

Criteria for Confirmation of Herbicide-Resistant Weeds

Resistance Validation Criteria



Criteria related to product label compliance

Product label compliance criteria require correct weed species identification, application at labelled rate and recommendations, elimination of non-resistance factors, and confirmation of reduced efficacy under field conditions.

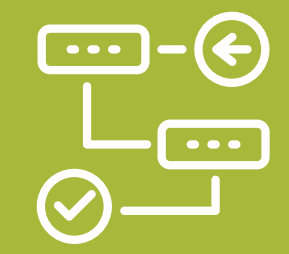
Criteria related to WSSA & ISHRW standard definitions of resistance

Standard resistance definitions by WSSA & ISHRW require evidence of historical susceptibility, documented susceptibility changes, field treatment history, practical field impact, natural selection proof, and heritable resistance through generations.

Criteria related to Test Procedure

Standard resistance definitions by WSSA & ISHRW require evidence of historical susceptibility, documented susceptibility changes, field treatment history, practical field impact, natural selection proof, and heritable resistance through generations.

Resistance Testing Workflow



Locate sampling sites

- Failure / complaint
- Resistance survey

Seed collection

- Plants / patches
- Whole field

Sample processing

- Dry and clean
- Break dormancy

Spray plants (or soil)

- Spray seedlings at standard size

Establish test assay

- Germinate, transplant, sow?
- Glasshouse / outside?

Design test protocol

- Single or few doses
- Full dose response

Assess plants

- Injury, mortality, biomass?

