

## A GROWING NIGHTMARE: DICAMBA RESISTANCE IN AMARANTHUS PALMERI POPULATIONS FROM SPAIN



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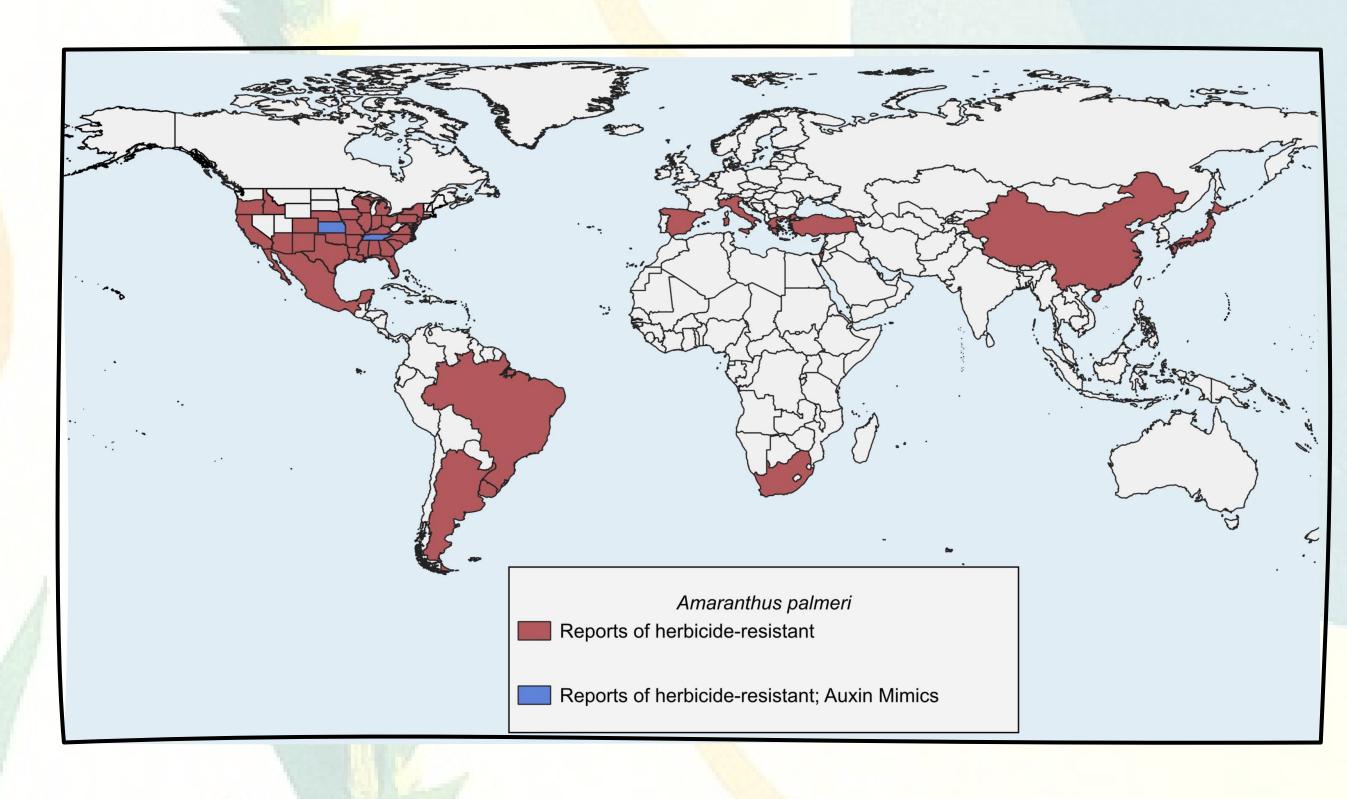
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Amaranthus palmeri S. Watson is one of the most problematic weeds in the American continent drastically reducing summer crops production. Since the first reported in the early 2000s, herbicide-resistant populations of *A. palmeri* have spread in the American continent and outside it's native region.

Dicamba is an herbicide that mimics the plant hormone auxin, causing abnormal cell division and growth.





**OBJECTIVE:** This study aimed to assess the dicamba resistance levels in four *A. palmeri* populations collected from cornfields in Spain (R1, R2, and R3) and one from Georgia (USA) used as the susceptible standard (S) population.

