Stress Test 2012: sh2 Hybrid Tolerance to Crowding and Nitrogen Stresses

Marty Williams
USDA-ARS
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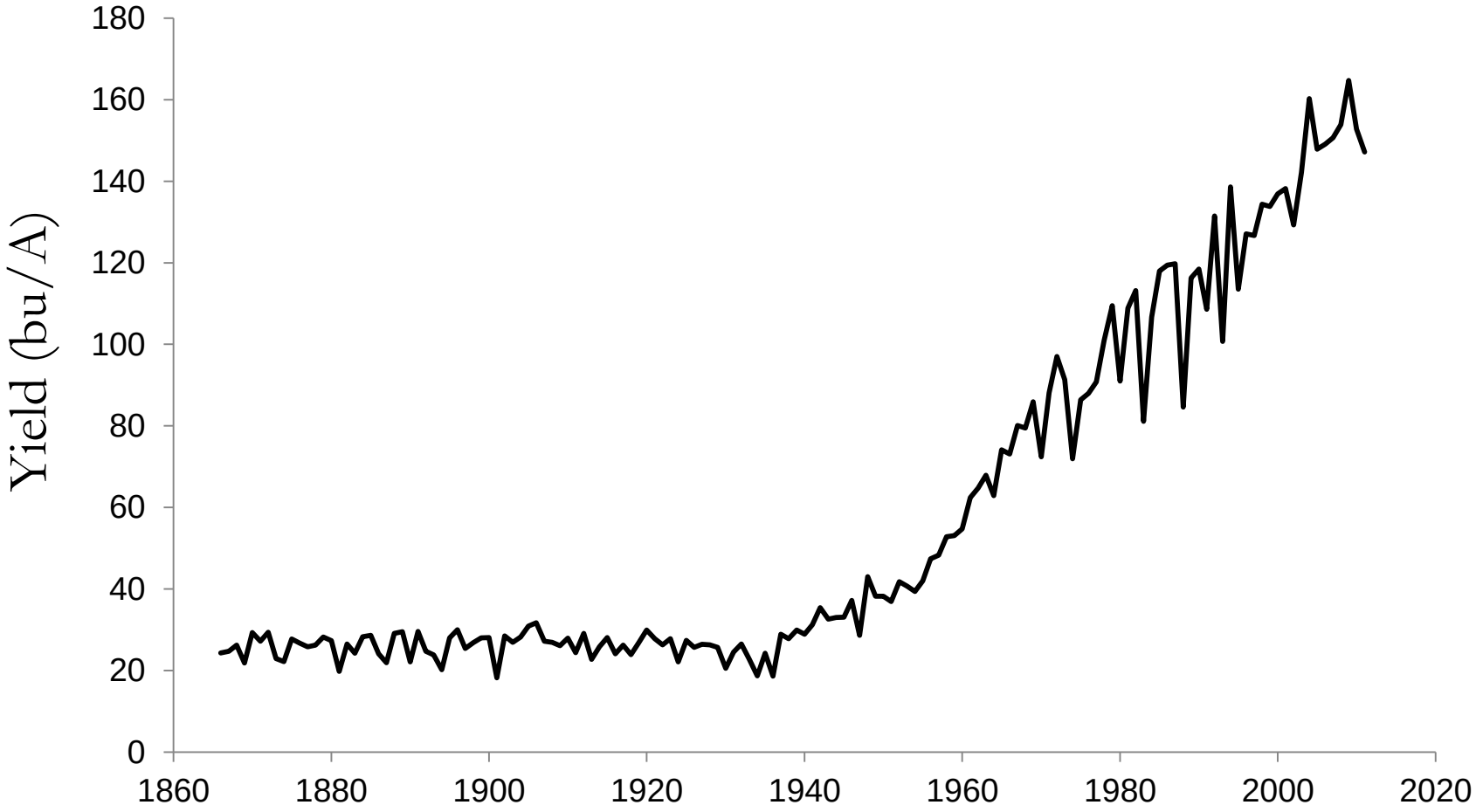
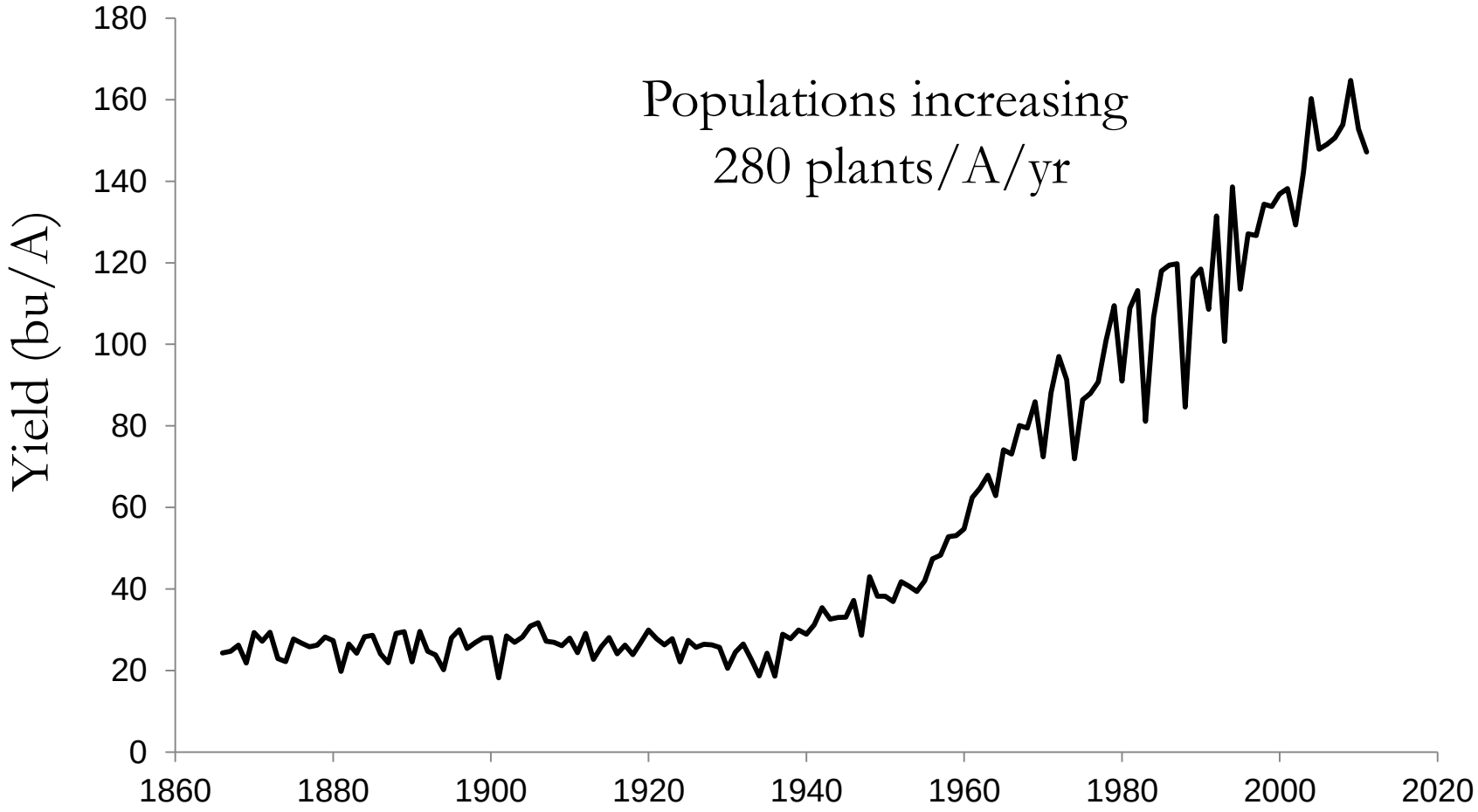
U.S. corn grain yields (1866 – 2011)



NASS 2012

U.S. corn grain yields (1866 – 2011)



NASS 2012

Processor gross profit margin

= (gross return) - (contract cost) - (population cost)