Analyse results

- Resistance frequency
- Dose response analysis

Possible Further tests

- Seed production (inheritance)
- Molecular assays

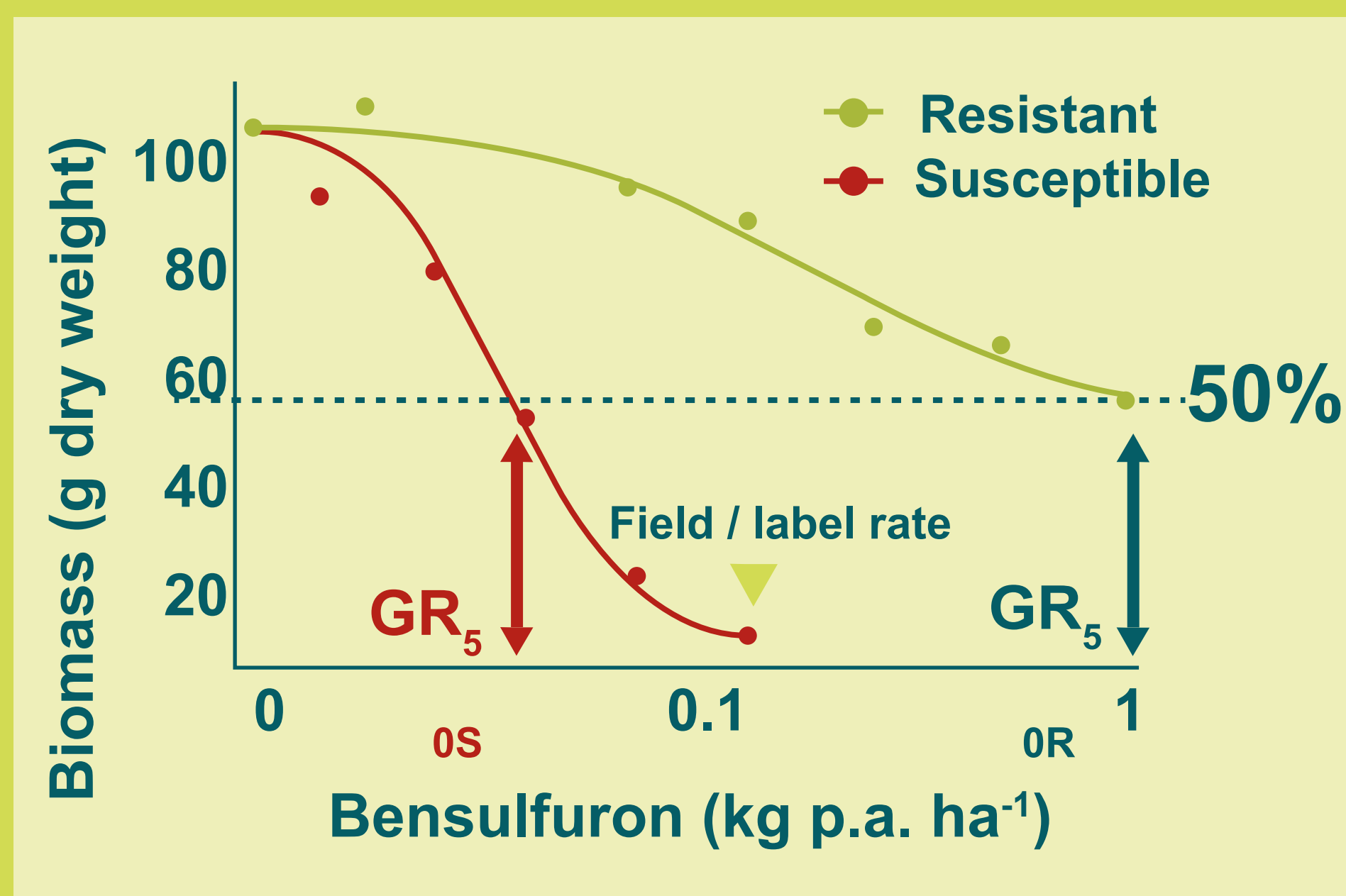
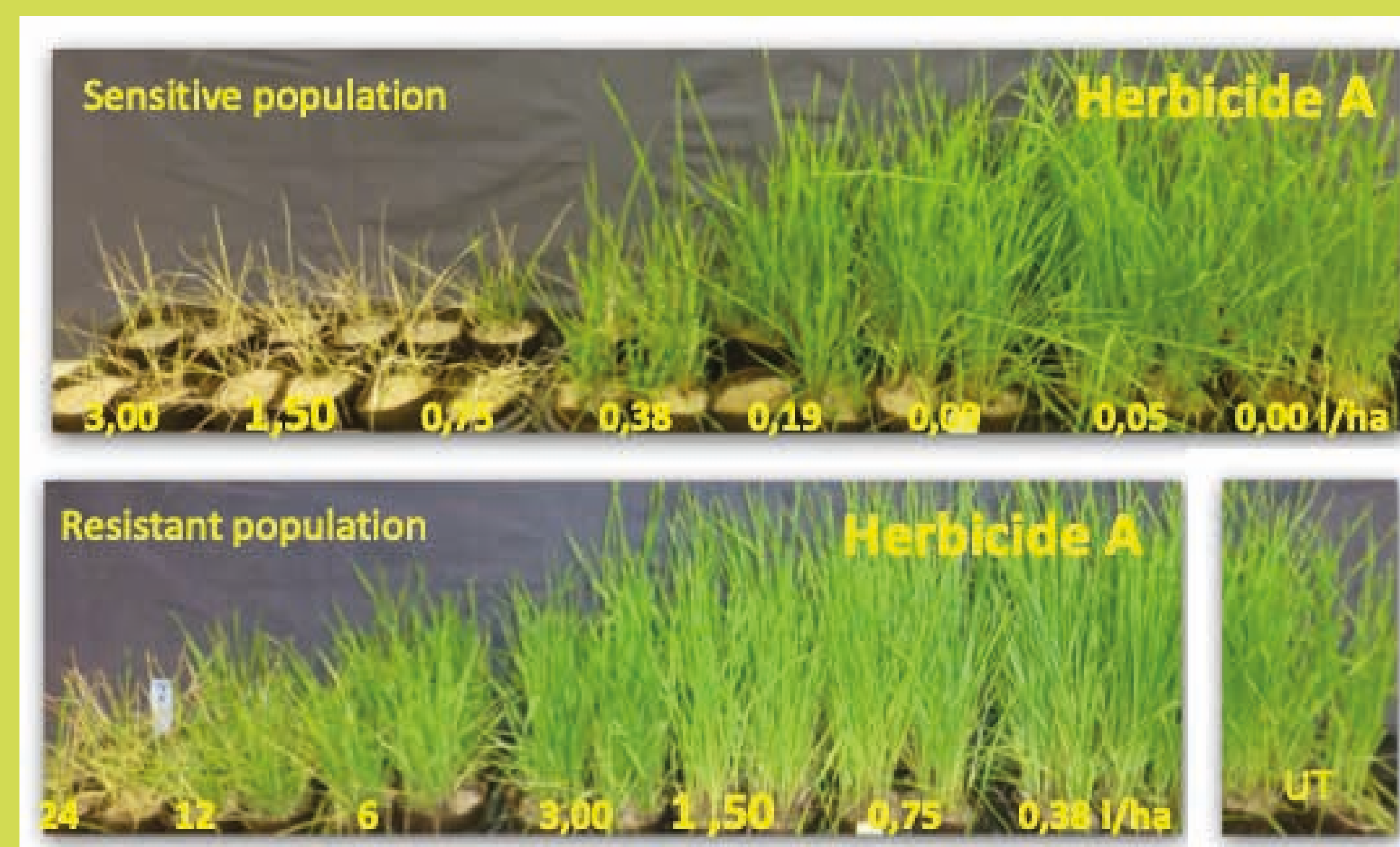
Dose Response Analyses



Use 2 to 3 sensitive populations from a close location of the resistant populations to be analyzed. Use at least 8 herbicide rates included an untreated control (UT).

$$\begin{aligned} GR_{50} S &= 0.03 \text{ Kg ha}^{-1} \\ GR_{50} R &= 1.05 \text{ Kg ha}^{-1} \end{aligned}$$

$$\begin{aligned} \text{Resistance index:} \\ GR_{50} S / GR_{50} R &= 1.05 / 0.03 \\ RI &= 35 \end{aligned}$$



Additional Criteria



With the progress of analytics, molecular biology and genomics it is possible today to analyze Target Site Resistance using e.g. PCR and metabolic resistance using e.g. HPLC MS/MS. These new criteria are under evaluation.



PCR machine



HPLC MS/MS