



# Agronomy influences competition between lupins and weeds

**Dr Bob French**  
Department of Agriculture and Food, Western Australia  
Dryland Research Institute  
Merredin



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# Weed management and competition

## Why is it important?

- Prevents wider adoption of lupins
- Weed competition reduces crop yield
- Crop competition reduces weed growth



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## What this talk is about

# Agronomy and crop-weed competition

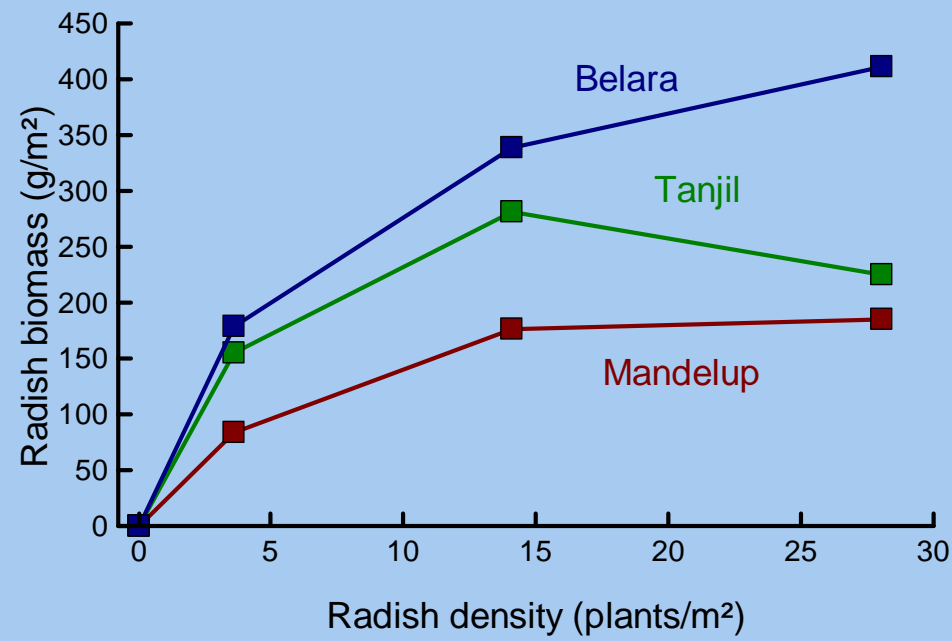
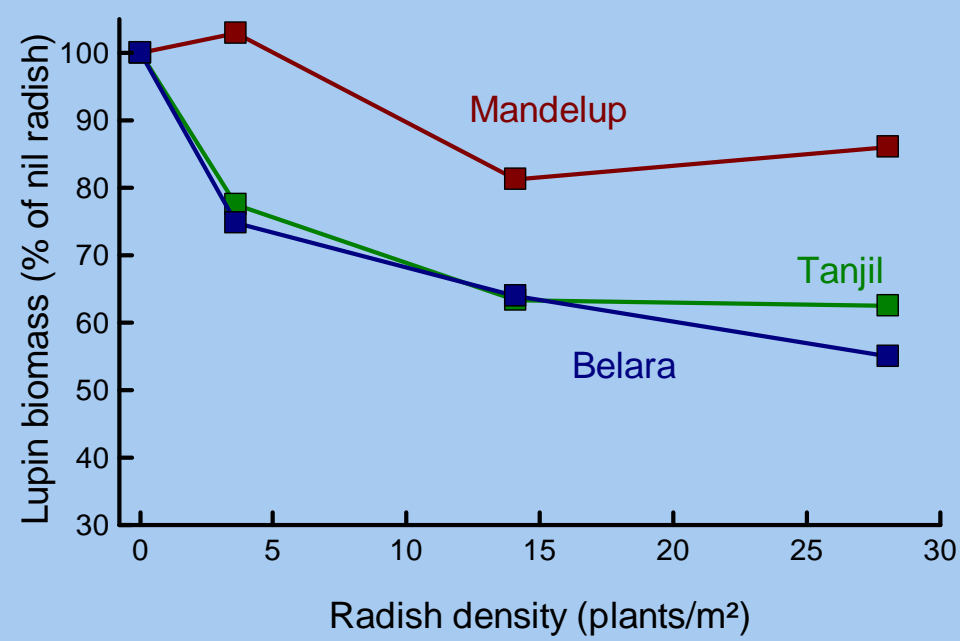
- Two major weeds
  - Annual ryegrass
  - Wild radish
- Agronomy
  - Cultivar choice
  - Sowing time
  - Planting configuration



