



Department of  
Primary Industries and  
Regional Development

**CNH**

# Electric weed control in Australia

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Wine  
Australia



**zasso**™

# Electric weed control



Catherine Borger, Department of Primary Industries and Regional Development.

# Electric weed control

- What affects weed control efficacy?
- What are the potential use patterns?



# Weed control efficacy



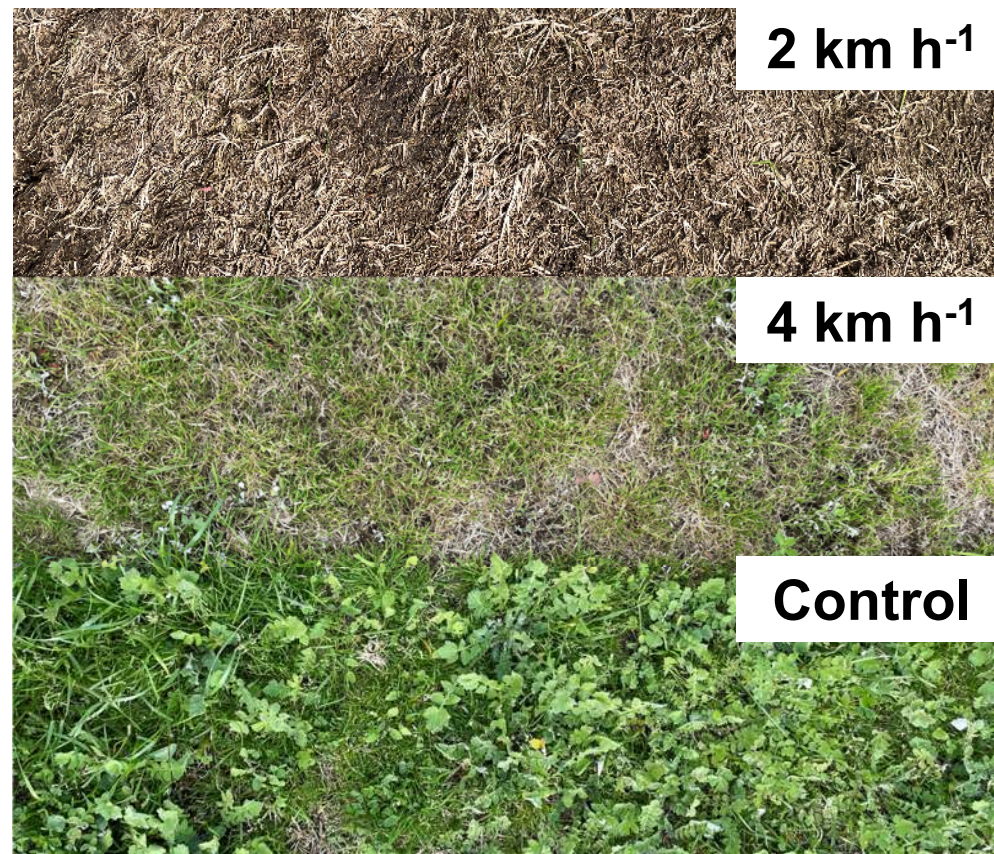
# Weed control efficacy

- Most factors that affect weed control are the same as herbicides.
  - Coverage (plant density).
  - Species type.
  - Age.
  - Dose (speed).
  - Environmental factors (soil moisture).



# Weed control efficacy

- Application speed – dose of electric current.
- Species – broadleaf weeds are easier to control than grass weeds.



# Weed control efficacy

Species where control was comparable to herbicide.

Annual ryegrass (*Lolium rigidum* Gaud.)

Silver grass (*Vulpia myuros* (L.) C.C. Gmel.)

Wild oats (*Avena fatua* L.)

Windmill grass (*Chloris truncata* R.Br.)

Kikuyu (*Cenchrus clandestinus* Hochst. ex Chiov.)

Couch grass (*Elymus repens* (L.) Gould)

Sowthistle (*Sonchus oleraceus* L.)

Cape tulip (*Moraea flaccida* (Sweet) Steud.)

Wild radish (*Raphanus raphanistrum* L.)

Wireweed (*Polygonum aviculare* L.)

