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NEW CHEMICALS FOR WEED CONTROL IN FIELD PRODUCTION OF ROSE PLANTS DURING THE FIRST SEASON OF GROWTH

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Simazine (Princep) and trifluralin (Treflan) have been used for many years to control weeds in rose production fields of East Texas (1). However, expensive hand labor and mechanical cultivation are still relied upon heavily to maintain weed-free fields.

Paterson et al., (1) have demonstrated that 4 lb active ingredient (ai)/acre (4.5 kg/hectare-ha) oryzalin (Surflan), 4 lb ai/acre (4.5 kg/ha) napropamide (Devrinol) or simazine plus oryzalin (2 lb ai/acre - 2.2 kg/ha each) can be used to control a broad spectrum of grass and broadleaf weed species in commercial rose plant production fields. But, oryzalin (4 lb ai/acre - 4.5 kg/ha) caused leaf chlorosis on rootstock plants when applied after grafting in commercial fields during April. The purpose of this study was to determine if other chemicals or chemical combinations could be used for reliable weed control in commercial field production of rose plants.

MATERIALS AND METHODS

Rose plants were started from disbudded *Rosa multiflora* 'Brooks 56' cuttings planted 6 inches apart in raised beds 44 inches apart in November 1982. The field was a loamy sand consisting of 88 percent sand, 7 percent silt, 5 percent clay and less than 1 percent organic matter. The pH was 6.1. Nitrogen, phosphorus and potassium levels were low, calcium and magnesium levels were medium and zinc, iron and manganese levels were high. The field was fumigated with Soil Brome 90 at 3 gals/acre (28 l/ha) before planting.

In April 1983, after cuttings were rooted and growing, the field was leveled and buds of 'Mirandy' were grafted onto the rootstock plants. On May 10, 1983, the different formulations and rates of various chemicals (Table 1) were applied over the top of the rootstock plants just after existing weeds were removed from the experimental plot area. The wettable powder and emulsifiable concentrates were applied in 26 gallons water/acre (243.1 l/ha) in a 44 inch (110 cm) band over the row using a portable CO_2 pressurized sprayer. The granular materials were applied in a 29 inch (72.5 cm) band using a wheel driven granular herbicide applicator (Gandy CO.). All herbicides were mechanically incorporated two inches (5 cm) after application.

Phytotoxicity was evaluated by observation on May 24, 1983; ratings were not needed. Herbicide performance was evaluated on September 14, 1983, by taking weed counts and estimating percent weed cover in a 1 square foot (0.09 square meters) area encompassing 6 inches (15 cm) on either side of the row in the center of each plot. Plots were 15 feet (4.6 meters) long and treatments were replicated four times in a randomized complete block design. Untreated border rows were used between each treated row and on the edges of the experimental plot area.

Percent weed coverage data were transformed $\sin^{-1} \sqrt{X}$ before analysis with 0.25 being added to 0% and subtracted from 100% (2). Count data for annual grasses and Cyperus esculentus were transformed Log (X+1.0) before analysis because means were correlated to the variances (2). F-tests for all count categories and % weed coverage were significant at the 5% level. Means were then separated by Fisher's protected LSD (2). All means were converted to the original scale for presentation but LSDs were not (Table 1). All treatment data with means of 0.0 were deleted from the analysis of variance because of the corresponding 0.0 variances. These treatments were considered effective.

RESULTS AND DISCUSSION

Weed counts used for analysis were those for annual grasses (primarily Digitaria sp. or crabgrass but also Cenchrus sp. or field sandbur), Diodia teres (poorjoe), and Cyperus esculentus (yellow nutsedge). Other weed species contributing to percent weed coverage determinations but were too few in number to discern herbicide control by counts included Cassia fasciculata (partridgepea), Croton capitatus (wooly croton), Bulbostylis capillaris (hairsedge) and Stellaria media (chickweed). The C. esculentus counted in the present study were mostly seedlings. Thus, a reduction in these counts should not be interpreted as control of growth from the storage organ or nut of this species.

Metolachlor (Dual)

Both rates of each formulation of metolachlor significantly reduced percent weed coverage and counts of D. teres and C. esculentus when compared to the control (Table 1). Counts of annual grasses were reduced by all treatments except the 3 lb ai/acre (3.4 kg/ha) rate of the 8E formulation. The 6 lb ai/acre (6.7 kg/ha) rate of either formulation was among the best treatments in the study.

Simazine (Princep)

All rates of both formulations of simazine significantly reduced percent weed coverage and counts of D. teres when compared to the control (Table 1). However, counts of C. esculentus were only reduced by the 2.3 lb ai/acre (2.7 kg/ha) rate of the 4G formulation. Reduction in the annual grass count was not significant but 2.4 lb ai/acre (2.7 kg/ha) of the 4G formulation reduced the count to 0.0.