# Cultivar choice

Some cultivars are more competitive

Mandelup is more competitive than Belara or Tanjil





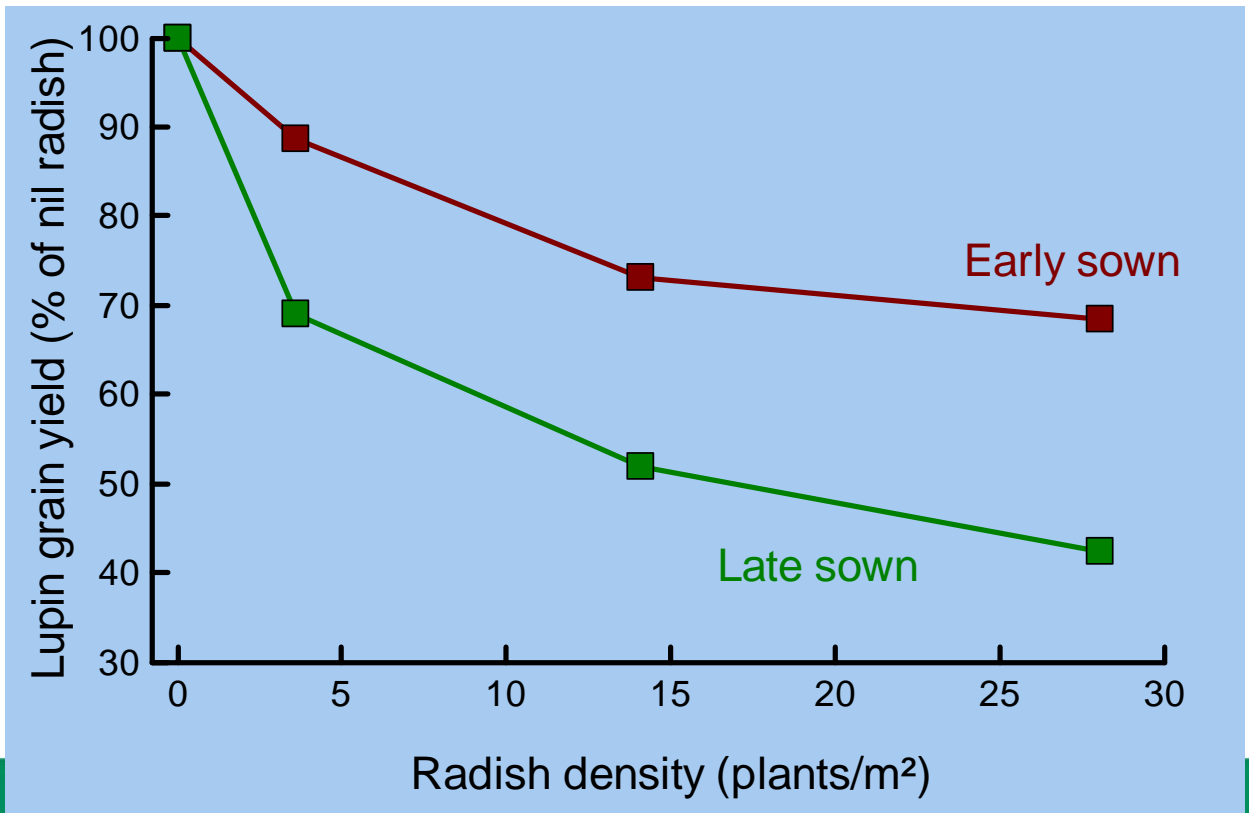
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# Sowing time

## Early sown lupins are more competitive

### Wild radish





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## Sowing time

### Early sown lupins are more competitive

#### Annual ryegrass

Weed competition reduces lupin grain yield (t/ha) more when sown late than when sown early

	Low weeds	High weeds
Sown 17 May	1.17	0.99 (85%)
Sown 26 May	1.18	0.85 (72%)