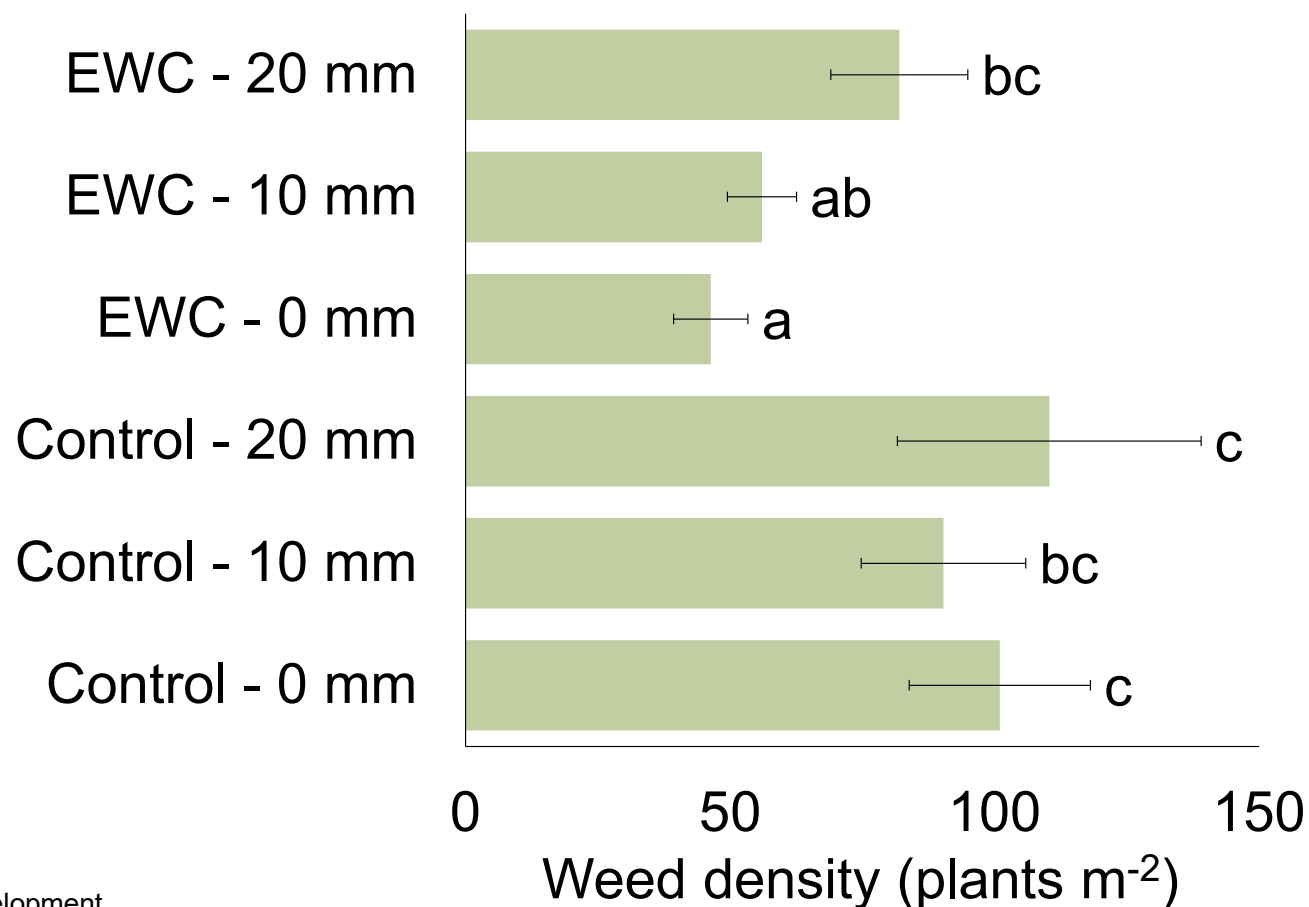


# Weed control efficacy

- Soil moisture

- No impact in 2022 when soil moisture was close to field capacity.

- Impact in 2023 when soil moisture was 9%-16%.