Processor gross profit margin

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kmass/A

x

kmass/case

x

wholesale cash price of canned corn

Processor gross profit margin

= (gross return) - (contract cost) - (population cost)

kmass/A

x

13.5 lb/case

x

$12/case

cash price of canned corn

Processor gross profit margin

= (gross return) - (contract cost) - (population cost)

kmass/A

x

13.5 lb/case

x

$12/case

cash price of canned corn

gmass/A

x

grower cash rate

Processor gross profit margin

= (gross return) - (contract cost) - (population cost)

kmass/A

x

13.5 lb/case

x

$12/case

cash price of canned corn

gmass/A

x

g **$100/ton**

Processor gross profit margin

= (gross return) - (contract cost) - (population cost)

kmass/A	gmass/A	plant density
x	x	x
13.5 lb/case	g **$100/ton**	seed cost
x		
$12/case		
cash price of canned corn		

Processor gross profit margin

= (gross return) - (contract cost) - (population cost)

kmass/A

x

13.5 lb/case

x

$12/case

cash price of canned corn

gmass/A

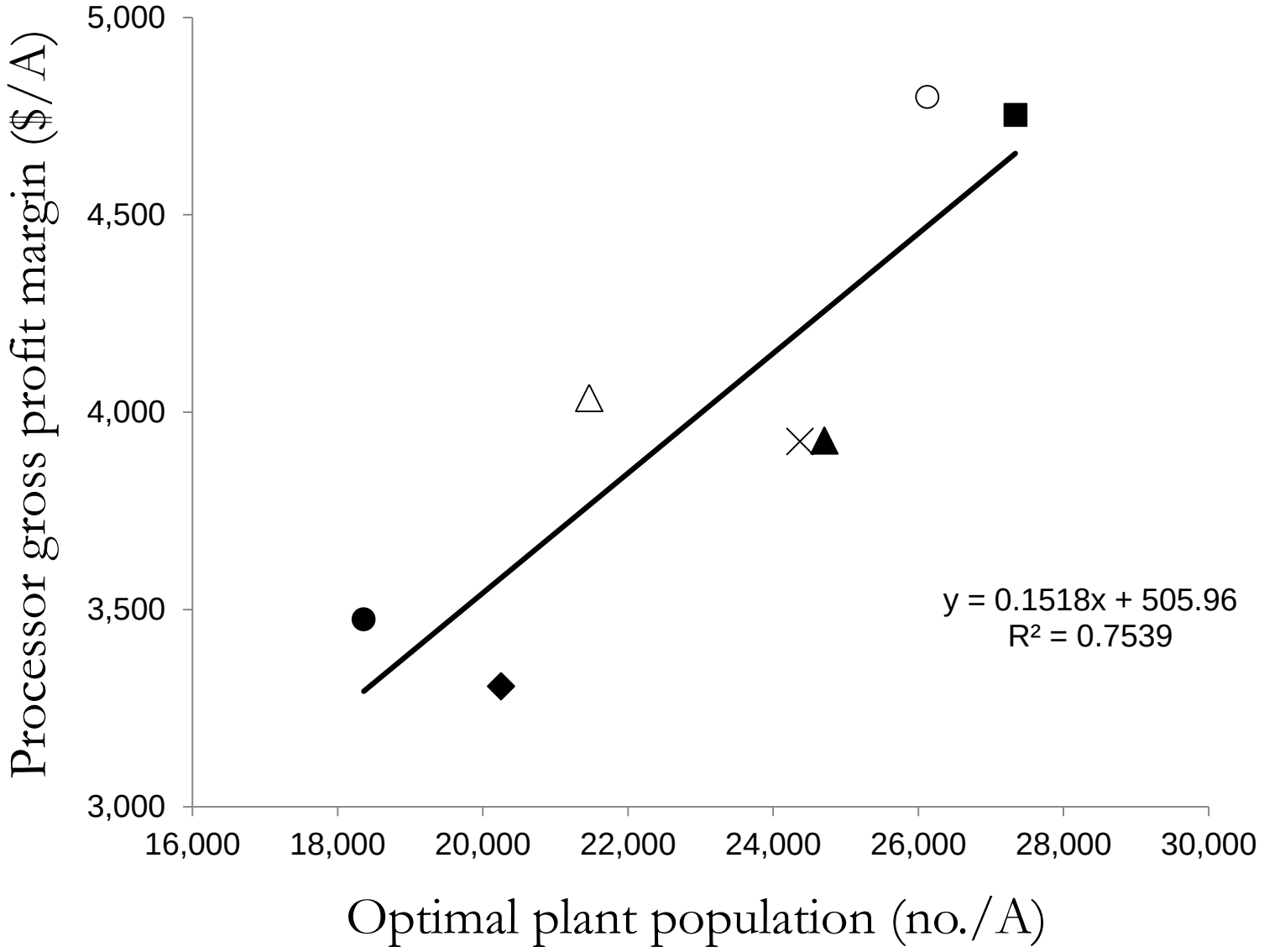
x

g **$100/ton**

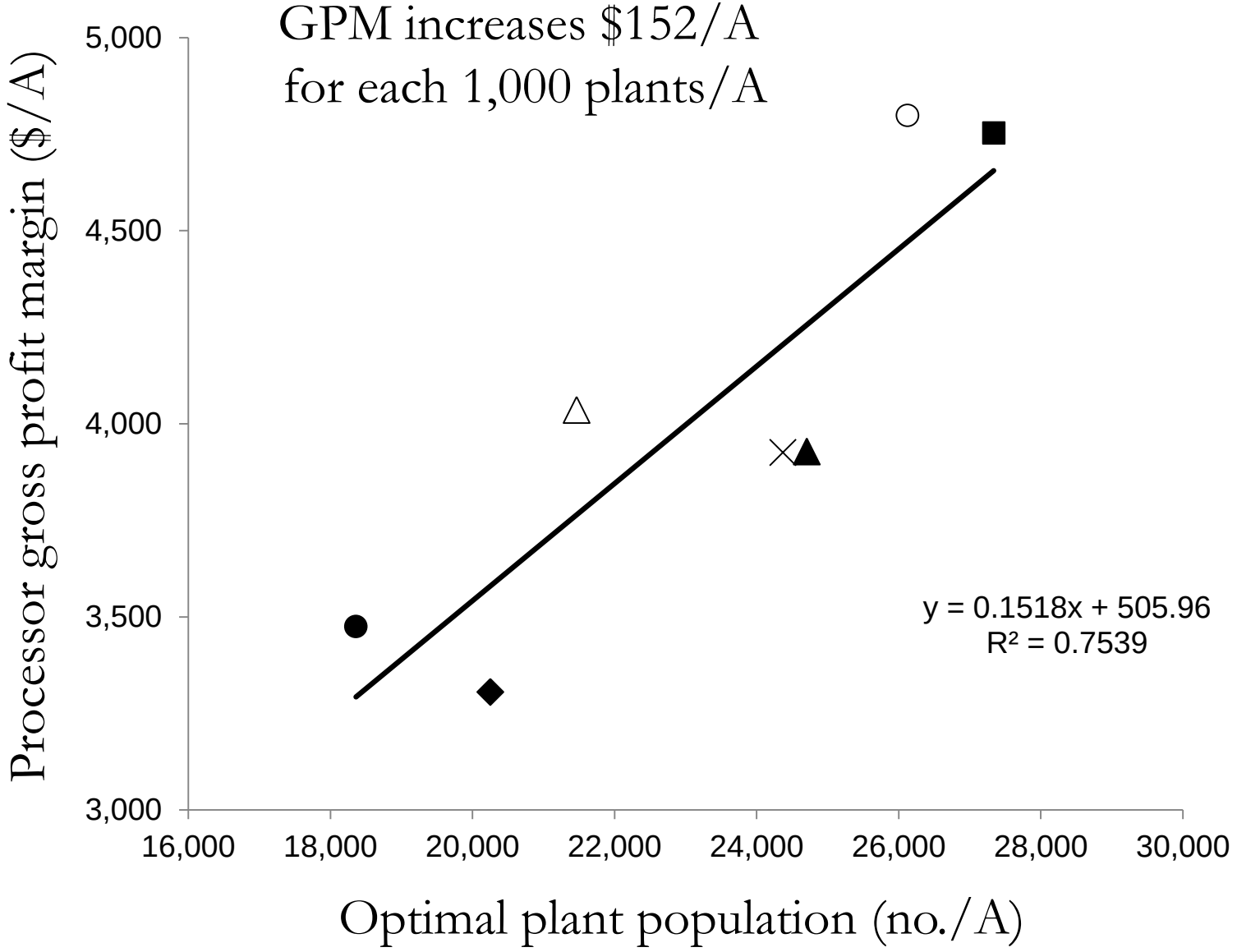
plant density

x

$3/1,000 kernels

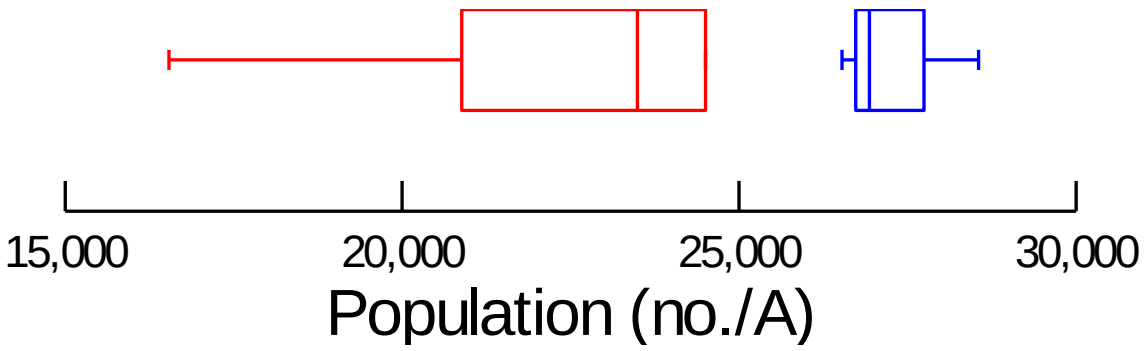


from Williams 2012



from Williams 2012

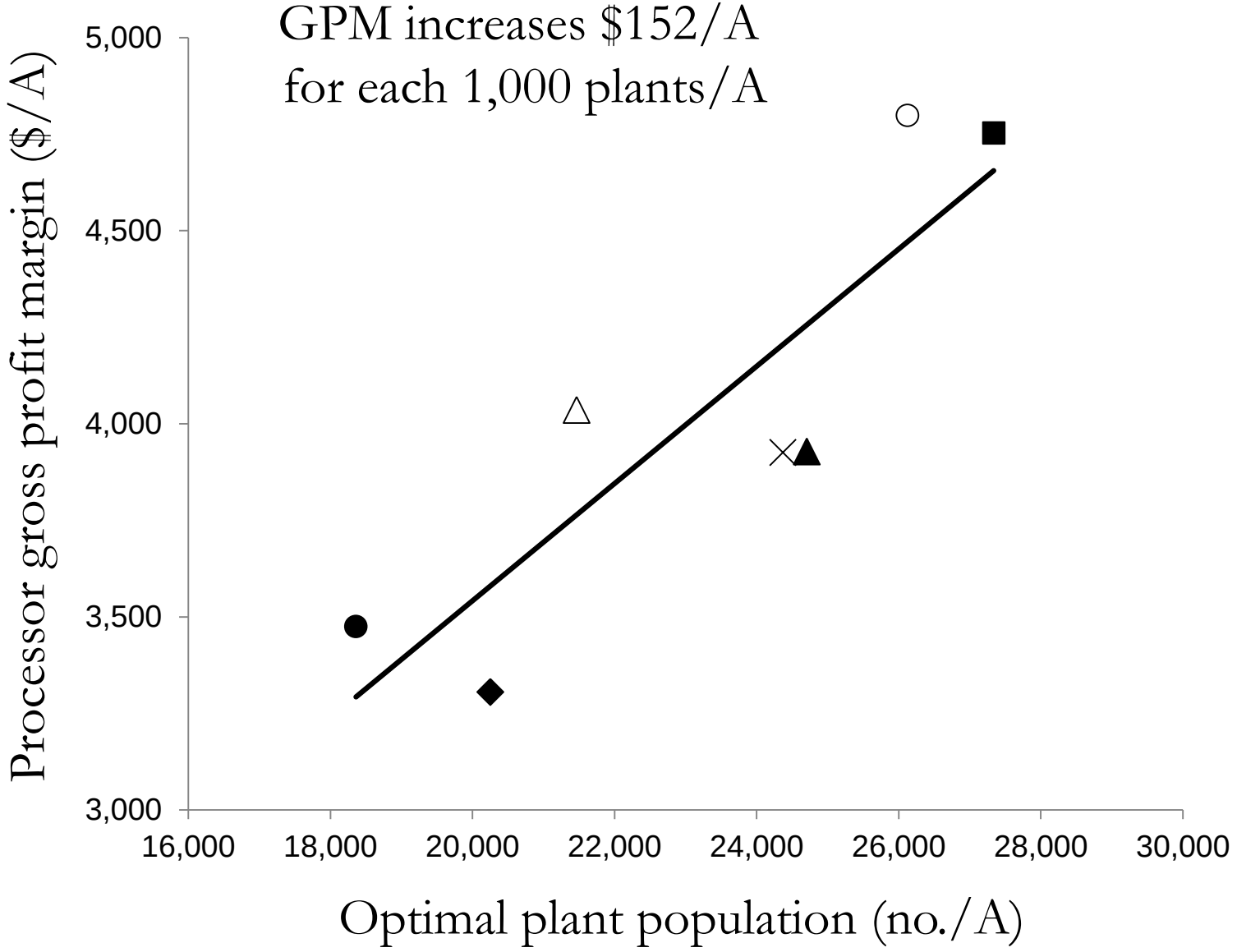
What's the current situation? Example of a top-performing hybrid



Observed in fields
Observed in trials

Objective

- Compare yield, recovery, and profitability of sh2 processing hybrids
  - tolerance to crowding stress
  - tolerance to nitrogen stress



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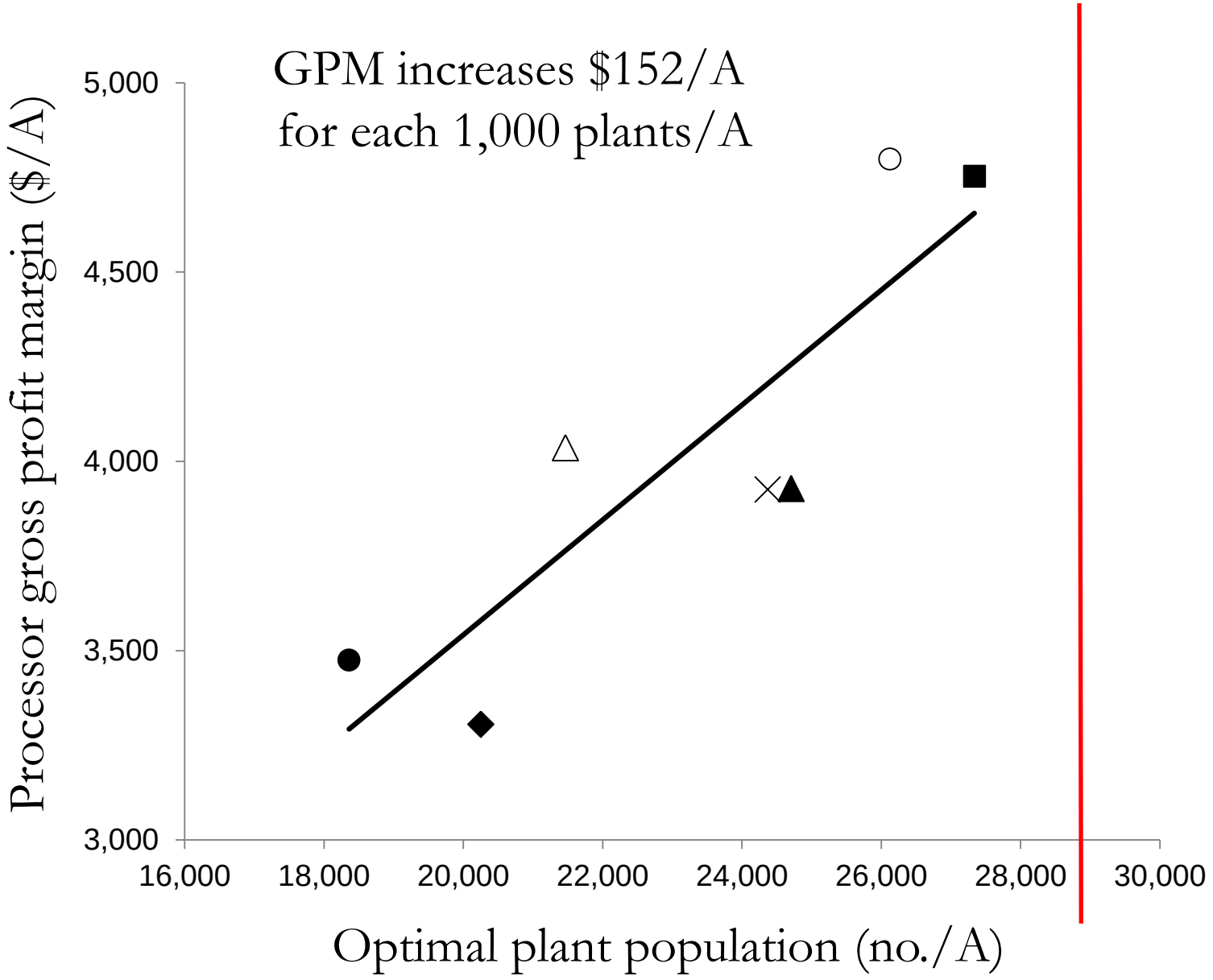