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## Sowing time

Early sown lupins are more competitive

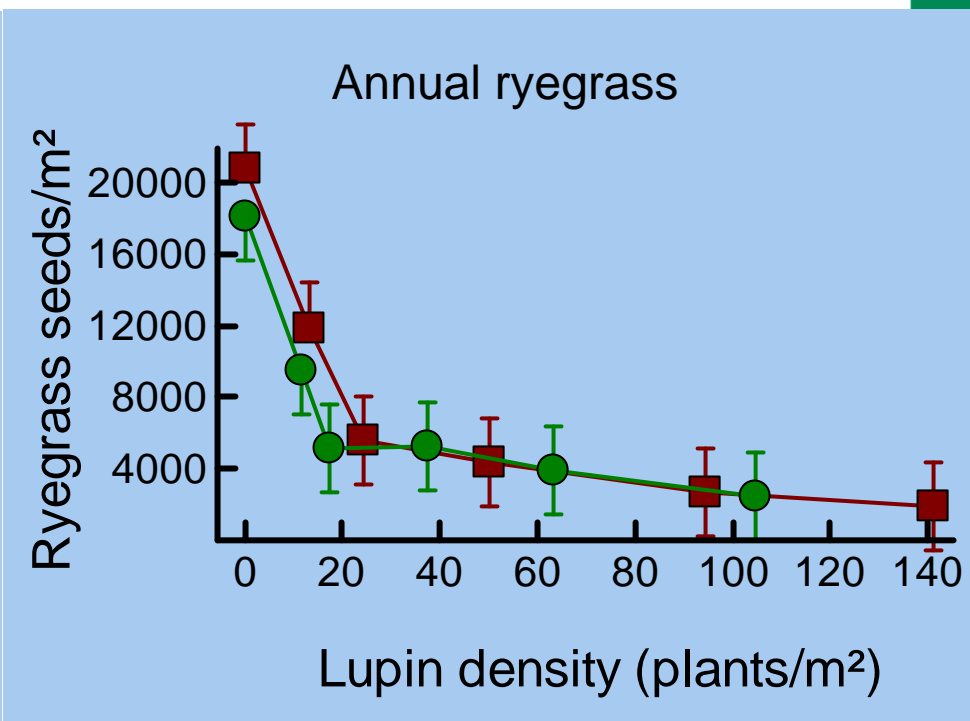
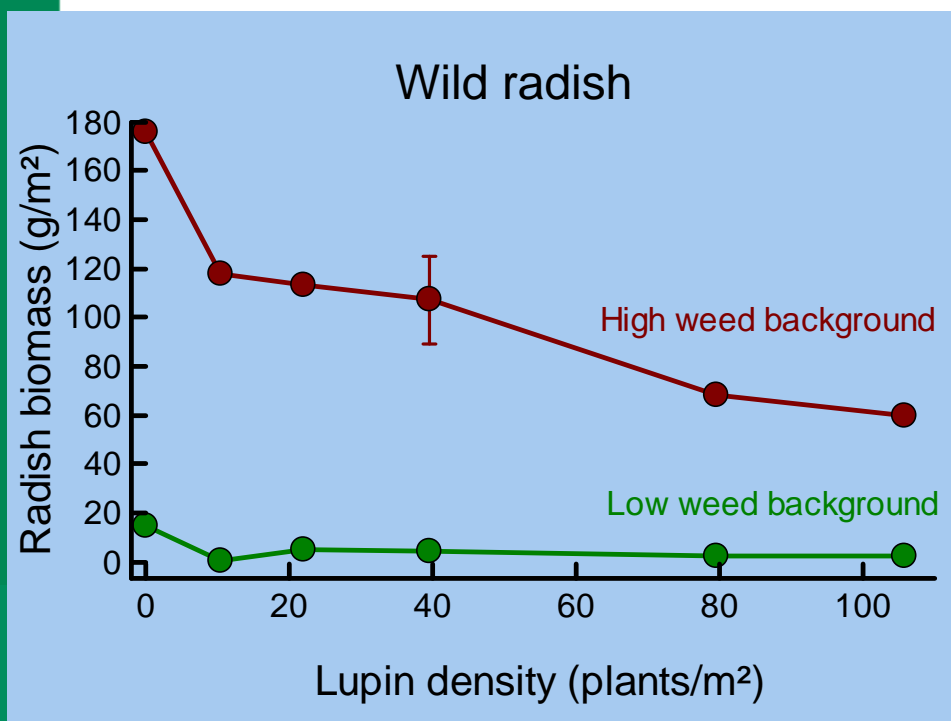
Sowing time has implications for weed management other than competitiveness