# Weed control efficacy

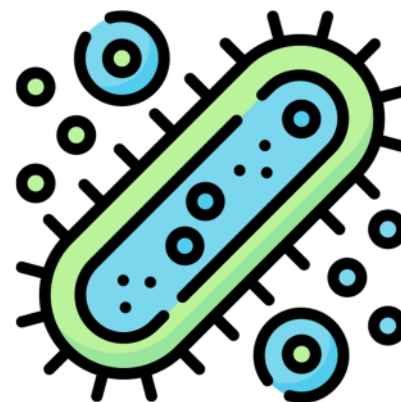
- Environmental requirements

Not important	Important
Windy conditions	High soil moisture (need to drive slower)
Environmental residue	Rainfall <u>directly before</u> (or during) application
Sensitive areas (i.e. water ways, native vegetation)	Very dry conditions (fire risk)
Stressed weeds	
Rainfall (or no rainfall) <u>following</u> application	



# Weed control efficacy

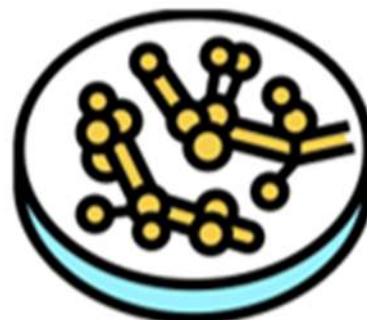
- No impact on soil biota, directly after application or a few weeks later.



