

# Assessment of Efficacy and Mechanism of Resistance to Soil-Applied PPO Inhibitors in *Amaranthus palmeri*

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Supplementary Data:

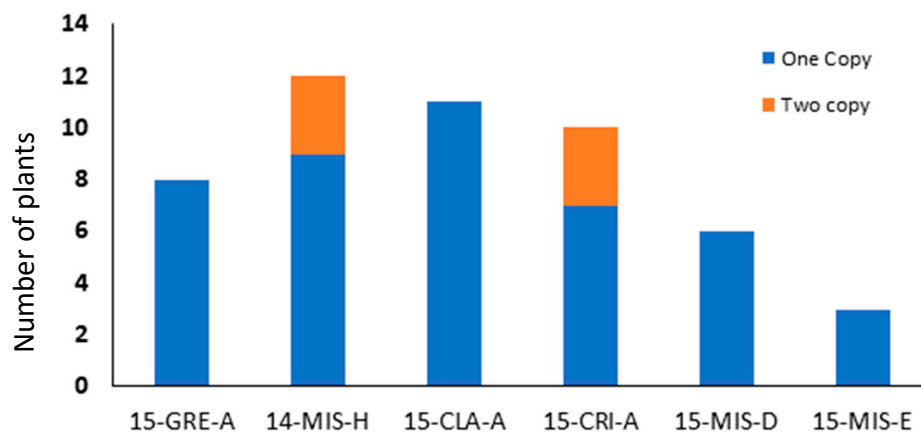


Figure S1. Copy number of *PPO2* gene in survivors from 1x soil-applied fomesafen treatment. On the y-axis is the number of plants used from each resistant population to show the copy number of *PPO2* gene, and on the x-axis are the six resistant populations selected for analysis.

Table S1. Common, trade names, and manufacturers of herbicides used in the study.

Common name	Trade	Rate* (g ai ha <sup>-1</sup> )	Company
fomesafen	Reflex 2SL	280	Syngenta Crop Protection, LLC, Greensboro, NC 27419
flumioxazin	Valor SX 51 WDG	70.6	Valent USA Corporation, Walnut Creek, CA
saflufenacil	Sharpen 4F	49.3	FMC Corporation, Philadelphia, PA 19103
sulfentrazone	Spartan 4F	280	FMC Corporation, Philadelphia, PA 19103
oxyfluorfen	GoalTender 4E	280	Dow AgroSciences LLC, Indianapolis, IN 46268

\*Herbicide solutions were prepared using tap water (from the city water supply of Northwest Arkansas) to get the corresponding recommended concentration.

Table S2. List of primers used in the copy number and expression assay.

Name	Sequence	Fluorescent dye for qPCR probe	Experiment
ApCNF1	TCCCATGGTTTGAATGTGAC		Copy number analysis
ApCNR1	TAGTATTTGCCCCCTCATCC		Copy number analysis
ActinF	GCGGAAAGCTAAGCGTGAAC		Expression analysis
ActinR	TCAGACCTGCTCTGGAGTCA		Expression analysis
Actin-probe	GGAGGAAAAGGCGGATGCTGCA	Hex/BMN-Q535	Expression analysis
PPO2F	TTGGCTCYGTGYTYGCTGGA		Expression analysis
PPO2R	RCGTACRCRAGGCTTCTTGA		Expression analysis
PPO2-probe	AGGAAAAGGGTGGVGGARARRATGCT	Fam / BMN-Q535	Expression analysis
PPO1F	CTCCACCCCCTCGAGACCCC		Expression analysis
PPO1R	TGCCAAGCCTAGCAGCAATGG		Expression analysis
PPO1-probe	CGCCTTCCTAAACCTAAGGGCCAGACT	ROX / BMN-590	Expression analysis

Table S3. Comparison of frequency of two resistant allele with the frequency of survivors to soil-applied fomesafen (1x) among six resistant *A. palmeri* population

Group	Population	% Frequency <sup>†</sup>		% Emergence <sup>††</sup>
		Two resistant allele	One resistant allele	
One	15-GRE-A	100	0	29
	14-MIS-H	83	17	17
	15-CLA-A	85	15	16
Two	15-CRI-A	50	50	8
	15-MIS-D	36	64	6
	15-MIS-E	50	50	9

Level	Least Sq Mean
Group One * (%) A	20.6
Group Two (%) B	7.6

\*Levels not connected by the same letter are significantly different by Student's T-test at 95% of confidence. P- value 0.0382 (n=3).

<sup>†</sup> The number of plants in Table 2 were converted to % as plants carrying two resistant alleles (cells highlighted in blue) and plants carrying one resistant allele (rest of the plants) from total number from each population.

<sup>††</sup> Seedlings were counted 21 days after treatment (DAT) and emergence was expressed as percent emergence relative to the corresponding non-treated trays.

Table S4. Comparison between frequency of survivors with foliar- and soil-applied fomesafen (1x).

Population	Fomesafen Foliar-applied* (%)	Fomesafen Soil-applied** (%)
15-GRE-A	77	17
14-MIS-H	53	26
15-CLA-A	38	37
15-CRI-A	60	11
15-MIS-D	42	10
15-MIS-E	35	11
LSD <sub>0.05</sub> <sup>a</sup>	20.2	

\*Data derived from Salas-Perez et al., 2017.

\*\*Data derived from Table S3 by converting %seedling emergence reduction to %emergence

<sup>a</sup> Student's T-test LSD to compare populations between folia-applied and soil-applied treatment at 95% of confidence. P- value 0.00009 (n=6).