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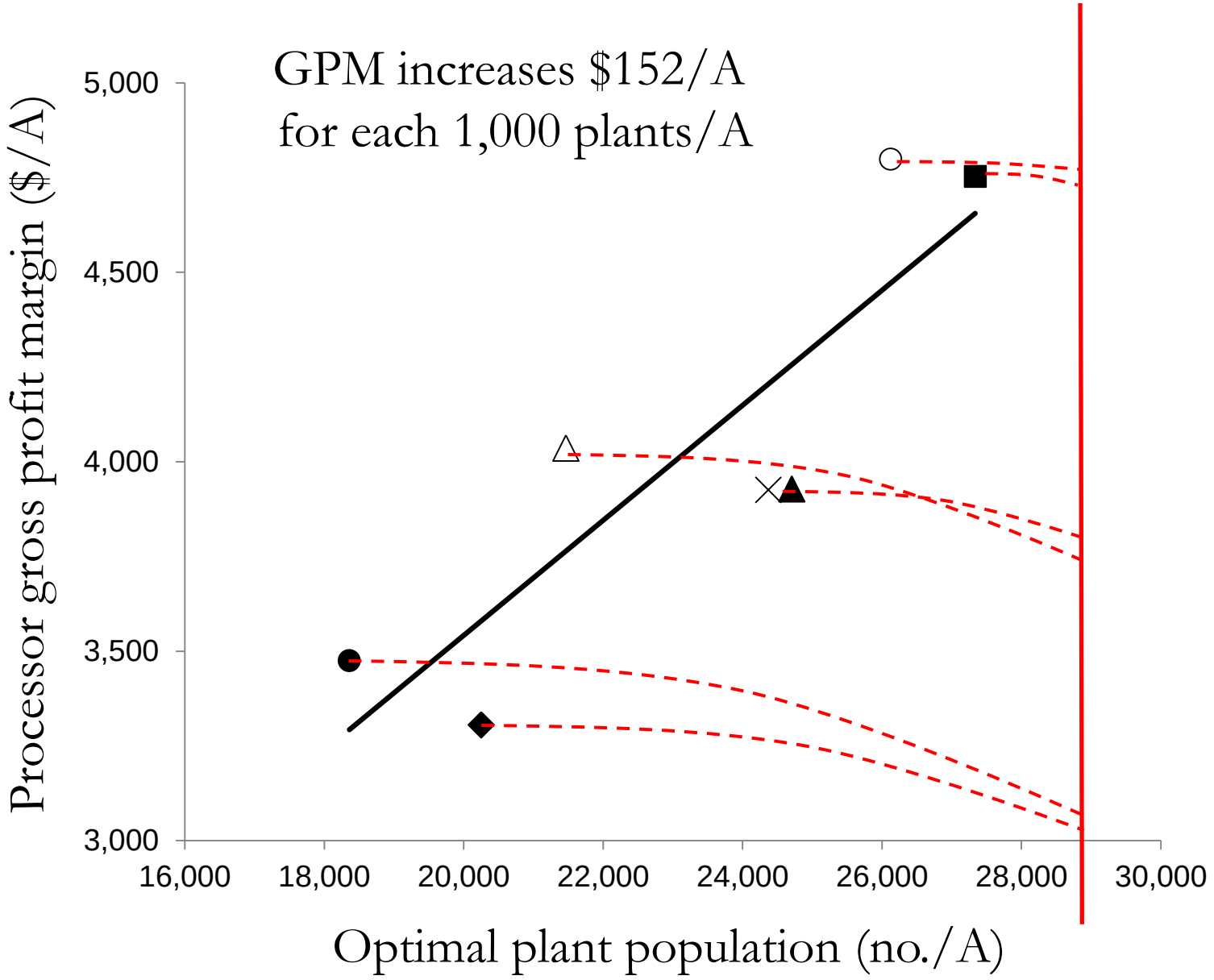

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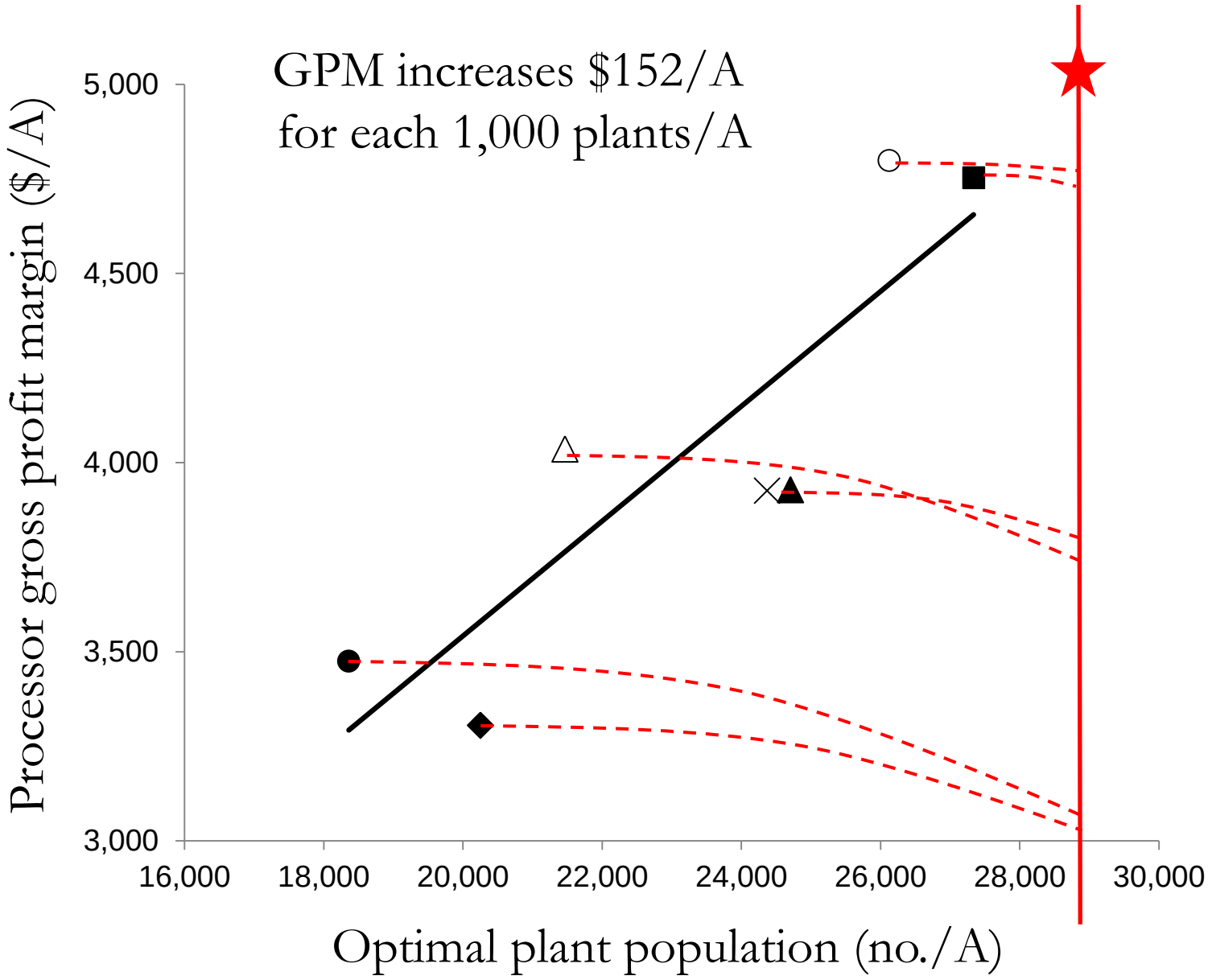