**Bacteria and archaea**



**Free-living nematodes**

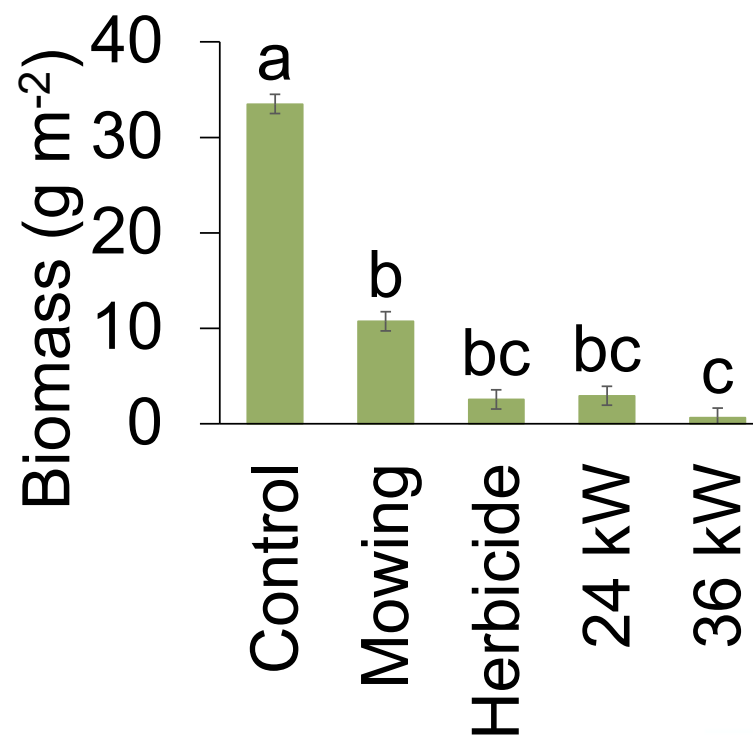


**Soil fungi**

# Use patterns - fence line weed control

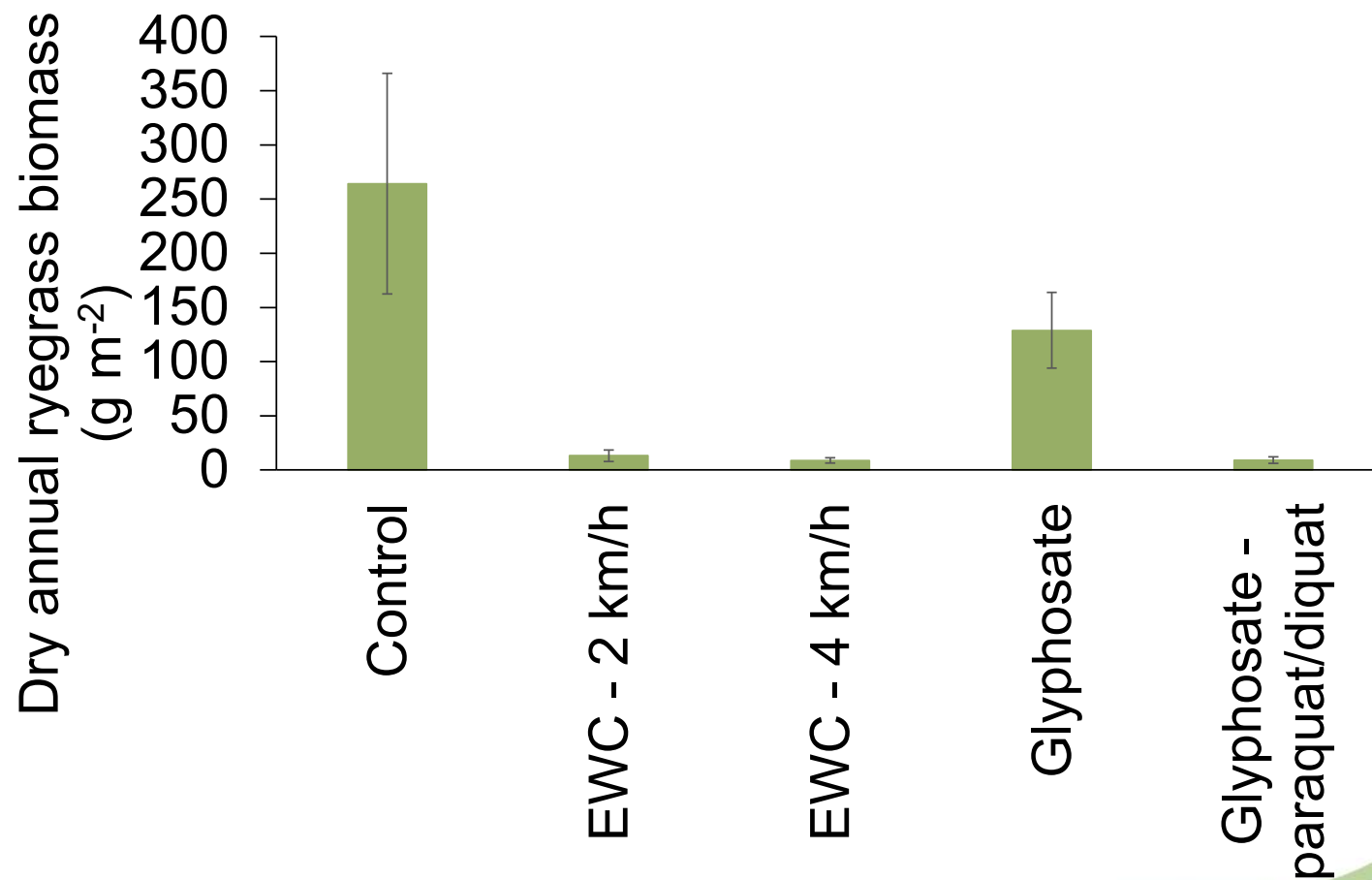


Control of annual ryegrass in 2023, 5 weeks after application.