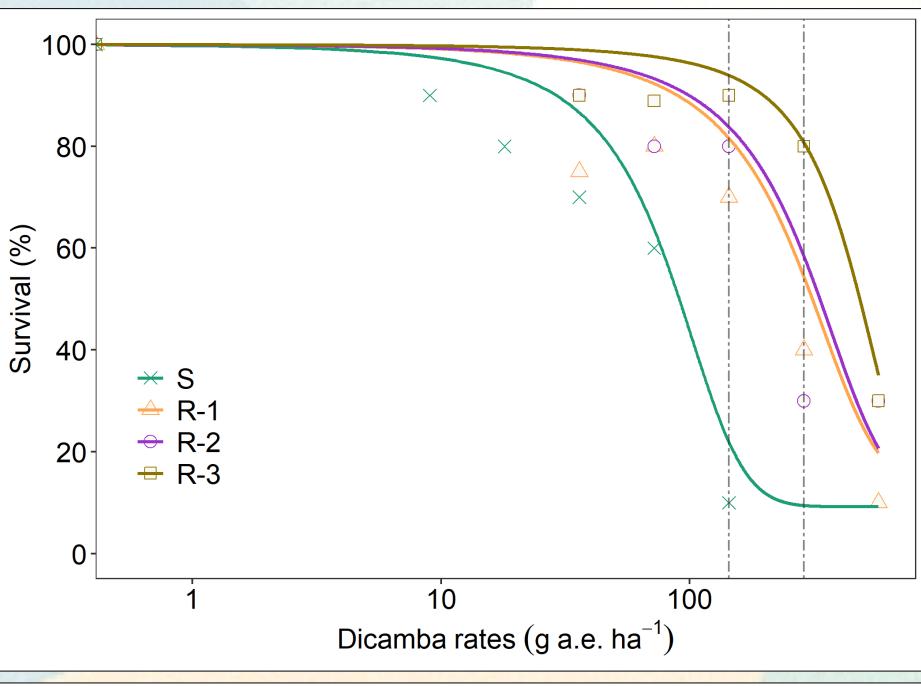


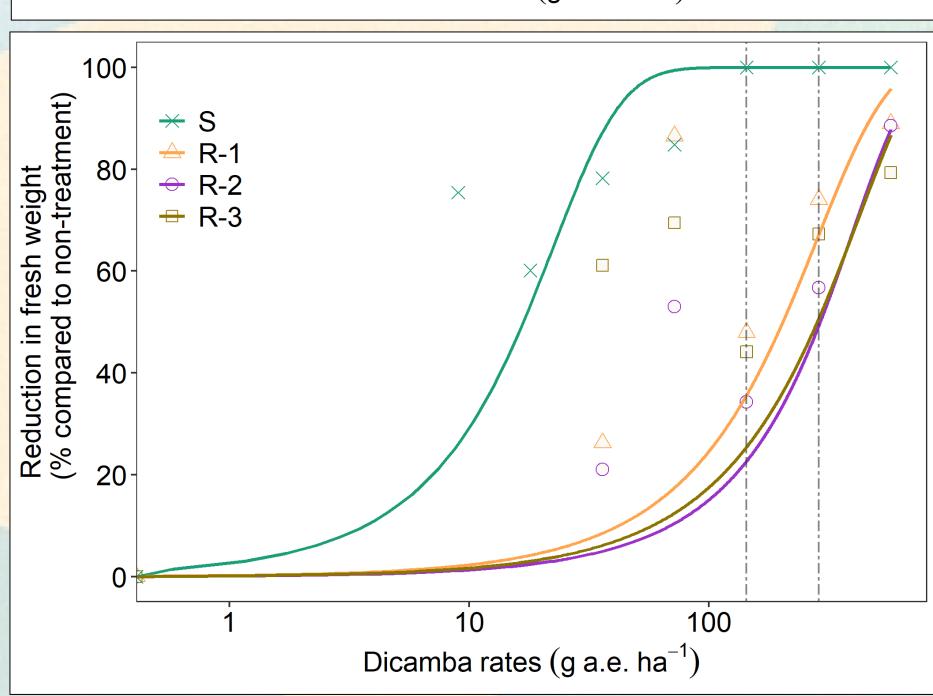
AMARANTHUS PALMERI

Dioecious

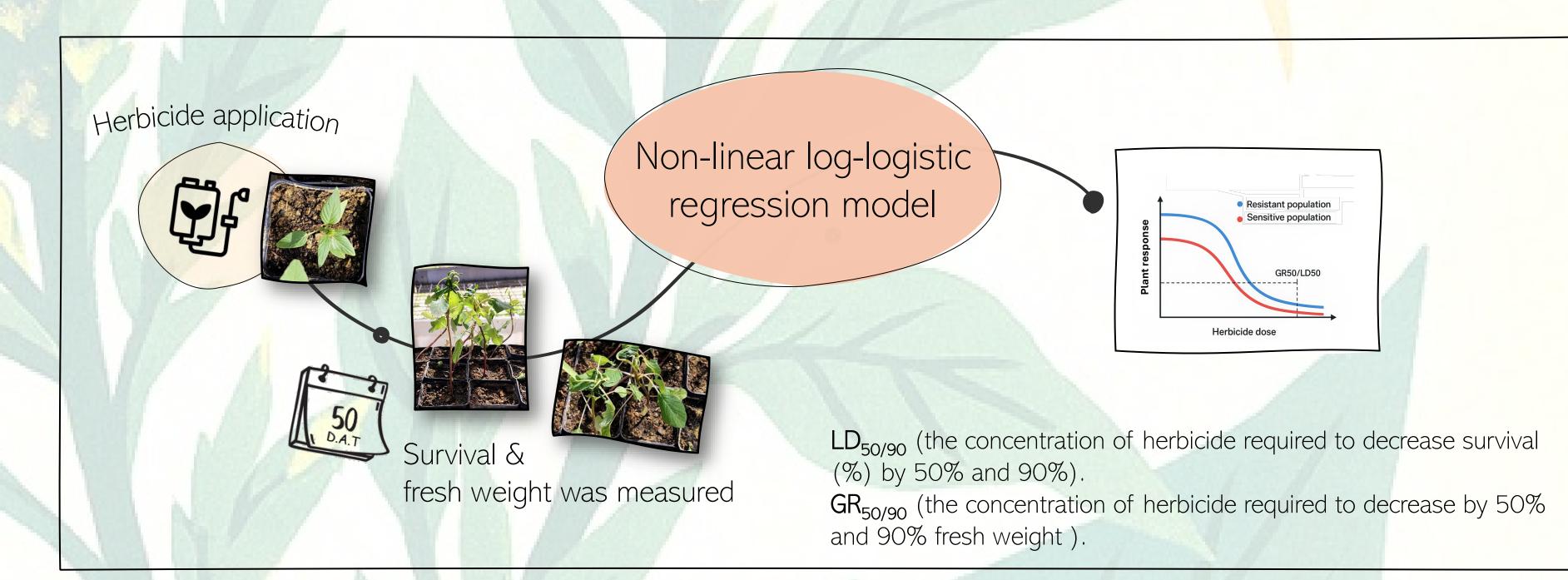
↑↑ Competitive

## **RESULTS:**





Survival rates (%) (above) and fresh weight reduction (%) (below) of A. palmeri to dicamba application, The minimum and maximum recommended field dose (RFD) and the highest doses are indicated by the dashed gray lines. Symbols represent the mean survival rates for each treatment. (n =10)



S population was completely controlled at the minimum (MinRFD, 144 g a.e. ha<sup>-1</sup>) and maximum (MaxRFD, 288 g a.e. ha<sup>-1</sup>) recommended field dose. Survival rate at MinRFD was 70% and 80% for R1 and R2 respectively and 90% for R3. The 80% of individuals from R3 survived at MaxRFD, while for R1 and R2 the survival rate was 40% and 30% respectively. Finally, the fresh weight reduction (%) were 47% for R1, 34% for R2, 44% for R3.

The R3 population showed the highest  $LD_{50}$  value compared to R1, R2, and the S population. However, the  $GR_{50}$  value was highest in R2. Overall, the values among the Spanish populations were closer to each other but clearly higher compared to the S American population.

POP	LD <sub>50</sub> ±SE	SLOPE	P-VALUE	LD <sub>90</sub> ±SE
