HWSC – What we have learned

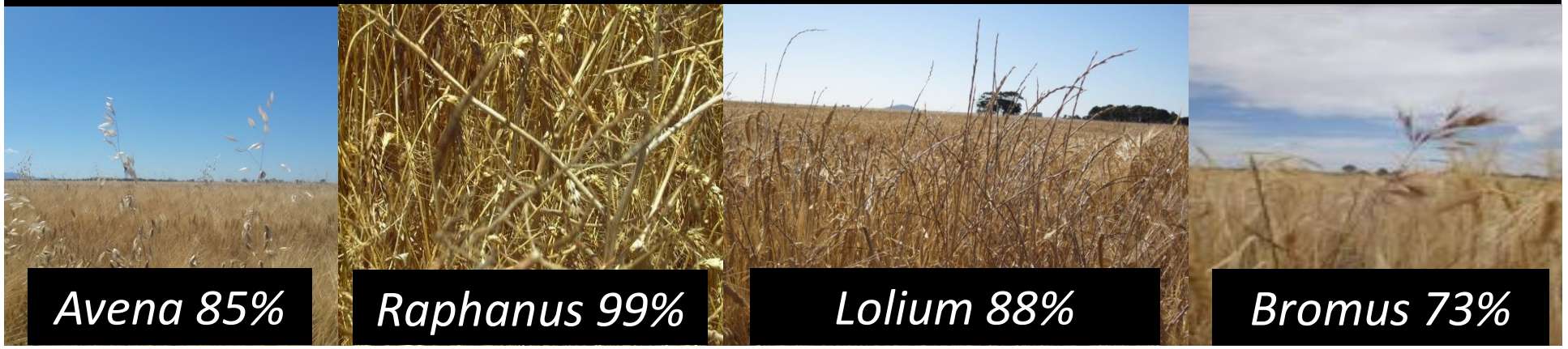
Michael Walsh
University of Sydney

THE UNIVERSITY OF SYDNEY | NSW GOVERNMENT Department of Primary Industries | Charles Sturt University | THE UNIVERSITY OF QUEENSLAND AUSTRALIA | QAAFI Queensland Alliance for Agriculture and Food Innovation | Queensland Government

