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1) Inheritance of metribuzin sensitivity in the soybean cultivar, 'Altona'.

Metribuzin [4-amino-6-tert-butyl-3-(methylthio)-as-triazin-5(4H)-one] is an herbicide that can be effective in controlling many broadleaf weeds in soybeans. However, some soybean cultivars are sensitive to metribuzin and can suffer considerable damage (Wax et al., 1976). Previous research has established that a single recessive gene, *hm*, conditions the sensitive reaction of 'Semmes' (Edwards et al., 1976) and 'Tracy' (Kilen and Barrentine, 1983) to metribuzin. The *hm* gene and the *Rps* $^{b}_{1}$ gene for phytophthora root rot [caused by *Phytophthora megasperma* f. sp. *glycinea*] resistance are closely linked (Kilen and Barrentine, 1983). 'Altona', a cultivar of maturity group 00, has the Rps_6 gene for phytophthora root rot resistance (Athow and Laviolette, 1982) and is sensitive to metribuzin (Wax et al., 1976). The objective of this study was to examine the inheritance of metribuzin sensitivity in Altona, and to determine if that cultivar's sensitivity also is due to the *hm* gene.

Materials and methods. Altona, K74-104-76-167, 'Century', and 'Sprite' were used as parents in these experiments. K74-104-76-167 is a metribuzin-sensitive line selected from a cross between Tracy and 'Williams'; Century and Sprite are tolerant to metribuzin. Sprite and Altona were crossed to investigate the inheritance of Altona's sensitivity to metribuzin. K74-104-76-167 and Century were crossed to confirm the presence of the *hm* allele in K74-104-76-167. Segregating progeny of the cross between Altona and K74-104-76-167 were tested to determine if the same gene or different genes were responsible for their metribuzin-sensitivity. F_3 families were classified according to the reactions of five plants. Gene model hypotheses were tested by chi-square analysis.

The F_1 and F_2 plants, and the F_3 families were evaluated in hydroponics in the greenhouse by a technique similar to one developed by Barrentine et al. (1976). The seeds were germinated in sand after treatment with the fungicide, thiram. The seedlings were transferred from sand to a 1X modified Hoagland's solution (Crafts-Brandner and Harper, 1982) when the cotyledons were in the hook stage. The plants were inserted through 0.64 cm holes drilled through white, 1.9 cm thick styrofoam sheets enabling the roots to dangle in the nutrient solution. Brown, plastic dishpans 29.2 cm x 39.4 cm x 13.3 cm deep

served as containers for the solution. Each pan held 8 liters of solution for 35 plants, 5 plants of each parent and 25 of F_1, F_2, or F_3.

When the plants grew unifoliolate leaves, the nutrient solution was discarded and replaced with fresh solution plus an aliquot of metribuzin at a rate of 150 $\mu g\ l^{-1}$. Plants developed injury symptoms about three days after introduction of the metribuzin. Those plants which survived after plants of the metribuzin-sensitive parental line had died were judged tolerant to metribuzin; plants killed were classified as sensitive.

Results and discussion. Sprite and Century were tolerant to metribuzin and K74-104-76-167 and Altona were sensitive to metribuzin (Table 1). The one tolerant Altona plant may have been an escape, or a result of an impure seed supply; occasional metribuzin-tolerant plants have been noted in cultivars sensitive to metribuzin (Barrentine et al., 1979). The reactions of the F_2 population and F_3 families of the Sprite X Altona cross fit a single recessive gene inheritance model for metribuzin sensitivity in Altona.

The results of the F_3 family screening of the cross K74-104-76-167 X Century corroborate those of the F_2 plant screening; K74-104-76-167 has the *hm* gene from Tracy.

Although in the K74-104-76-167 X Altona cross, two tolerant plants in the F_2 and one segregating F_3 family were observed, it can be concluded that Altona and Tracy possess the same gene for metribuzin sensitivity (*hm*). Since the two tolerant F_2 plants were next to each other in the screening, there may have been an environmental factor which delayed their injury symptoms. The one segregating F_3 family may have been derived from a foreign F_2 seed or may have delayed injury. More segregating F_3 families should have been observed, possibly fitting a 1 tolerant: 8 segregating: 7 sensitive ratio, if two recessive genes were involved.

The *hm* gene causes metribuzin sensitivity in Altona and appears to be important in conditioning metribuzin sensitivity over a wide range of soybean maturity groups. The fact that metribuzin sensitivity is due to simple inheritance eases the task of eliminating sensitive soybean genotypes.

Table 1. Reactions of parents, F_1 and F_2 plants, and F_3 families to 150 µg l^{-1} metribuzin in hydroponics

Cross	No. plants or families			Chi-square	Probability
	Tolerant	Segregating	Sensitive		
Sprite	40		0		
Century	40		0		
K74-104-76-167	0		40		
Altona	1		38		
Sprite X Altona (F_1)	10		0		
Sprite X Altona (F_2)	144		36	3:1	0.5-0.1
Sprite X Altona (F_3)	10	19	14	1:2:1	0.9-0.5
K74-104-76-167 X Century (F_1)	31		0		
K74-104-76-167 X Century (F_2)	146		52	3:1	0.9-0.5
K74-104-76-167 X Century (F_3)	11	20	11	1:2:1	0.9-0.5
K74-104-76-167 X Altona (F_1)	0		13		
K74-104-76-167 X Altona (F_2)	2		182		
K74-104-76-167 X Altona (F_3)	0	1	39		

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