlor (Dual®, Pennant®)	2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)acetamide, 960 g/L
metribuzin (Sencor®, Lexone®)	4-amino-6-(1,1-dimethylethyl-3-methylthio)-1,2,4-triazin-5(5H)-one, 75 DF
MON-13211	---, 240 g/L
napropamide (Devrinol®)	N,N-diethyl-2-(1-naphthalenyloxy)propanamide, 50 WP
naptalam (Alanap®)	2-[(1-naphthalenylamino)carbonyl]benzoic acid, 240 g/L
oryzalin (Surflan®)	4-(dipropylamino)-3,5-dinitrobenzenesulfonamide, 480 g/L
oxyfluorfen (Goal®)	2-chloro-1-(3-ethoxy-4-nitrophenoxy)-4-(trifluoromethyl)benzene, 192 g/L
paraquat (Gramoxone Extra®)	1,1'-dimethyl-4,4'-bipyridinium ion (as dichloride salt), 300 g/L
pendimethalin (Prowl®)	N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine, 480 g/L, 5% G
pyridate (Tough®)	O-(6-chloro-3-phenyl-4-pyridazinyl)S-octyl carbonothioate, 450 g/L
sethoxydim (Poast®)	2-[1-(ethoxyimino)butyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one, 180 g/L
trifluralin (Treflan®)	2,6-dinitro-N,N-dipropyl-4-(trifluoromethyl)benzenamine, 480 g/L
X-77®	---

Appendix Table 2. Climatological data, Vegetable Substation, Kibler, 1991.

Day	May			June			July		
	Temp.		Rain-	Temp.		Rain-	Temp.		Rain-
	Max (°C)	Min (°C)	fall (mm)	Max (°C)	Min (°C)	fall (mm)	Max (°C)	Min (°C)	fall (mm)
1	28	10		36	22		39	21	
2	29	11		34	19	8.4	39	23	0.3
3	26	17	13.2	33	20		35	21	14.5
4	30	16	5.1	38	19		37	19	
5	20	8		30	20		40	20	
6	25	5		31	18		39	20	
7	28	10		32	18		42	22	
8	28	15		34	17		41	23	
9	24	17		33	16		39	22	
10	30	18		32	18	3.6	39	23	
11	34	17		33	20	12.4	40	21	
12	34	20		36	21		40	21	
13	36	20		37	22		40	22	
14	36	19	0.8	36	22		37	20	
15	28	17	0.8	35	22		38	19	
16	32	17		35	21	3.6	38	19	
17	33	20		37	19		40	16	
18	35	19	11.9	37	20		41	21	
19	31	19	12.7	36	22		42	21	
20	30	21	3.3	37	20		40	21	8.4
21	30	21	1.3	38	21	0.3	40	21	
22	25	21	1.0	38	21	1.0	42	21	
23	36	21	1.5	36	21		42	22	
24	33	19	39.9	38	21	9.7	40	22	10.4
25	33	19	4.1	37	22		24	20	3.6
26	34	20		37	22		34	19	
27	34	20		35	22		27	21	8.1
28	35	20		37	20		34	21	

Appendix Table 3. Climatological data, Main Experiment Station, Fayetteville, 1991.

Day	March			April			May			June			July		
	Temp.		Rain-	Temp.		Rain-	Temp.		Rain-	Temp.		Rain-	Temp.		Rain-
	Max (°C)	Min (°C)	fall (mm)	Max (°C)	Min (°C)	fall (mm)	Max (°C)	Min (°C)	fall (mm)	Max (°C)	Min (°C)	fall (mm)	Max (°C)	Min (°C)	fall (mm)
1	18	9	6.9	19	8		26	9		31	22		32	24	
2	21	4	1.5	22	6		21	8		31	18	9.4	34	23	
3	6	-2		24	11	11.4	26	14	38.6	28	19		34	22	3.3
4	7	-3		17	11	5.6	24	14	0.3	29	19		27	16	4.3
5	18	0		19	7		27	10	0.8	31	18		33	21	
6	26	10		25	12		13	3		26	18	5.8	34	21	
7	13	0		24	18	0.8	21	9		26	14		33	22	
8	10	-2		23	16	6.6	23	12		28	18		34	22	
9	13	-2		23	11		24	14		28	16		35	23	
10	13	-2		20	3		23	16		28	16		35	25	
11	17	8		22	7	24.1	25	15		26	19	0.3	36	24	
12	19	13		18	11	21.8	28	20		27	19	2.3	36	23	
13	21	4		24	16	0.3	29	20		31	19		36	23	1.0
14	4	0		23	12	31.2	31	17		32	23		33	19	
15	3	1		20	8	1.8	29	19		31	23		31	17	
16	7	2		23	8		26	16	0.5	31	19	0.3	33	18	
17	18	7	25.4	27	13		28	18		29	18		33	16	
18	16	6		27	14	15.5	29	19		29	19	12.4	35	19	
19	18	5		24	8		29	17	4.8	31	18		36	21	
20	21	9		13	8	0.3	26	19	1.3	31	19		.	.	
21	20	16		12	6		26	19	5.1	31	21		.	.	
22	24	13	33.5	12	7	4.1	27	21		33	21		36	23	
23	21	7	14.7	13	4		22	19	3.8	33	18	14.0	37	23	
24	20	3		22	8		29	19		31	19		37	22	1.0
25	24	8		24	12	1.3	29	18	37.6	32	21		31	19	4.1
26	24	17		23	13		28	19		28	22		22	17	2.5
27	26	18	4.3	27	14	6.9	30	18		27	22		30	21	
28	21	2		27	14	1.0	31	19		32	18		30	21	2.0
29	21	1	6.1	27	13	3.0	31	21		31	22		32	21	
30	9	-2		27	11		31	21		32	23		29	14	
31	11	1		29	22		33	17							

Appendix Table 4. Standardized plant (Bayer) codes, Weed Science Society of America, for weeds appearing in this report.