Harvest weed seed control

Developed in response to herbicide resistance

Because of potential to target weed seeds

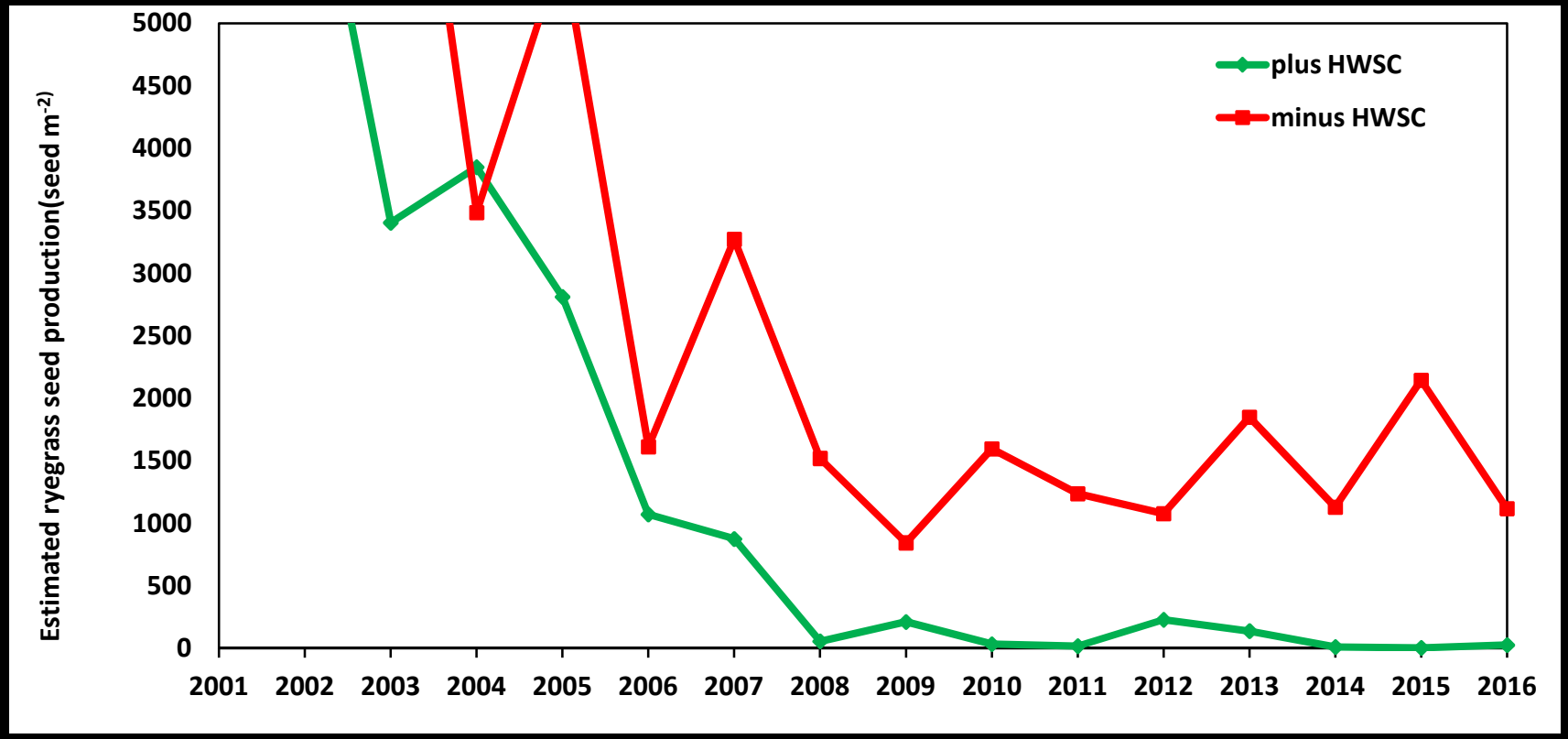


Why HWSC?

Ryegrass re-seeding

1 plant/m^2 produces 4 kg/ha seed

Seedbank inputs



Equally effective

60% reduction in emergence*

*Assuming weed seed are in chaff

Chaff cart

Chaff tramlining

Narrow windrow burning

Bale Direct

iHSD

HSD

So which HWSC system??

Chaff cart

Chaff tramlining

Narrow windrow burning

Bale Direct

iHSD

HSD

Chaff carts

Feed source
Trailing system
Some nutrient removal

Grazing

Baling

Autumn burning

Glenvar Bale Direct System

Financial opportunity where residue is a problem and there is a market for straw, nutrient removal

Narrow Windrow Burning

Cheap, suited to non cereals,

Can be problems with burning, nutrient removal

Chaff lining and chaff tramlining

Confine chaff on a tramline or in narrow row

Hostile environment for weed seeds

Leave undisturbed

Seed survival under chaff in April

	Survival (%)	Chaff (t/ha)
Canola	2	31
Wheat	74	19
Barley	3	18

Chaff tramlining

Cheap

No additional operations

Some weed emergence,

Some nutrient removal

Chaff lining

Cheap

No additional operations

Some weed emergence

Some nutrient removal

Residue buildup

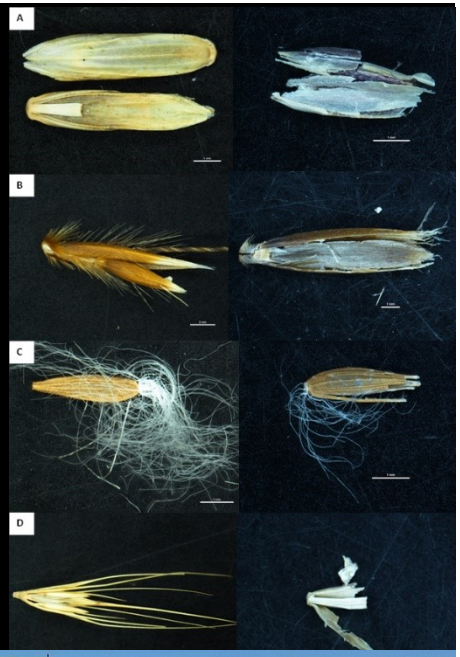
Impact mills

HSD, iHSD, seed terminator etc.

No follow up operations
Retains all residues
Horsepower
Maintenance

Impact mills

Weed species	Seed weight (mg/seed)	Seed kill (%)
Annual ryegrass (Lolium rigidum)	2.8	96
Wild oats (Avena spp.)	26.8	99
Wild radish (Raphanus raphanistrum)	5.2	99
Barley grass (Hordeum vulgare)	10.0	99
Brome grass (Bromus spp.)	15.7	98
Barnyard grass (Echinochloa spp.)	2.2	99
Indian hedge mustard (Sysmbrium orientale)	0.20	99
Fleabane (Conyza bonariensis)	0.047	99
Windmill Grass (Chloris truncata)	0.28	97
Sowthistle (Sonchus oleraceus)	0.33	99
Feathertop Rhodes Grass (Chloris virgata)	0.33	98