Metholachlor (Dual) plus Simazine (Princep)

Both rates of each formulation combination of metolachlor and simazine significantly reduced percent weed coverage and counts of D. teres and C. esculentus when compared to the control (Table 1). The combination rate of 6 lb ai/acre (6.7 kg/ha) metolachlor 25G plus 1.6 lb ai/acre (1.8 kg/ha) simazine 4G reduced the weed population to essentially 0.0 making this treatment one of the best in the study. This treatment was better than all simazine treatments except for 2.4 lb ai/acre (2.7 kg/ha) of the 4G formulation, but was not significantly better than 6 lb ai/acre (6.7 kg/ha) metolachlor of either formulation. The use of 0.8 lb ai/acre (0.9 kg/ha) of either 80W or 4G simazine with 3 lb ai/acre (3.4 kg/ha) of 8E or 25G metolachlor, respectively, provided very acceptable control of the weed species present in this study. Control of annual grasses was better than 3 lb ai/acre (3.4 kg/ha) 8E metolachlor alone. The use of 3 lb ai/acre (3.4 kg/ha) of metolachlor allowed the amount of simazine to be reduced from the traditionally used 3 lb ai/acre (3.4 kg/ha) rate (1) to 0.8 lb ai/acre (0.9 kg/ha). This treatment significantly reduced C. esculentus counts over the control whereas 0.8 lb ai/acre (0.9 kg/ha) simazine alone did not.

Oxyfluorfen (Goal)

Both rates of oxyfluorfen reduced percent weed coverage and weed counts when compared to the control (Table 1). However, both rates burned and defoliated the rootstock plants though they eventually produced new foliage. The rates used in the present study were higher than those recommended for this formulation.

Pronamide (Kerb)

All rates of pronamide significantly reduced percent weed coverage and counts of *D. teres* but did not reduce counts of *C. esculentus* when compared to the control (Table 1). The 2 and 4 lb ai/acre (2.2 and 4.5 kg/ha) rate reduced the annual grass count.

In conclusion, either 6 lb/acre (6.7 kg/ha) metolachlor or 3 lb/acre (3.4 kg/ha) metolachlor plus 0.8 lb/acre (0.9 kg/ha) simazine could be used for weed control in rose plant production. Either formulation studied for each chemical could be used. However, these chemicals were applied only during the first year of a two year field production cycle for a rose plant. Further treatment of the same plots during the second year of production is in progress so that any phytotoxic effects of the chemicals on the scion buds and/or shoots can be evaluated.

LITERATURE CITED

1. Paterson, D. R., R. M. Menges, D. R. Earhart, and M. C. Fuqua. 1980. Herbicide research with east Texas roses, 1977-79. Texas A&M Ag. Exp. Station Progress Rept. PR-3752.
2. Steel, R., G. D. and J. H. Torrie. 1980. Principles and procedures of statistics. 2nd ed. McGraw-Hill Book Co., New York.

Table 1. Percent weed coverage and number of weeds per 1 ft^2 sampling area in plots treated with soil-incorporated herbicides in field grown roses during the summer of the first production season.

	Activity/ formulation	Rate (lb ai /acre)	Weed coverage[z] (%)	Annual[y] grasses	*Diodia teres*[y]	*Cyperus esculentus*[y]
Metolachlor	8E[x]	3	32.0*[v]	0.8	1.3*	0.2*
(Dual)		6	12.0*	0.3*	1.0*	0.0*
	25G	3	13.6*	0.2*	2.0*	0.0*
		6	10.7*	0.0*	1.3*	0.2*
Simazine	80W	0.8	24.6*	2.5	2.0*	3.5
(PrinceP)		1.6	35.7*	2.2	1.5*	3.7
		2.4	5.2*	0.7	0.3*	1.8
	4G	0.8	12.2*	2.6	1.3*	3.4
		1.6	4.2*	0.7	0.8*	1.2
		2.4	3.0*	0.0*	0.3*	0.6*
Metolachlor	8E+80W	3+0.8	9.5*	0.0*	1.5*	0.3*
(Dual)		6+1.6	14.6*	0.6*	0.5*	0.0*
Simazine	25G+4G	3+0.8	14.4*	0.2*	0.5*	0.0*
(Princep)		6+1.6	0.9*	0.0*	0.0*	0.0*
Oxyfluorfen[w]	1.6E	2	36.4*	0.2*	1.3*	1.0*
(Goal)		4	3.2*	0.0*	0.0*	0.3*
Pronamide	50W	1	30.7*	2.2	0.5*	3.8
(Kerb)		2	43.9*	0.3*	0.5*	12.7
		4	43.5*	0.0*	0.8*	25.2
Control			91.6	3.8	5.8	7.5
LSD 5%[v]			28.4[z]	0.4828[y]	2.2	0.5884[y]

[z]Rating on 9-14-83. 0=complete control, 100=no control. Original data were transformed $\sin^{-1}\sqrt{X}$ for analysis. Means but not LSD were converted to the original scale for presentation.

[y]Original data were transformed Log (x+1.0) for analysis. Means but not LSD were converted to original scale for presentation.

[x]E=emulsifiable concentrate; numeral indicates the number of lbs of ai per gallon.
G=granular and W=wettable powder; numeral indicates the percent ai of the formulation.

[w]All rates of application burned and defoliated rootstock plants.

[v]Means must differ by at least this amount to be significantly different according to Fisher's protected LSD procedure (2).
*Treatments were significantly smaller than the control.
Treatments with 0.0 means were not used in the analysis but were considered effective.