

# 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.

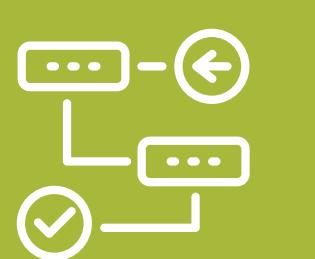
### Criteria related to WSSA & ISHRW standard definitions of resistance

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?

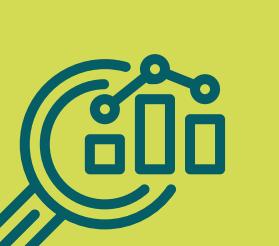
### Analyse results

- Resistance frequency
- Dose response analysis

### Possible Further tests

- Seed production (inheritance)
- Molecular assays

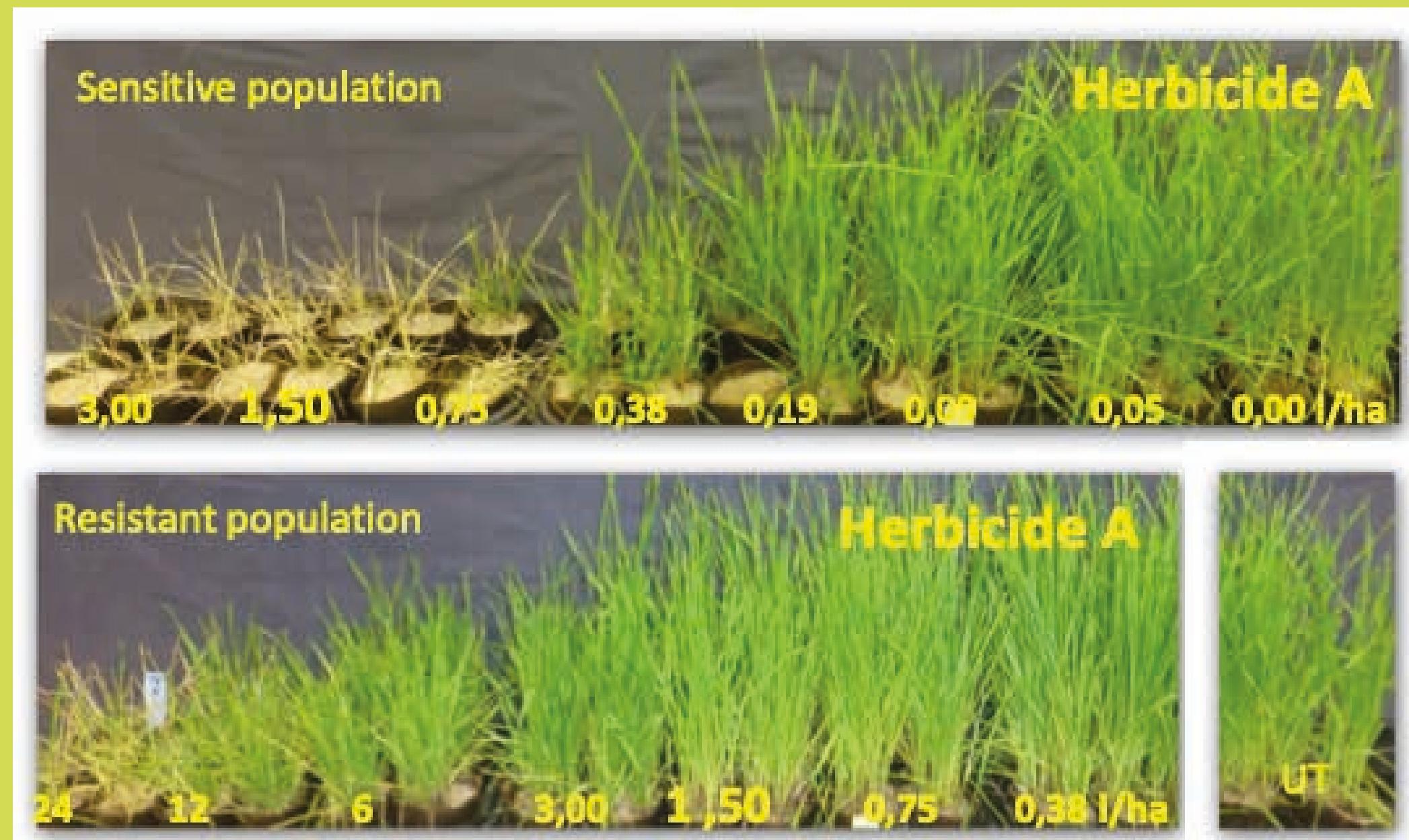