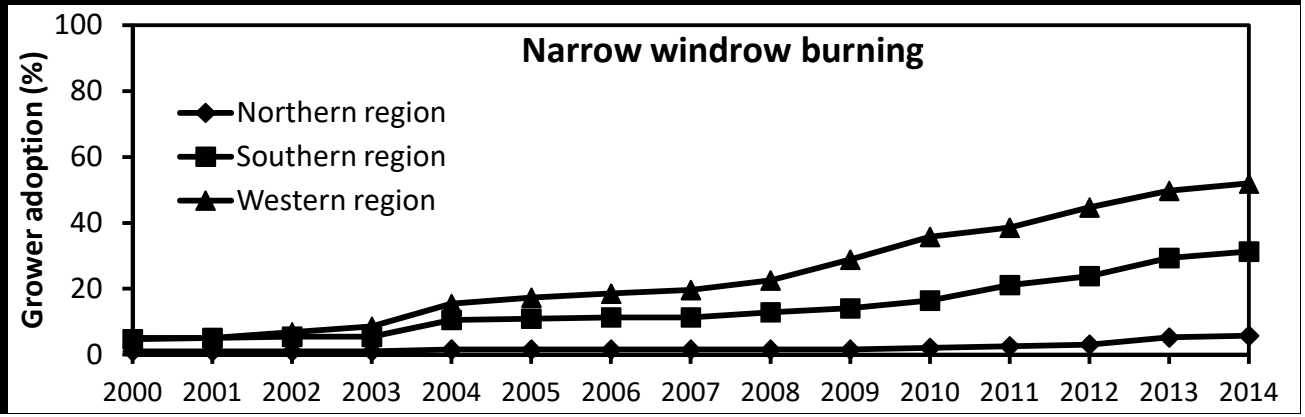


HWSC: an accepted practice

43% of Australian growers using HWSC (2014)

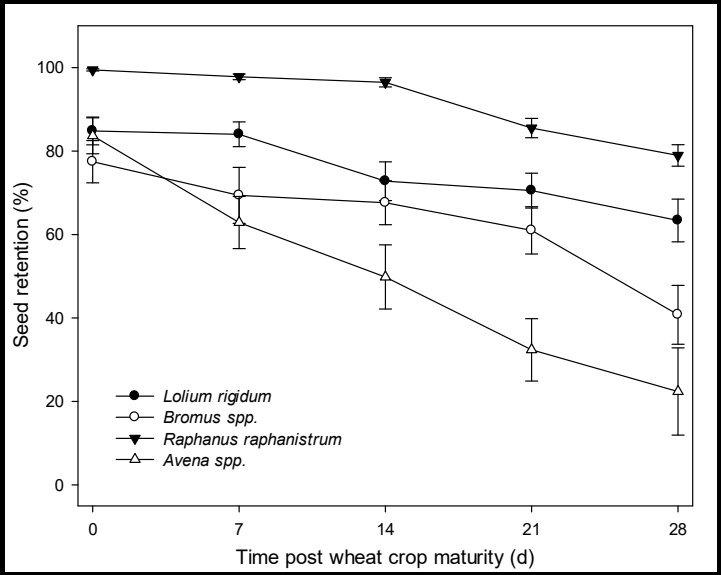
- 30% narrow windrow burning
- 7% chaff tramlining
- 3% chaff carts
- 3% bale direct