from Williams 2012

Things this study won't provide:

- Plant population you should use
- N rate you should apply
- Other management considerations
- Your yield – this year or next
- Election results, winning lottery numbers, etc.

Things this trial will provide:

- Through sound, objective science, identify hybrids most tolerant to yield-limiting stresses

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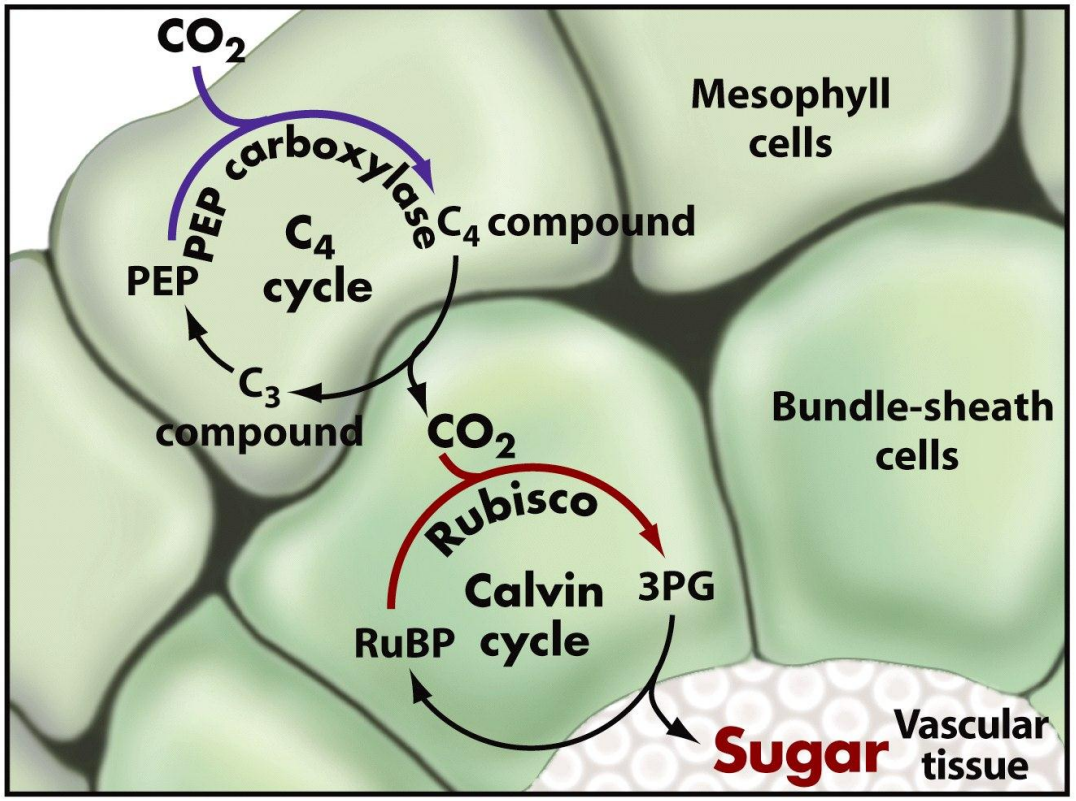

Figure 10-25b Biological Science, 2/e

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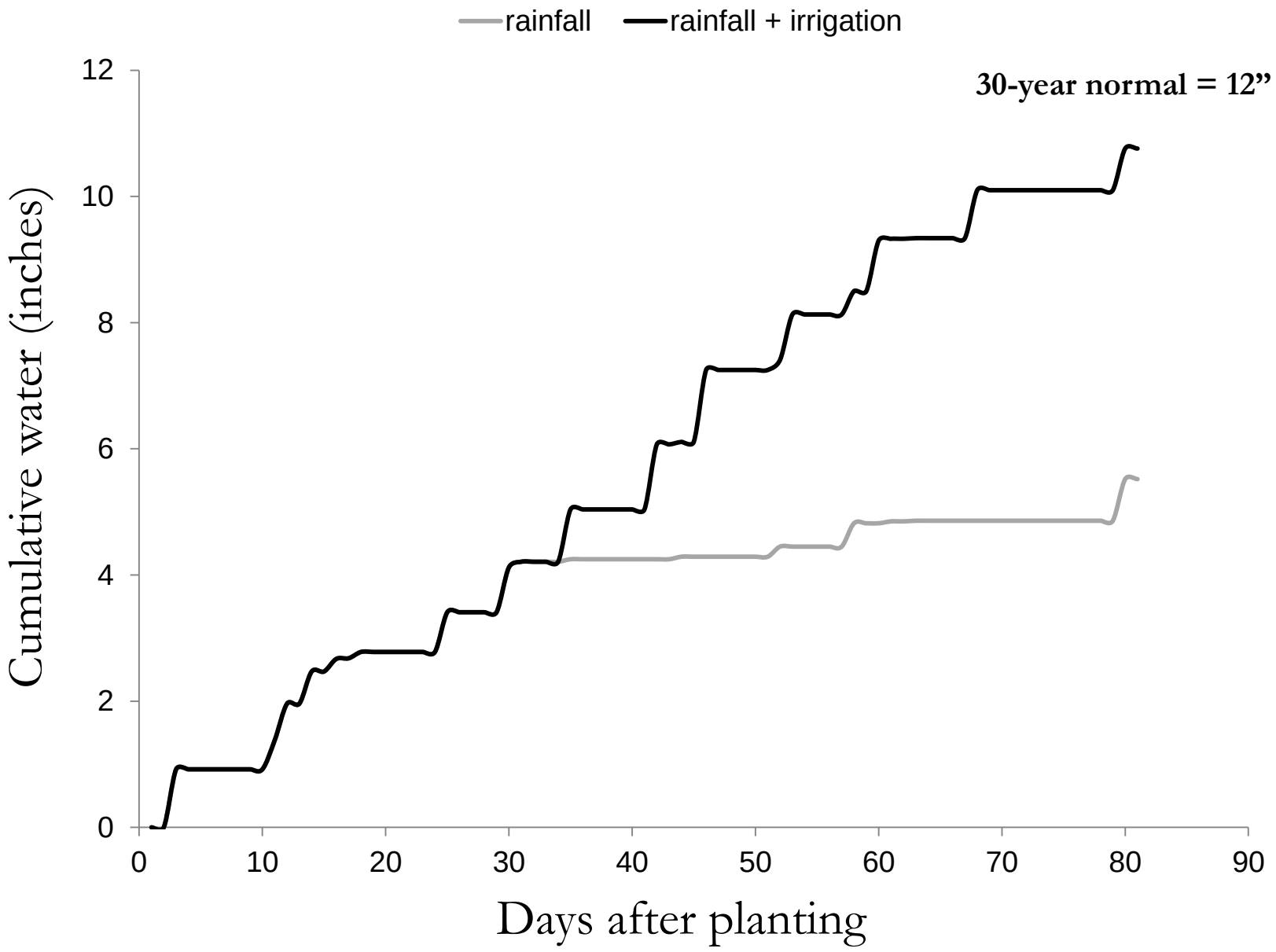
- 24 entries
- 50% and 150% N rec
- RCBD, 4 reps
- Planted 5/17/12
- 37,000 kernels/A thinned to 29,000 plants/A


rainfall
rainfall + irrigation
30-year normal = 12”
Cumulative water (inches)
0
2
4
6
8
10
12
0
10
20
30
40
50
60
70
80
90
Days after planting

