QUINCLORAC AND PROPANIL RESISTANT -BARNYARDGRASS BIOTYPES (*Echinochloa crusgalli*) IN RICE FIELDS OF EASTERN URUGUAY

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INTRODUCTION

Barnyardgrass is the main weed under rice culture and a tank mixture of propanil, quinclorac and clomazone was very popular among farmers to control it for many years in Uruguay. The objective was to assess the susceptibility of barnyardgrass biotypes collected to propanil, quinclorac, clomazone, byspiribac, penoxulam and imazapyr plus imazapic.

MATERIALS AND METHODS

A field survey was conducted to collect mass samples of seed from barnyardgrass escapees on rice of the Uruguayan side of the Lagoon Merin basin in 2005-2006, 2006-2007 and 2007-2008.

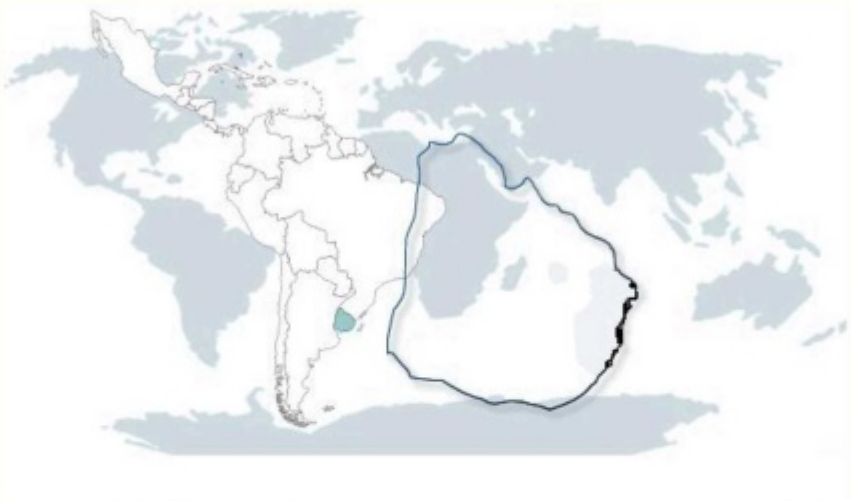

Figure 1. Light blue colored area was surveyed looking for herbicides resistant-barnyardgrass biotypes (Lagoon Merín basin of eastern Uruguay).

Pot experiments were carried out to asses barnyardgrass biotypes resistance in 2011-2012. Zero, 1/8, ¼, ½, 1, 2, 4 and 8 X rates were used for every combination herbicide / biotype studied with four replications. One X rate was 375, 1920 and 480 g a.i. ha-1 for quinclorac, propanil and clomazone; respectively. Adjuvants recommended for each herbicide were applied. Trials were repeated twice, following Herbicide Resistance Action Committee's protocols. According to Ritz & Streibig (2005), log-logistic models were adjusted by means of the drc package of the R software being the fresh weight per pot the dependent variable. The relationship between LD50 resistant/LD50 susceptible biotypes was used as the resistance factor (RF).

RESULTS

For quinclorac fourteen biotypes of seventeen assessed showed resistance and just three were susceptible. The highest RF-values were for Pbarrob and UPAG1 biotypes. Instead for propanil, two of the fifteen biotypes tested presented resistance and the highest RF-values obtained were for Pbarrob and Schedersh biotypes (Table 1).

RESULTS

Table 1 Resistance factor (RF) for quinclorac and propanil

Herbicides	quinclorac			propanil		
Department/ Biotypes	RF[(2)] ± sd	t-value	p.	RF± sd	t-value	p.
Tacuarembó						
Pbarroa	8.7	na	na	22.6 ± 6.8	3.17	0.0016
Pbarrob	148.3	na	na	na	na	na
Cerro Largo						
Sgr44	1.0	na	na	5.7 ± 2.6	1.80	0.0721
Leites	21.7	na	na	3.4 ± 1.1	2.2	0.0282
Leites2	na	na	na	na	na	na
CasRB281	70.5	na	na	4.7 ± 1.6	2.38	0.0179
CasRB282	18.5	na	na	2.4 ± 1.4	1.00	0.3176
CnoVgas	28.9	na	na	1.5 ± 0.5	0.99	0.3193
Treinta y Tres						
Zapata1	64.2	na	na	6.9 ± 2.2	2.72	0.0068
Zapata2	64.2	na	na	1.0 ± 0.4	-0.1	0.9209
Zapata3	49.5	na	na	2.2 ± 0.6	1.89	0.0602
Schdersh	67.1	na	na	15.2 ± 4.5	3.19	0.0015
Schder	na	na	na	0.1 ± 0.5	-1.91	0.0561
Arrozal33	45.8	na	na	na	na	na
A33P2	1.0	na	na	na	na	na
Manara1	64.2	na	na	1.0 ± 0.4	0.0	0.9986
UPAG1	173.1	na	na	1.4 ± 0.6	0.62	0.5383
Rocha						
Cebo2880	49.2	na	na	2.4 ± 0.8	1.84	0.0665
Cebo292	1.0	na	na	4.6 ± 1.6	2.20	0.0281

[(1)]= resisted maximum rate used, na= not available, [(2)]= LD50 replaced by the lowest rate (46.7) evaluated for susceptible biotype A33P2 just used for resistance factor (RF), [(3)]= LD50 of Pbarrob (179 ± 52, t-value=3.41, p.=0.0007) used for propanil-RF, [(4)]= LD50 of Test008 (230 ± 89, t-value=2.595, p.=0.01) used for propanil-RF

With regard to clomazone just one of fourteen biotypes showed a RF of 8.7 ± 3.6 (p.=0.051), instead for bispiribac, penoxulam and imazapyr plus imazapic any biotypes assessed presented RF > 10 (data not shown).

CONCLUSIONS

Seemingly, quinclorc-resistant biotypes came from fields under more intensive rice production systems rather than from fields under rotation with long-term pastures.

Quinclorac-resistant biotypes were broadly dispersed in the acreage surveyed; meanwhile propanil-resistant ones had much lower frequency.