S	78.1 ± 12.7	0.03	< 0.001	153.1 ± 29.4
R-1	245.5 ± 45.3	0.01	< 0.001	525.5 ± 122.7
R-2	272.2 ± 59.5	0.01	< 0.001	564.6 ± 257.1
R-3	461.1 ± 59.5	0.01	< 0.001	778.4 ± 127.5
POP	GR <sub>50</sub> ±SE	SLOPE	P-VALUE	GR <sub>90</sub> ±SE
POP S	GR <sub>50</sub> ±SE 10.3 ± 3.4	<b>SLOPE</b> - 0.09	<b>P-VALUE</b> < 0.005	GR <sub>90</sub> ±SE 34.9 ± 15.8
				30
S	10.3 ± 3.4	- 0.09	< 0.005	34.9 ± 15.8

Log-logistic equation parameters of dose-response regression curves of survival (above) and fresh weight (below) in *A. palmeri* populations treated with dicamba. P-value is the level log significance of the non-linear model. Slope refers to the rate at which the response variable.

CONCLUSION: This research confirmed that three *A. palmeri* Spanish populations have developed resistance to dicamba, which is the first documented case of dicamba resistance in Europe. However, further investigations are needed to describe the resistance mechanisms of these populations. Moreover, R1, R2 and R3 have been reported to be resistance to ALS-inhibitors. The presence of multiple herbicide-resistant populations of *A. palmeri* from Europe highlights the need for integrated weed management approaches and preserve the efficacy of chemical control.