Temperature

Month	Mean temp (F)	Departure from mean (F)	Days>90	Note
May	68.6	+6.1	6	3 days tie/break record
June	72.5	+0.3	9	
July	82.5	+7.5	27	Record no. days above 90 7 days above 100
August	80.5	+7.2	6	

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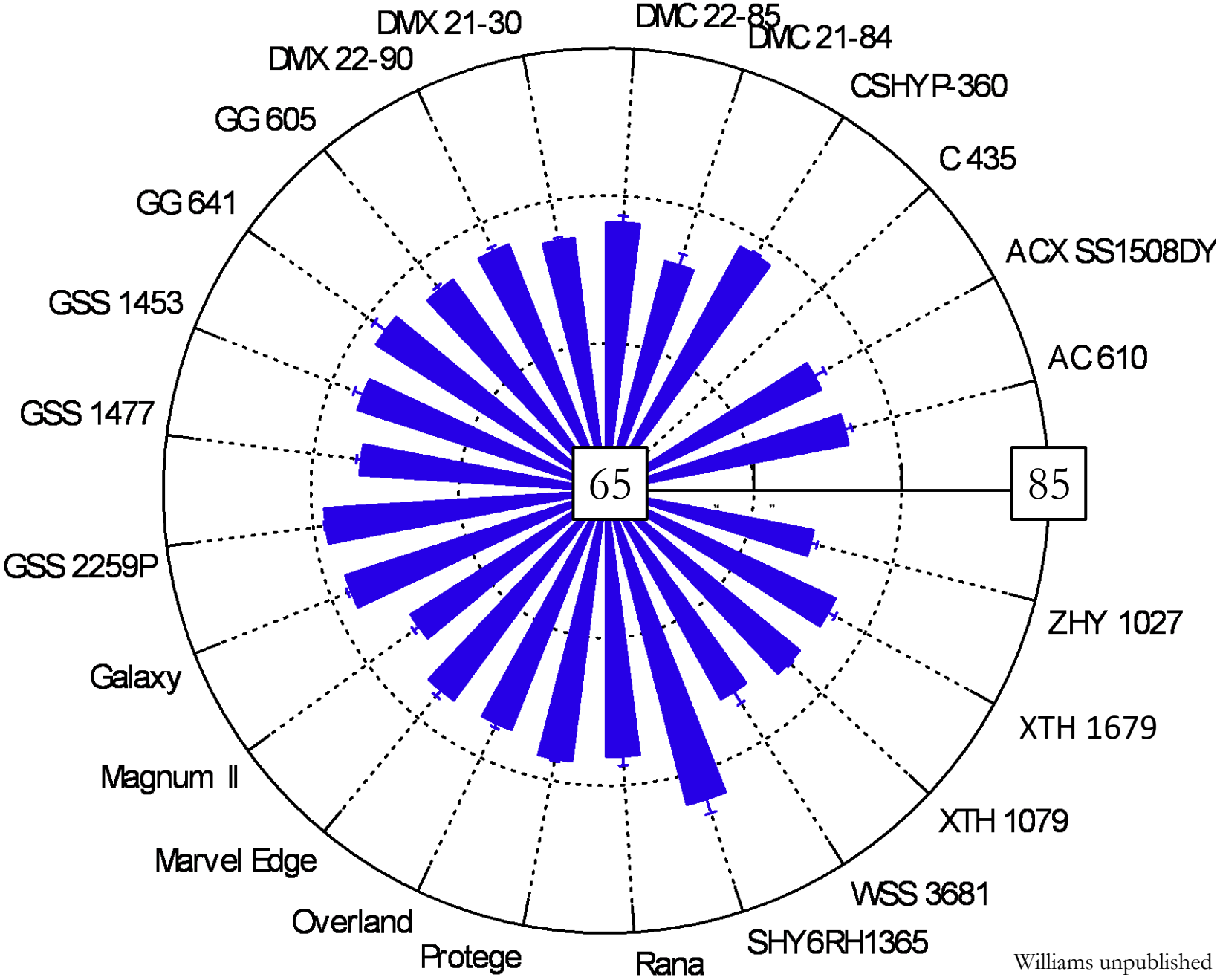
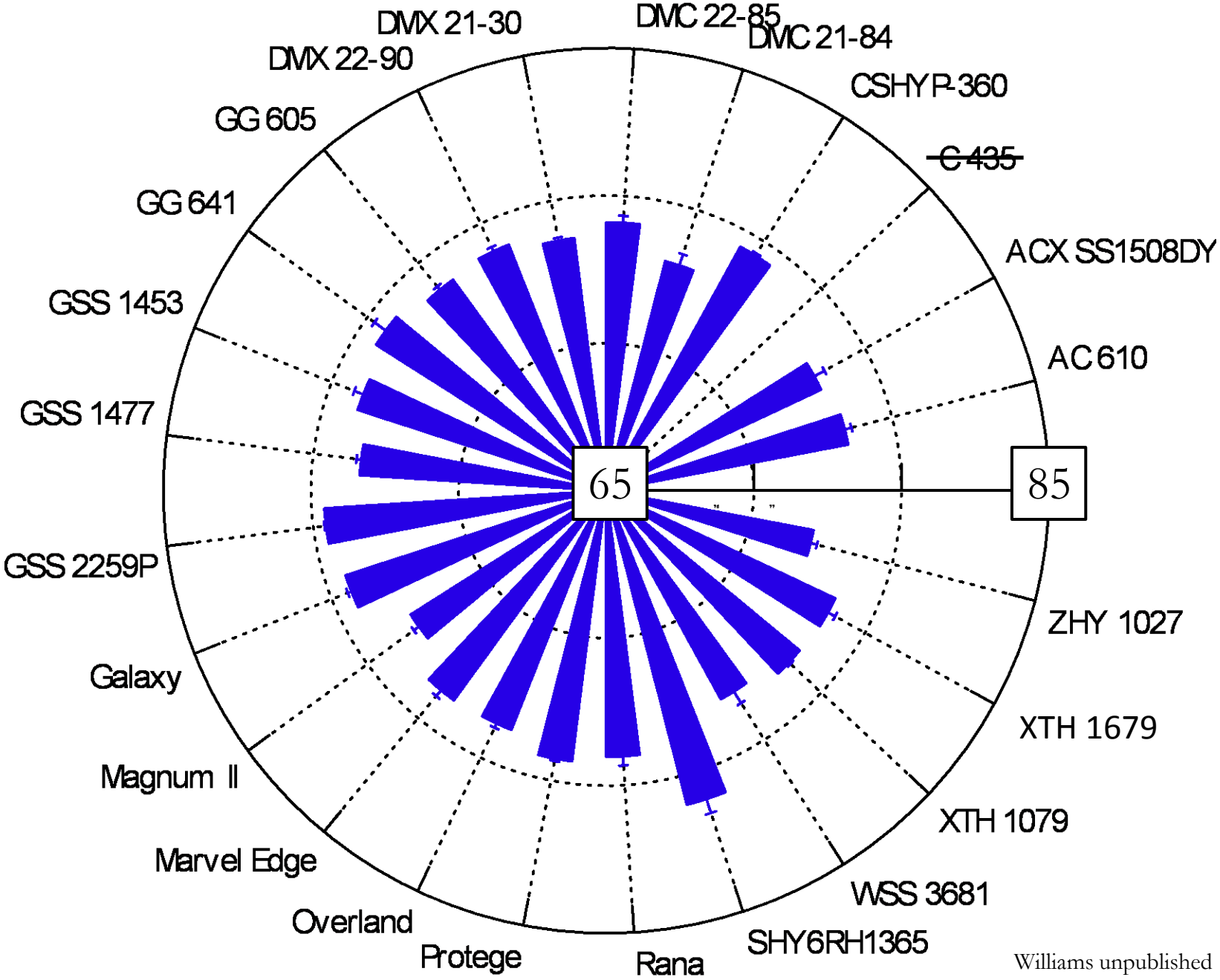
Kernel moisture (%)