80% growers expect to be using HWSC by 2020



HWSC: an accepted practice

Need to increase weed seed collection



Preserve weed seed collection

Influences on weed seed collection

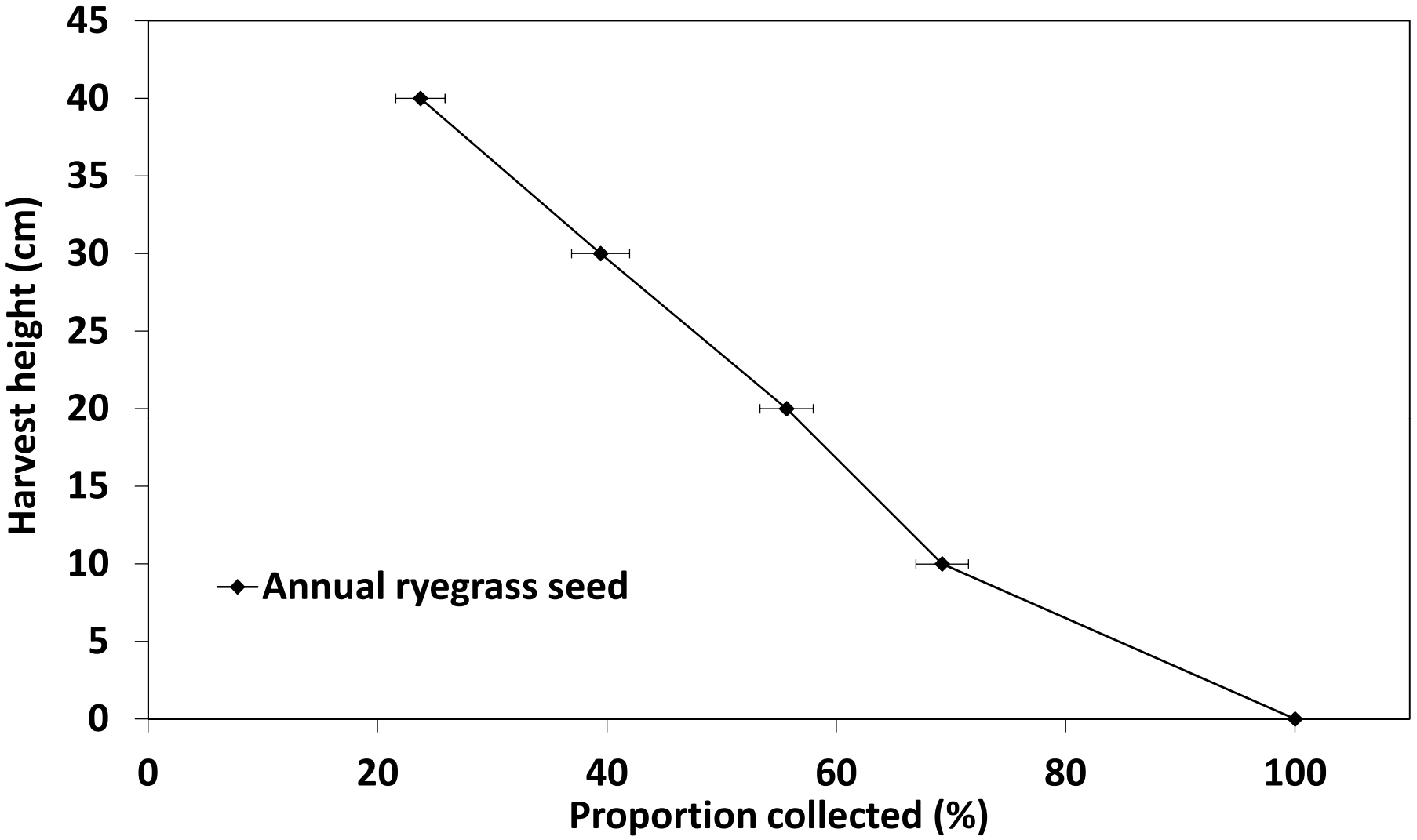
Harvest height

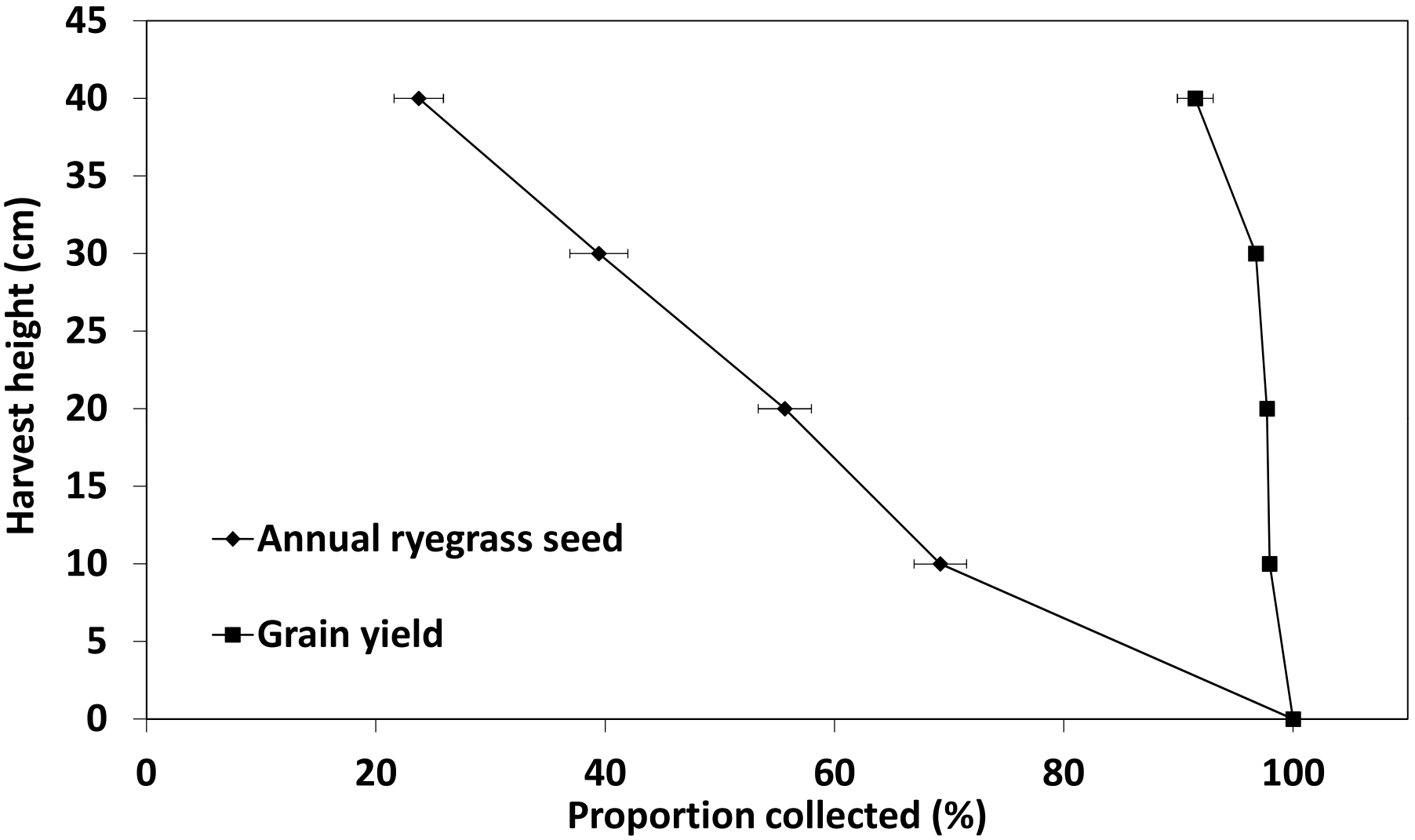