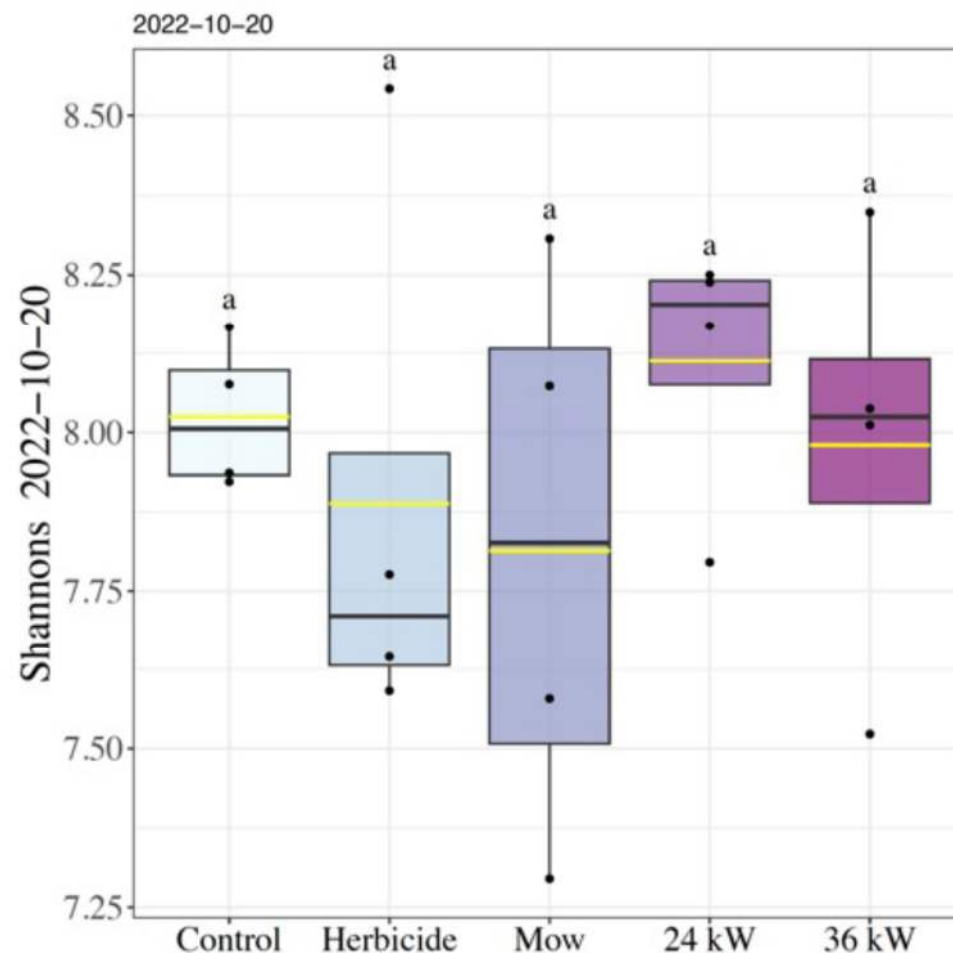
# Weed control efficacy

- Control of glyphosate resistant ryegrass



# Use patterns - fence line weed control

- No impact on soil biota (bacteria, fungi, nematodes).
- Alpha diversity of 16s communities (i.e. bacteria) assessed in 2022 at the Peccavi estate.



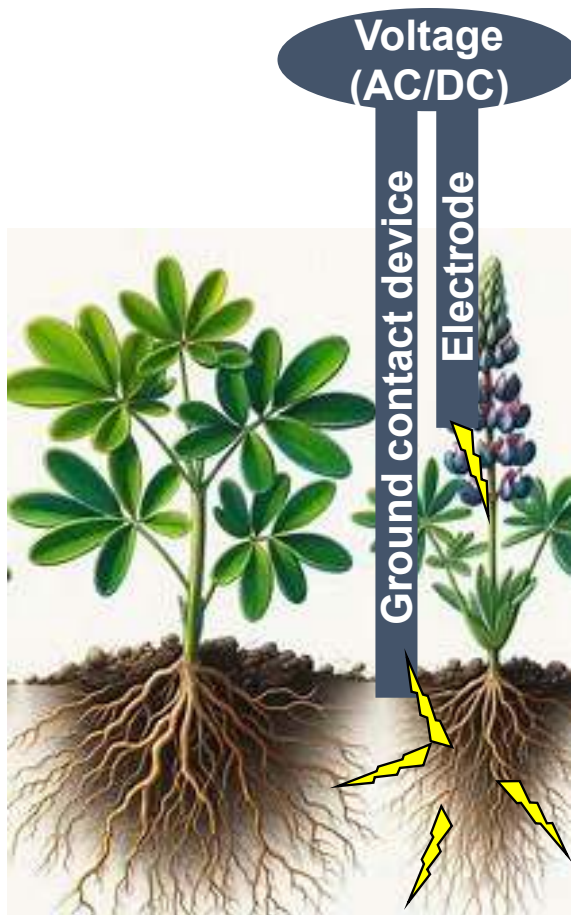
# Use patterns - inter-row weed control

- Inter-row weed control units are on the market.
- Shielded, custom units (width of 20 cm to 40 cm).
- Mainly for vegetable crops, but applicable to grain cropping.