Williams unpublished

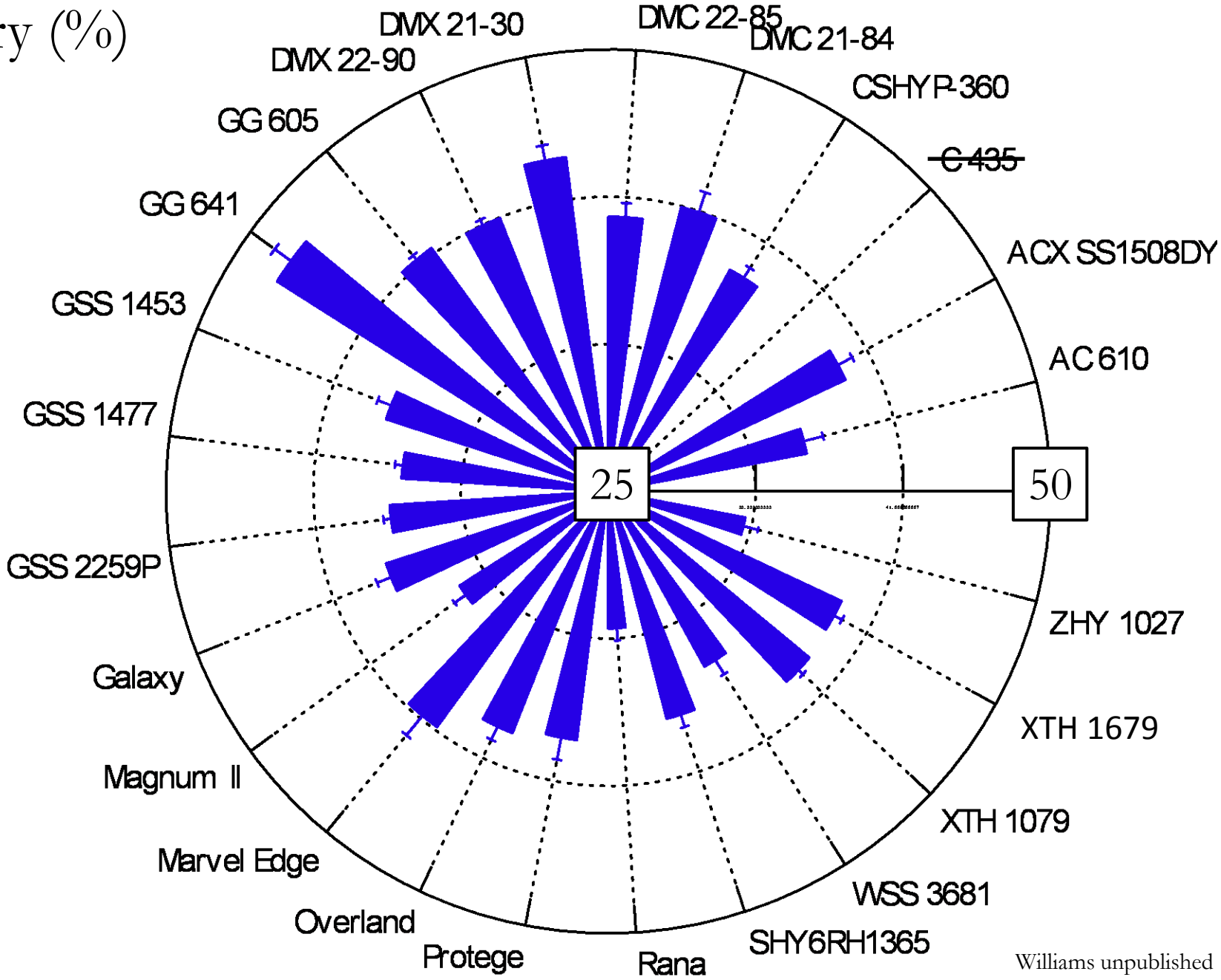
Kernel moisture (%)



Williams unpublished

Tolerance to crowding stress

Recovery (%)