Crop competition

Resistance to HWSC

Survey across Australia of 70 wheat crops at maturity

10cm increment plant sampling down through canopy


Harvest height (cm)
45
40
35
30
25
20
15
10
5
0
Annual ryegrass seed
0
20
40
60
80
100
Proportion collected (%)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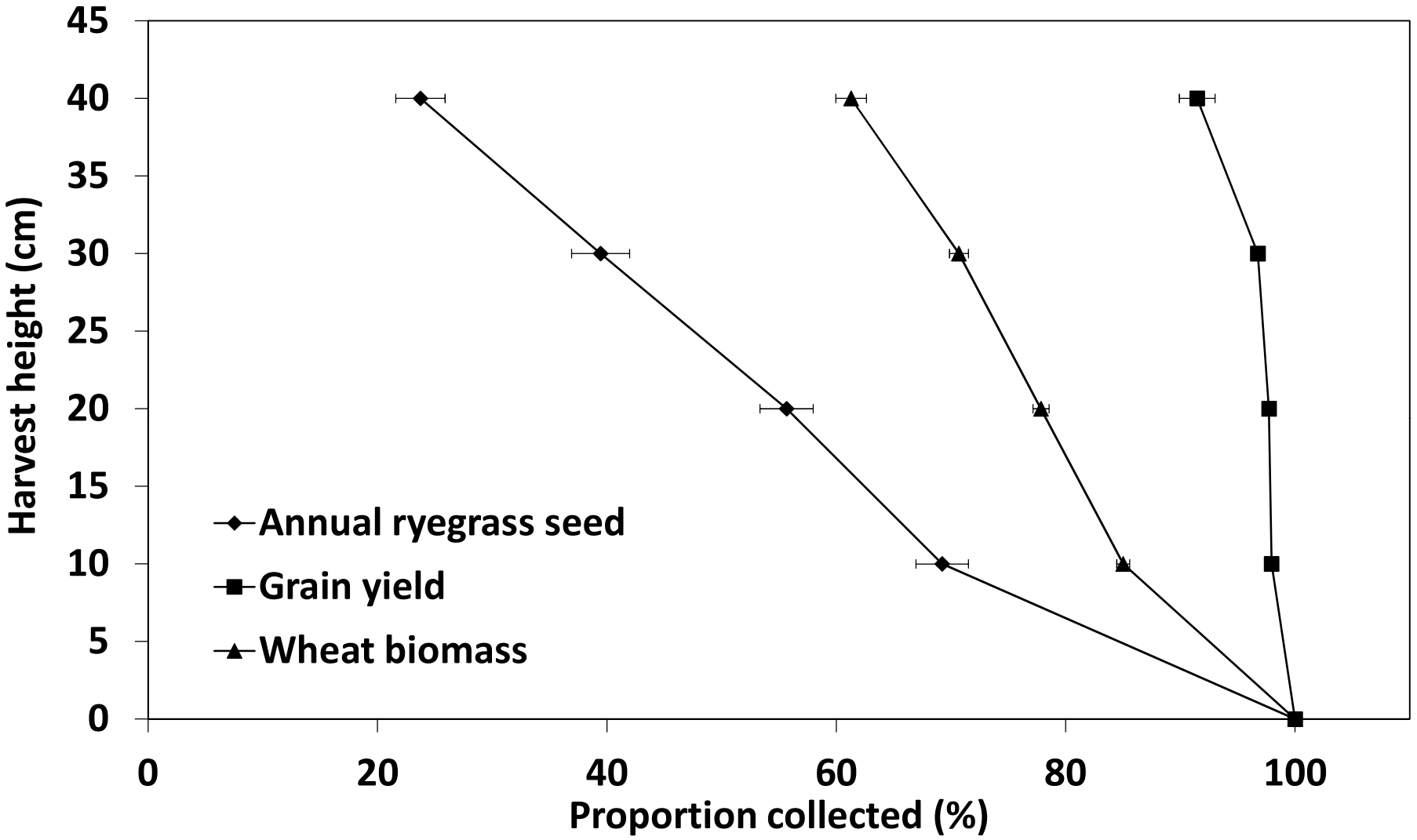
Proportion collected (%)
Annual ryegrass seed
Grain yield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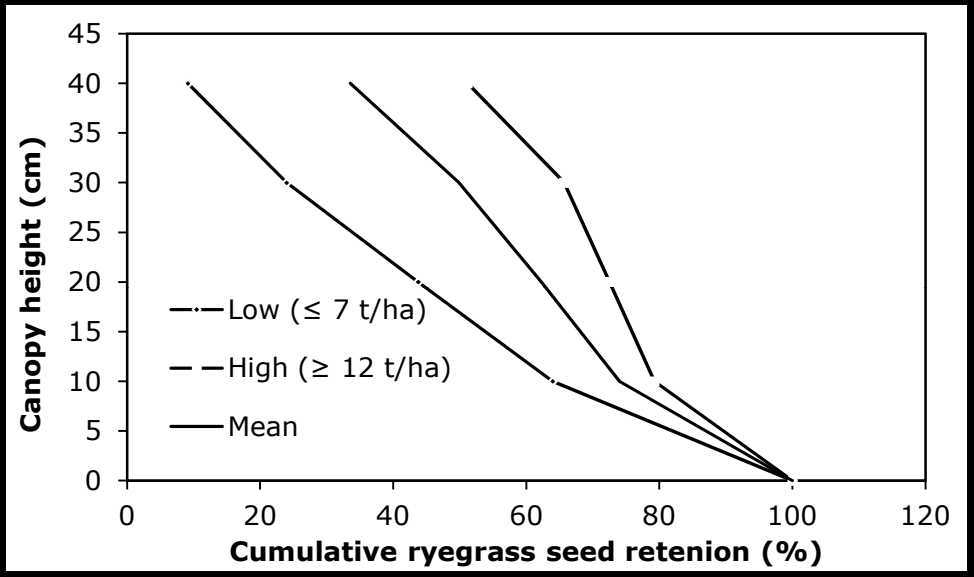
Proportion collected (%)
Annual ryegrass seed
Grain yield
Wheat biomass