# Crop density

Dense lupin crops are more competitive

Suppress weed growth and seed production

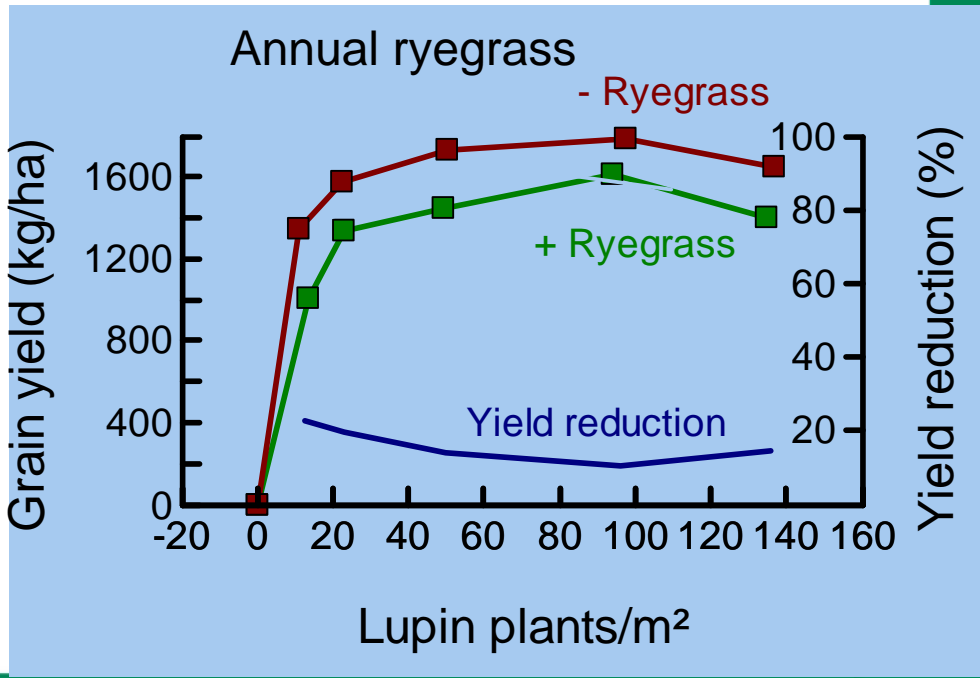
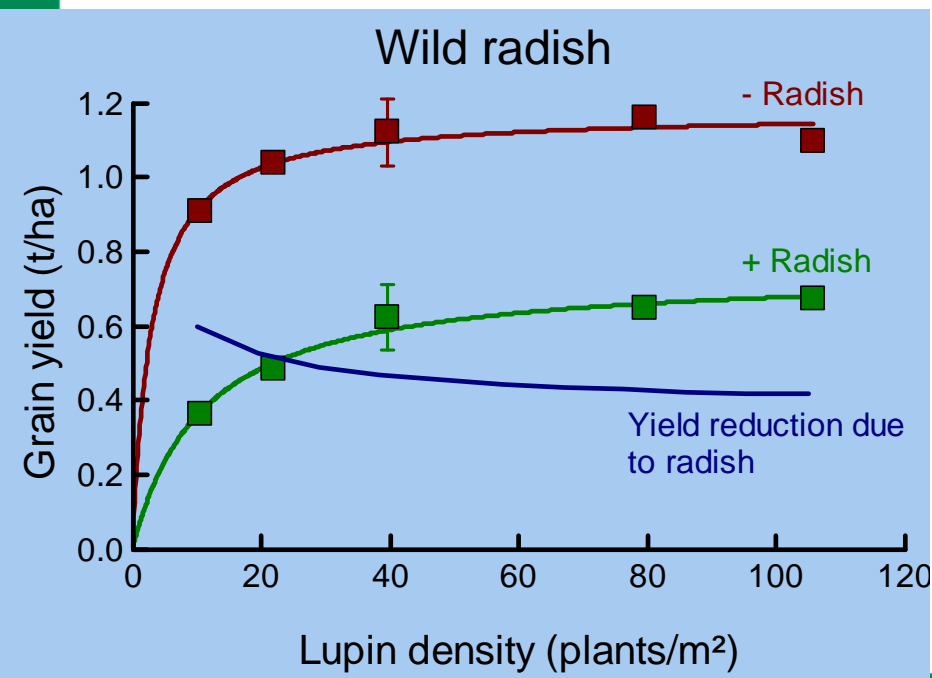