Code	Scientific Name	Common Name
ABUTH	Abutilon theophrasti	velvetleaf
AMAAL	Amaranthus albus	tumble pigweed
AMACH	Amaranthus hybridus	smooth pigweed
AMAPA	Amaranthus palmeri	Palmer amaranth
AMBEL	Ambrosia artemisiifolia	common ragweed
ANVCR	Anoda cristata	spurred anoda
BRAPP	Brachiaria platyphylla	broadleaf signalgrass
CHEAL	Chenopodium album	common lambsquarters
CYPES	Cyperus esculentus	yellow nutsedge
DIGSA	Digitaria sanguinalis	large crabgrass
ELEIN	Eleusine indica	goosegrass
ERBGR	Eriochloa gracilis	southwestern cupgrass
ERICA	Conyza canadensis	horseweed
IPOHG	Ipomoea hederacea var. integriuscula	entireleaf morningglory
IPOLA	Ipomoea lacunosa	pitted morningglory
LACSE	Lactuca serriola	prickly lettuce
LAMAM	Lamium amplexicaule	henbit
MOLVE	Mollugo verticillata	carpetweed
OEOLA	Oenothera laciniata	cutleaf eveningprimrose
PANDI	Panicum dichotomiflorum	fall panicum
POLLA	Polygonum lapathifolium	pale smartweed
POROL	Portulaca oleracea	common purslane
SEBEX	Sesbania exaltata	hemp sesbania
SETFA	Setaria faberi	giant foxtail
SIBVI	Sibara virginica	sibara
SIDSP	Sida spinosa	prickly sida
SINAR	Brassica kaber	wild mustard
SORHA	Sorghum halepense	johnsongrass
VICVI	Vicia sativa	common vetch
XANST	Xanthium strumarium	common cocklebur

lix Table 5. Common and scientific names of wildflowers.

on name	Scientific name
arrow	Achillea millefolium
yweed	Asclepias tuberosa
wer	Centaurea cyanus
Daisy	Chrysanthemum carinatum
Daisy	Chrysanthemum leucanthemum
Leaved Coreopsis	Coreopsis lanceolata
Coneflower	Echinacea purpurea
ia Poppy	Eschscholzia californica
Flower	Gaillardia aristata
ther	Liatris pycnostachya
Flax	Linum grandiflorum var. rubrum
ax	Linum lewisii
ial Lupine	Lupinus perennis
Mint	Monarda citriodora
yed Susan	Rudbeckia hirta
Evening Primrose	Oenothera missouriensis
Evening Primrose	Oenothera speciosa
ening Primrose	Oenothera hookeri
Gilia	Ipomopsis rubra
rple Coneflower	Echinacea pallida
y	Cichorium intybus
exican Hat	Ratibida columnaris
Coneflower	Ratibida columifera
Star	Liatris spicata

dix Table 6. Common, cultivar and scientific names of bedding plants.

on name	Cultivar	Scientific name
um	Blue Danube	Ageratum houstonianum
m	New Carpet of Snow	Lobularia maritima
	Double Blue	Callistephus chinensis
a	Kewpie Red	Celosia cristata
psis	lanceleaf	Coreopsis lanceolata
	Firgaro	Dahlia X hybrida
us	Fantasia	Dianthus barbatus
um	Pinwheel Red	Pelargonium X hortorum
us	Southern Belle	Hibiscus moscheutos
ens	Super Elfin Orange	Impatiens wallerana
ld	Pineapple Crush	Tagetes patula T. Erecta
ld	Red Hero	Tagetes patula
ia	Nicki Red	Nicotiana alata
ental pepper	Fire Works	Capsicum annuum
a	Red Cloud	Petunia X hybrida
a	Snow Cloud	Petunia X hybrida
	Blue Rhea	Salvia farinacea
	Red Pillar	Salvia splendens
Dragon	Tahitii	Antirrhinum majus
	Bright eyes	Catharanthus roseus
	Yellow Marvel	Zinnia elegans

CONVERSION TABLE

U.S. to Metric			Metric to U.S.		
to convert from:	to:	Multiply the U.S. unit by	to convert from:	to:	Mu me
length			**length**		
miles	Kilometers	1.61	kilometers	miles	0.6
yards	meters	0.91	meters	yards	1.0
feet	meters	0.31	meters	feet	3.2
inches	centimeters	2.54	centimeters	inches	0.3
area volume			**area and volume**		
sq yards	sq meters	0.84	sq meters	sq yards	1.2
sq feet	sq meters	0.09	sq meters	sq feet	10.
sq inches	sq centimeters	6.45	sq centimeters	sq inches	0.
cu inches	cu centimeters	16.39	cu centimeters	cu inches	0.0
acres	hectares	0.41	hectares	acres	2.4
liquid measure			**liquid measure**		
cu inches	liters	0.02	liters	cu inches	61.
cu feet	liters	28.34	liters	cu feet	0.0
gallons	liters	3.79	liters	gallons	0.2
quarts	liters	0.95	liters	quarts	1.0
fluid ounces	milliliters	29.57	milliliters	fluid ounces	0.0
weight and mass			**weight and mass**		
pounds	kilograms	0.45	kilograms	pounds	2.2
ounces	grams	28.35	grams	ounces	0.0
temperature			**temperature**		
F	C	5/9(F-32)	C	F	(9/