Harvest implications

Height reduction from 30 to 10 cm increased

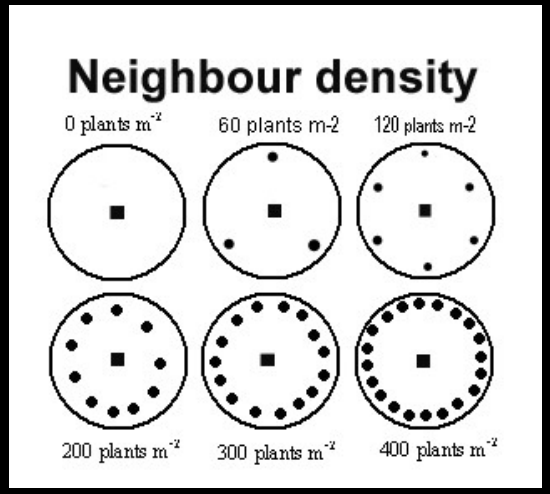
- biomass collection by 14%
- annual ryegrass seed collection by 30%

Crop biomass effects on annual ryegrass seed retention height

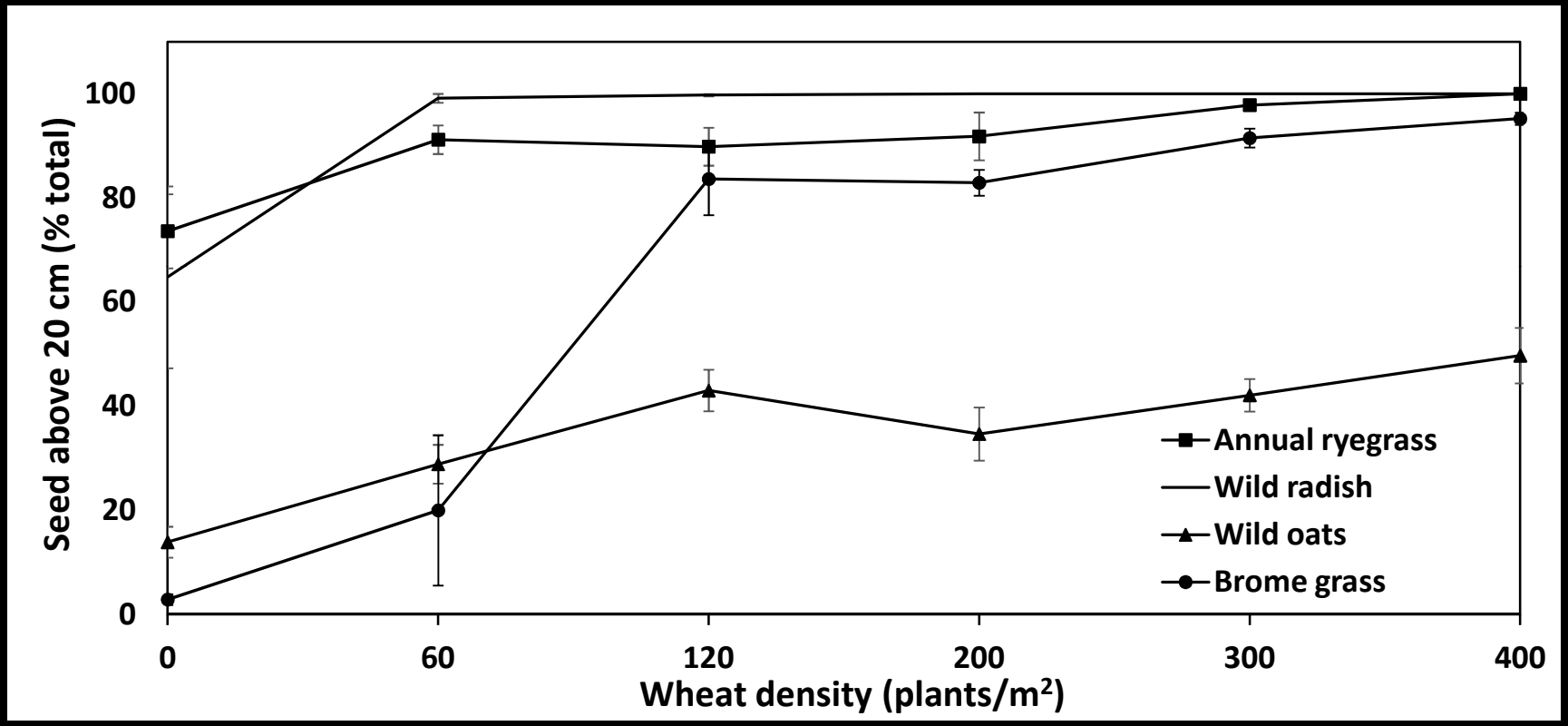


Crop competition pot trials

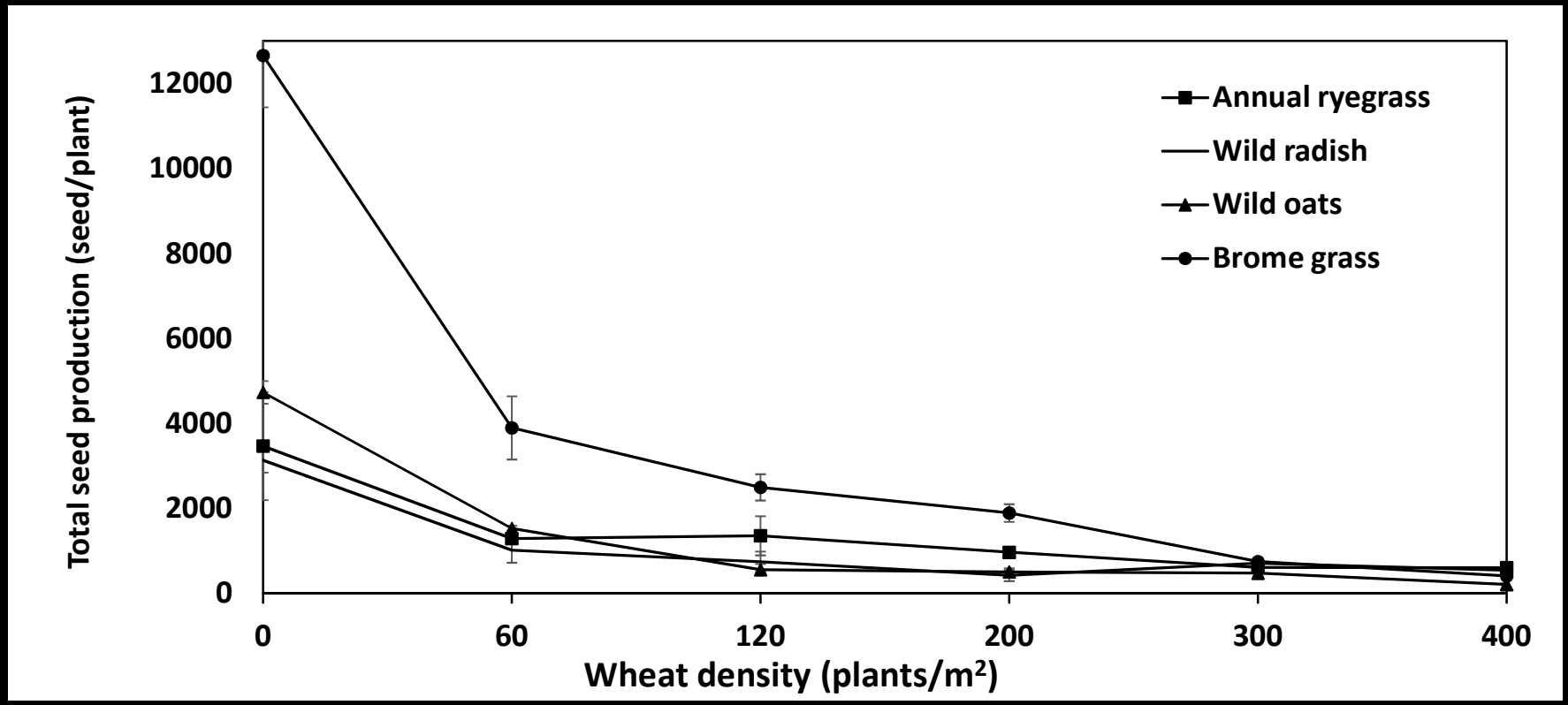
Competition effects of crop (neighbour) on weed (target)