# Crop density

## Dense lupin crops are more competitive

### May reduce yield penalty





## Crop density

Dense lupin crops are more competitive

Competition effects can be modelled

$$y_L = \frac{R_L x_L}{(1 + a_L x_L + b_L x_L^2 + c_L x_r)}$$

$$y_r = \frac{R_r x_r}{(1 + a_r x_r + c_r x_L)}$$



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## Row spacing

Effect on competitiveness depends on how wide

Very wide rows reduce competitiveness

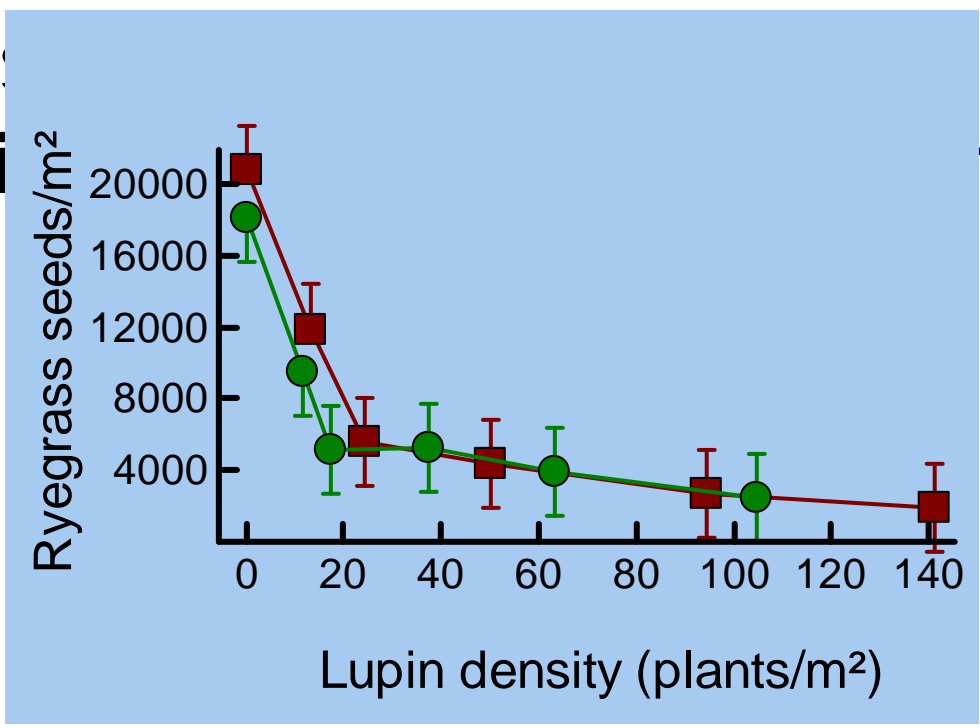




# Row spacing

Row spacing up to 60 cm has little effect on competitiveness

But row spacing has implications



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## Sowing time....again!

### Trade-off between yield reduction and reduced competition

- Delayed sowing reduces lupin grain yield
- Delayed sowing allows cultural weed control
- When is it worth trading off potential yield against the benefits of improved weed control?



## Sowing time....again!

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Trade-off between yield reduction and reduced competition

- Modelled lupin yield penalty at different locations
- Calculated weed density to give the same yield loss



# Sowing time....again!

## Trade-off between yield reduction and reduced competition

Median yield penalty for 1 week seeding delay and densities of wild radish and annual ryegrass that would cause the same yield penalty

	Break yield (t/ha)	Yield penalty	Radish equivalent	Ryegrass equivalent
Mingenew	2.43	0.24	2.2	57
Buntine	1.55	0.18	2.6	65
Merredin	1.16	0.10	2.5	63



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## Conclusions

### Crop competition can contribute to weed management in lupins

- Plant highest yield potential cultivar
- Keep crop density above 40 plants/m<sup>2</sup>
- Do not plant in wider rows than 60 cm
- Delaying sowing reduces crop competitiveness but can also reduce weed burden