## Dose Response Analyses



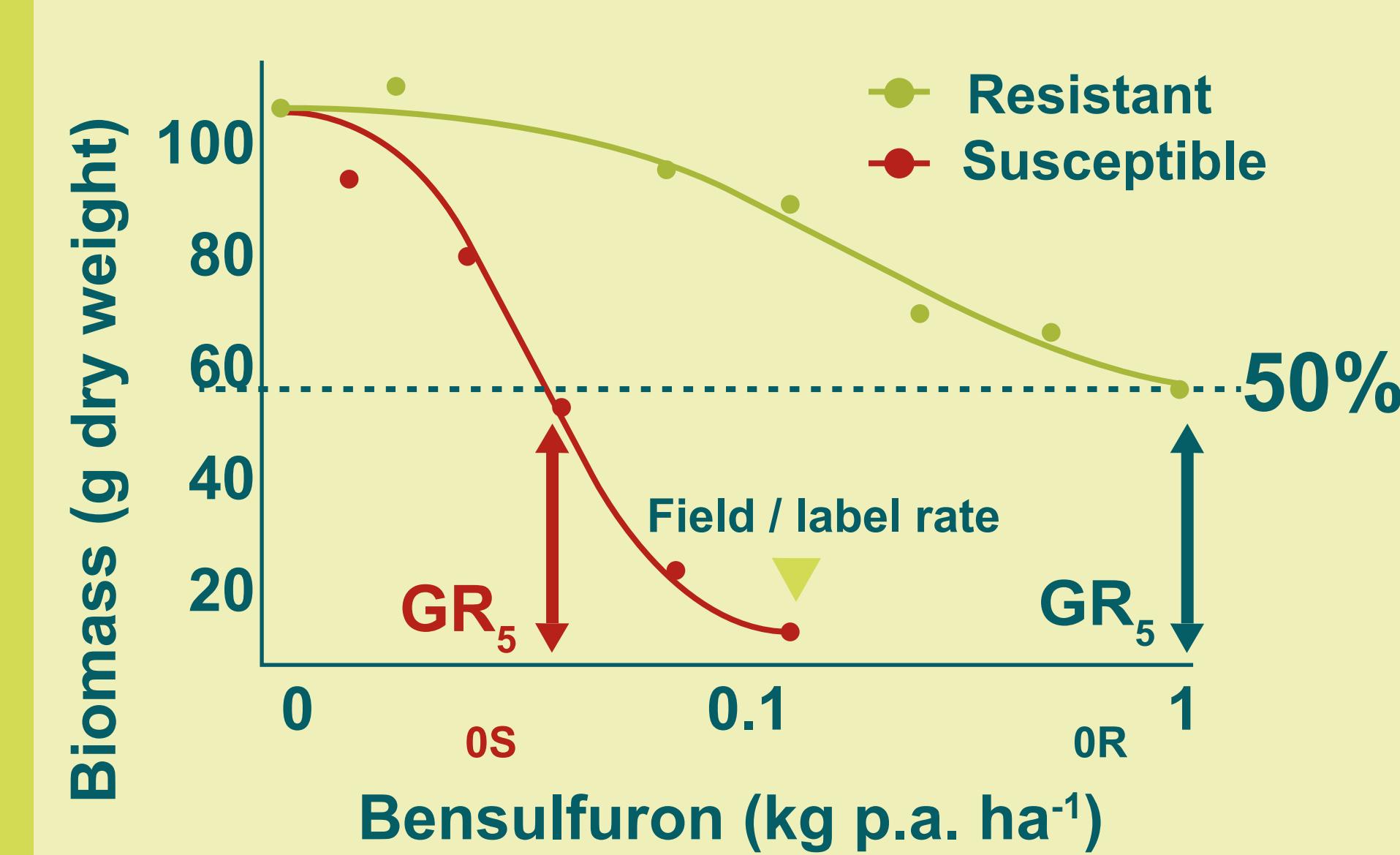
Use 2 to 3 sensitive populations from a close location of the resistant populations to be analyzed. Use at least 8 herbicide rates included an untreated control (UT).

$$\text{GR}_{50}\text{S} = 0.03 \text{ Kg ha}^{-1}$$

$$\text{GR}_{50}\text{R} = 1.05 \text{ Kg ha}^{-1}$$



Resistance index:  
 $\text{GR}_{50}\text{S} / \text{GR}_{50}\text{R} = 1.05 / 0.03$   
 $\text{RI} = 35$



## 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.