Crop competition effects on weed seed retention height



Crop competition effects on weed seed production

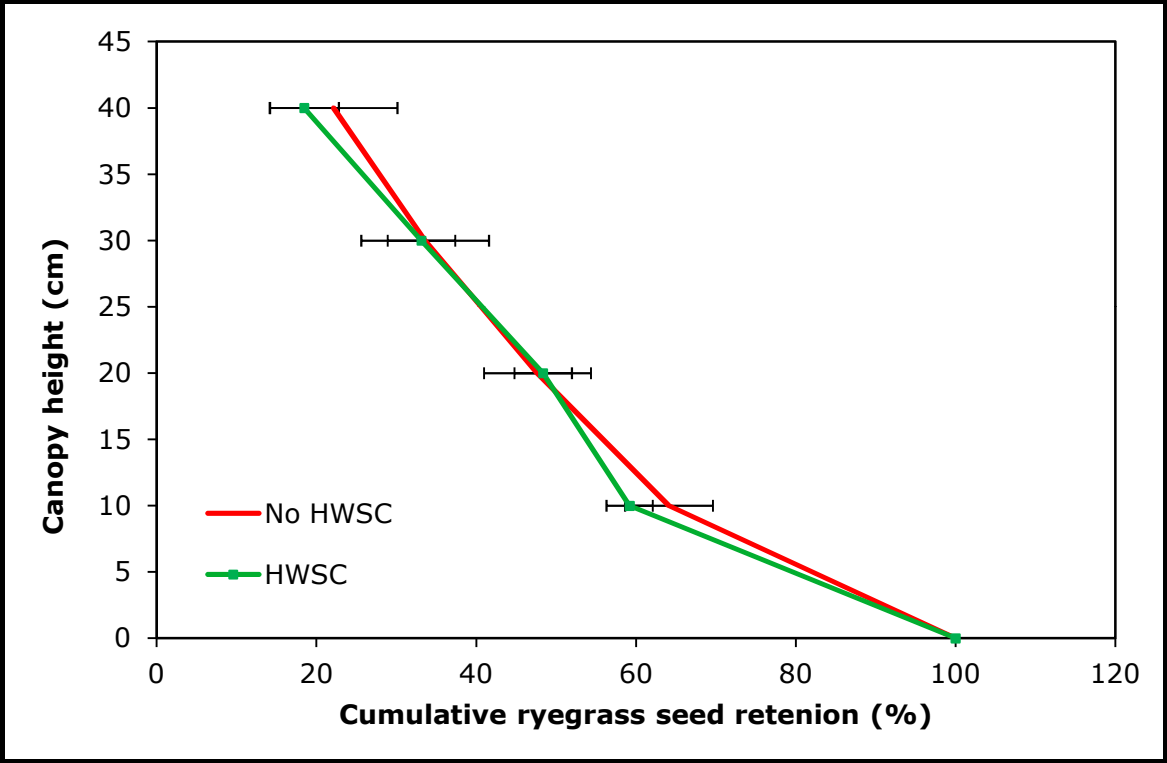


Dual effects of Crop competition

Reduced weed seed production

Increased height of seed retention

Resistance to HWSC



Ryegrass seed retention

9 + and - HWSC sites

5 – 10 seasons HWSC use

HWSC: Australian grower innovations with global adoption

20,000 Ha narrow windrow burning in Arkansas

3 HSD systems (research) in North America

3 Bale Direct systems in US

1 Bale Direct system in Israel

Chaff tramlining in UK


Thank you
GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION
THE UNIVERSITY OF SYDNEY
NSW GOVERNMENT
Department of Primary Industries
Charles Sturt University
THE UNIVERSITY OF QUEENSLAND
AUSTRALIA
QAAFI
Queensland Alliance for Agriculture and Food Innovation
Queensland Government