<https://www.futurefarming.com/crop-solutions/weed-pest-control/zasso-and-agxtend-present-electric-weeding-solution-for-row-crops/>. Photo: Zasso Group

# Use patterns - inter-row weed control



- Potential damage to non-target plants?
- Electric 'spray drift'.
- Depends on the resistance of the soil, i.e. soil type (sand or clay, level of organic matter) and soil moisture.

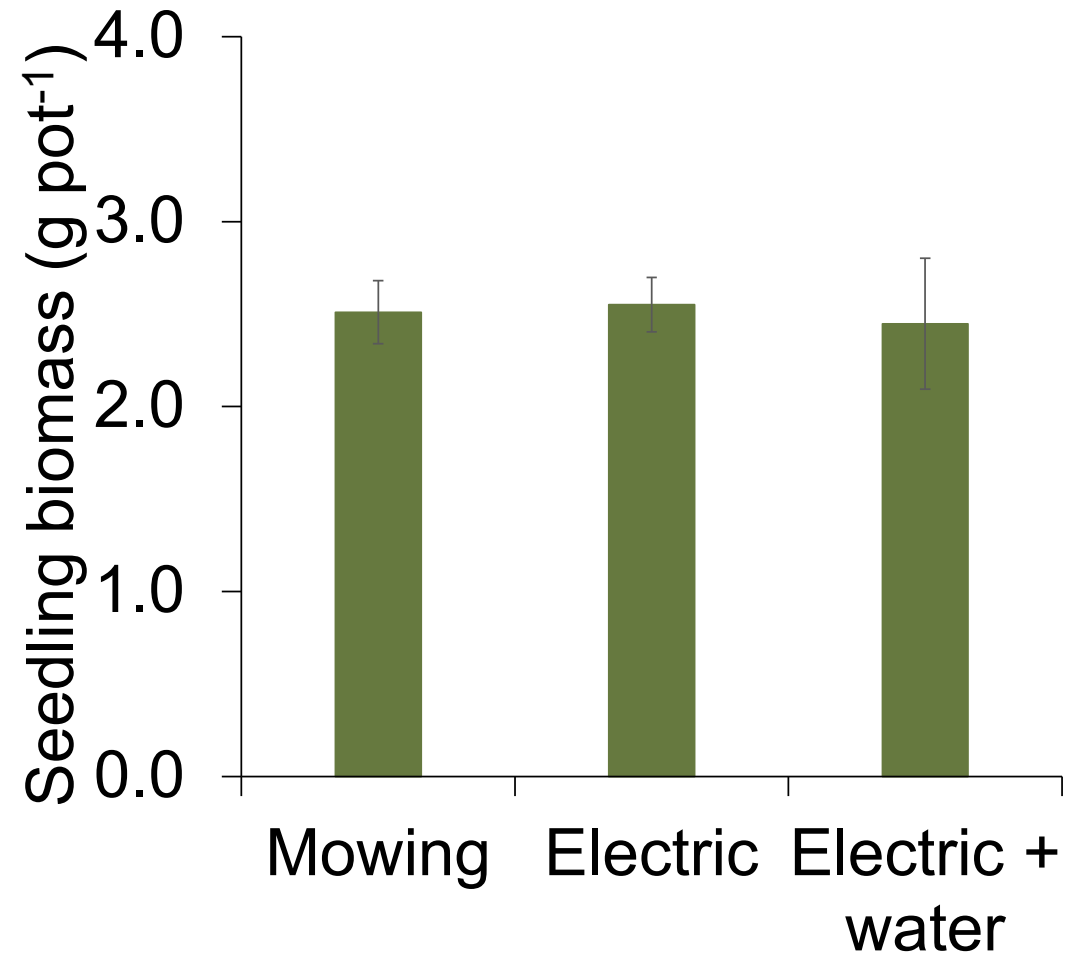
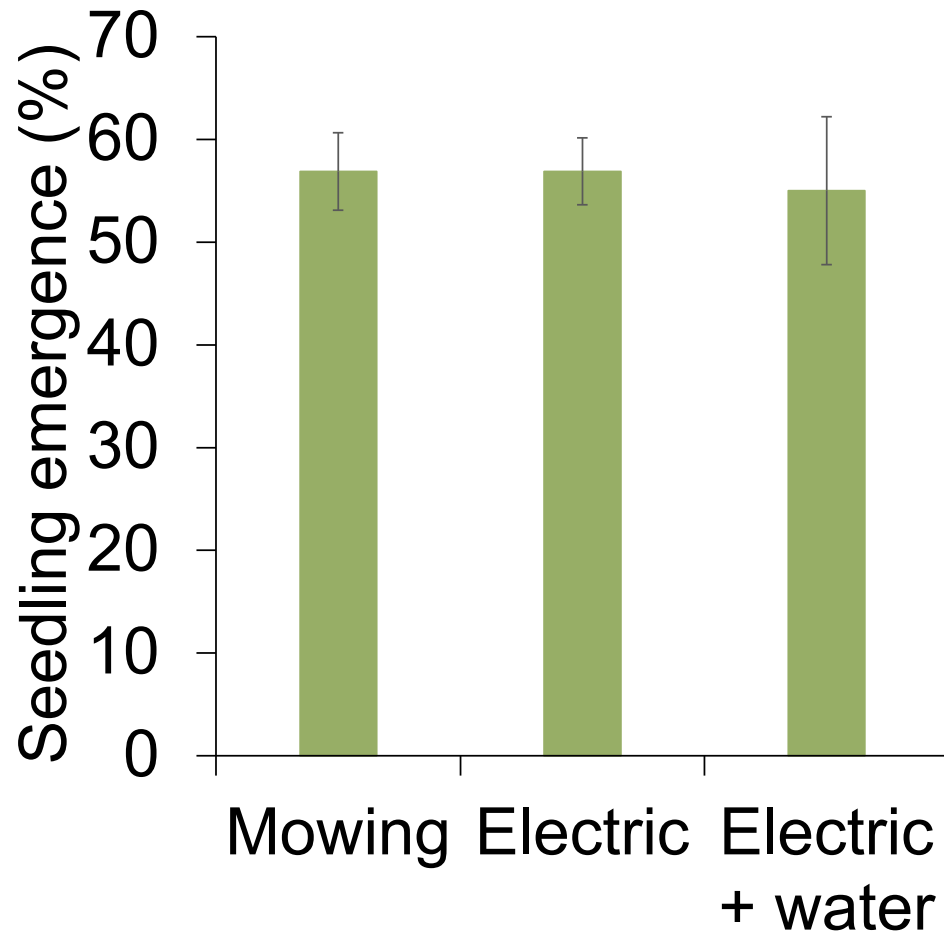
# Use patterns - inter-row weed control

- A series of experiments investigated crop damage to lupins.



Treatment	Plants (m <sup>-1</sup> )	Biomass (g plant <sup>-1</sup> )	Pods (plant <sup>-1</sup> )	Seeds (plant <sup>-1</sup> )
Mowing	11.7	26.5	5.3	79.7
Electric weed control	11.9	23.7	4.4	68.7
Electric weed control after watering	11.7	26.4	5.1	80.9
LSD (not significantly different)	3.6	12.1	2.4	37.0

# Use patterns - inter-row weed control



# Costs

- Cost of weed control = product (\$/ha) + spray machinery + fuel + labour
  - Product = \$0
  - Machinery = Under \$100 000 euros. Machinery cost reduced by 30% in the last 2 years.
  - Fuel = 10.48 L h<sup>-1</sup>. But...there are caveats around this number.
  - Labour. Slow application speed means that weed control alternatives (electric, laser etc.) really need autonomous machinery in grain cropping.

# Conclusions

- Electric weed control is a non-selective weed control method comparable to other weed management tactics.
- There are a range of potential uses in varying crops. In agronomy, uses include:
  - Fence line weed control (immediate).
  - Inter-row weed control (future potential).



<https://zasso.com/products/>. Photo: Zasso Group



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# Thank you

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