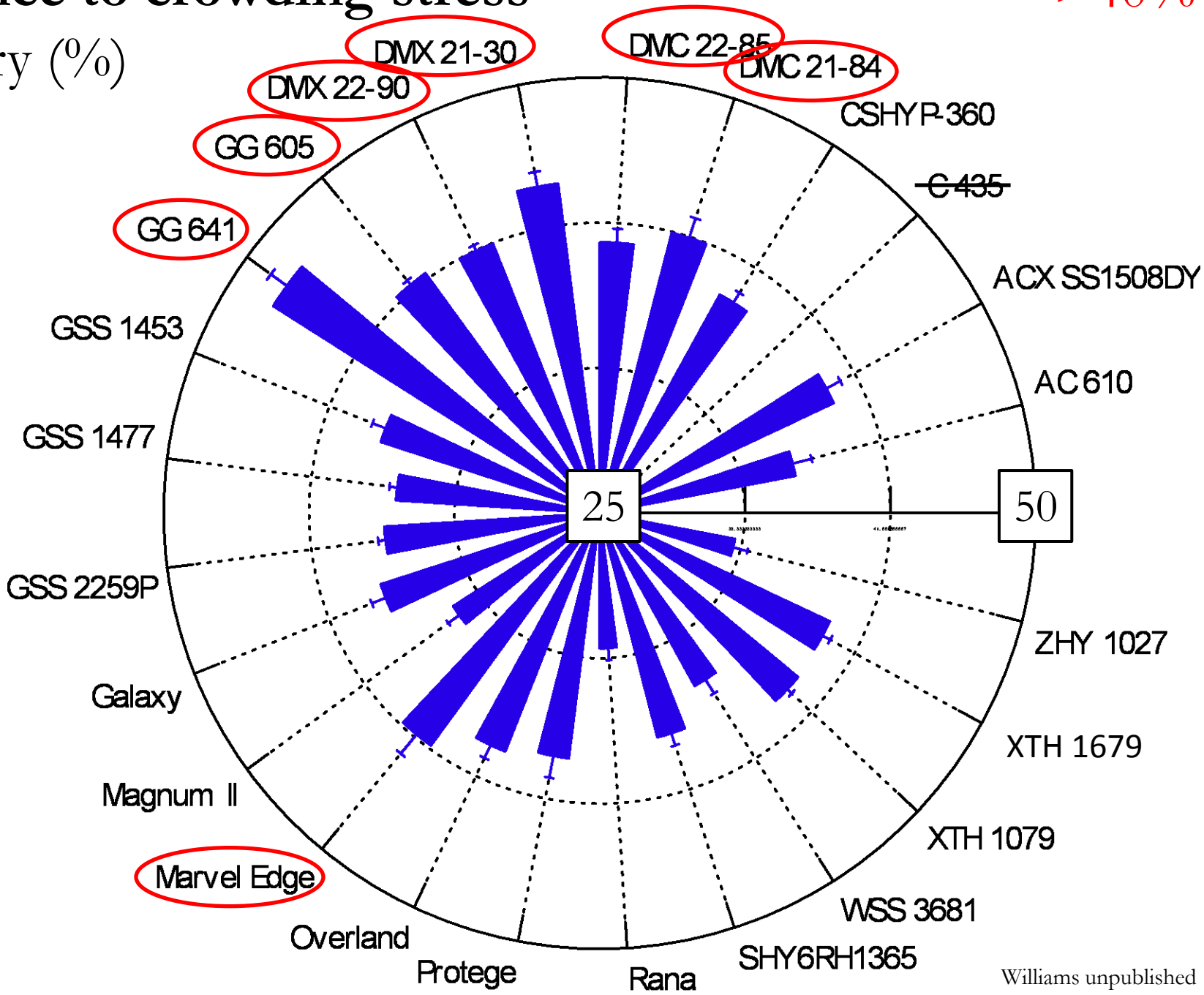


Williams unpublished

Tolerance to crowding stress

>40%

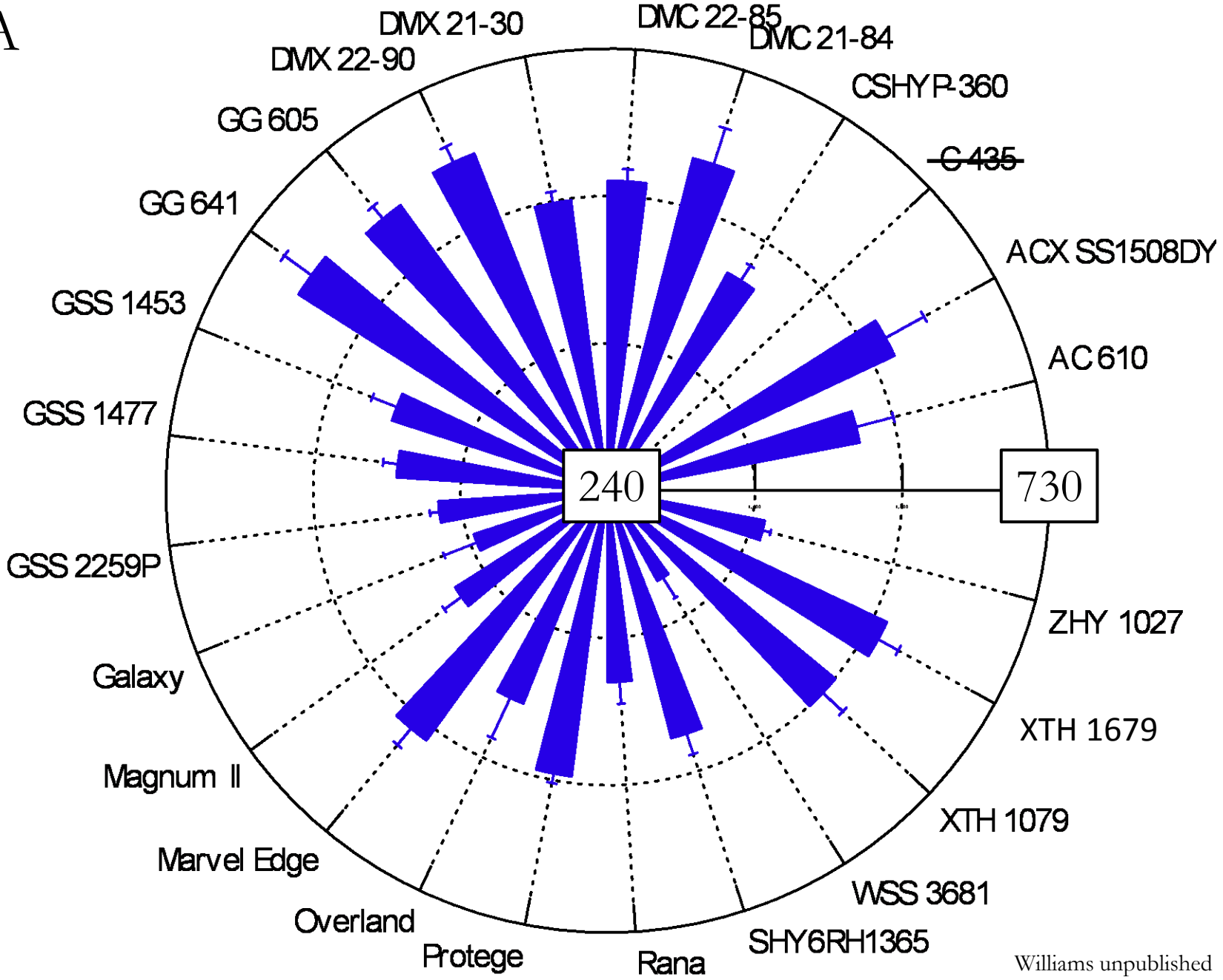
Recovery (%)



Williams unpublished

Tolerance to crowding stress

Cases/A

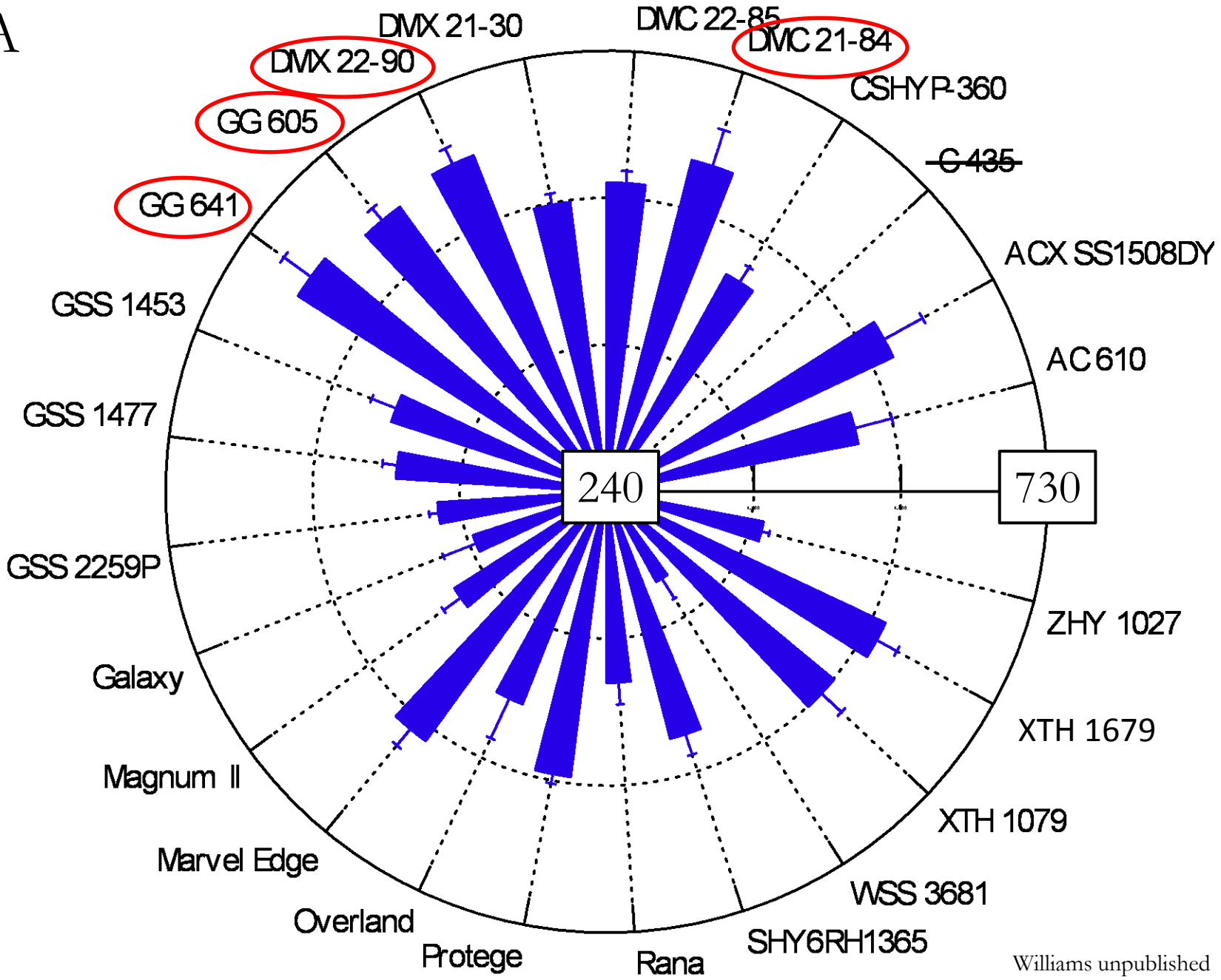


Williams unpublished

Tolerance to crowding stress

>600 cases/A

Cases/A



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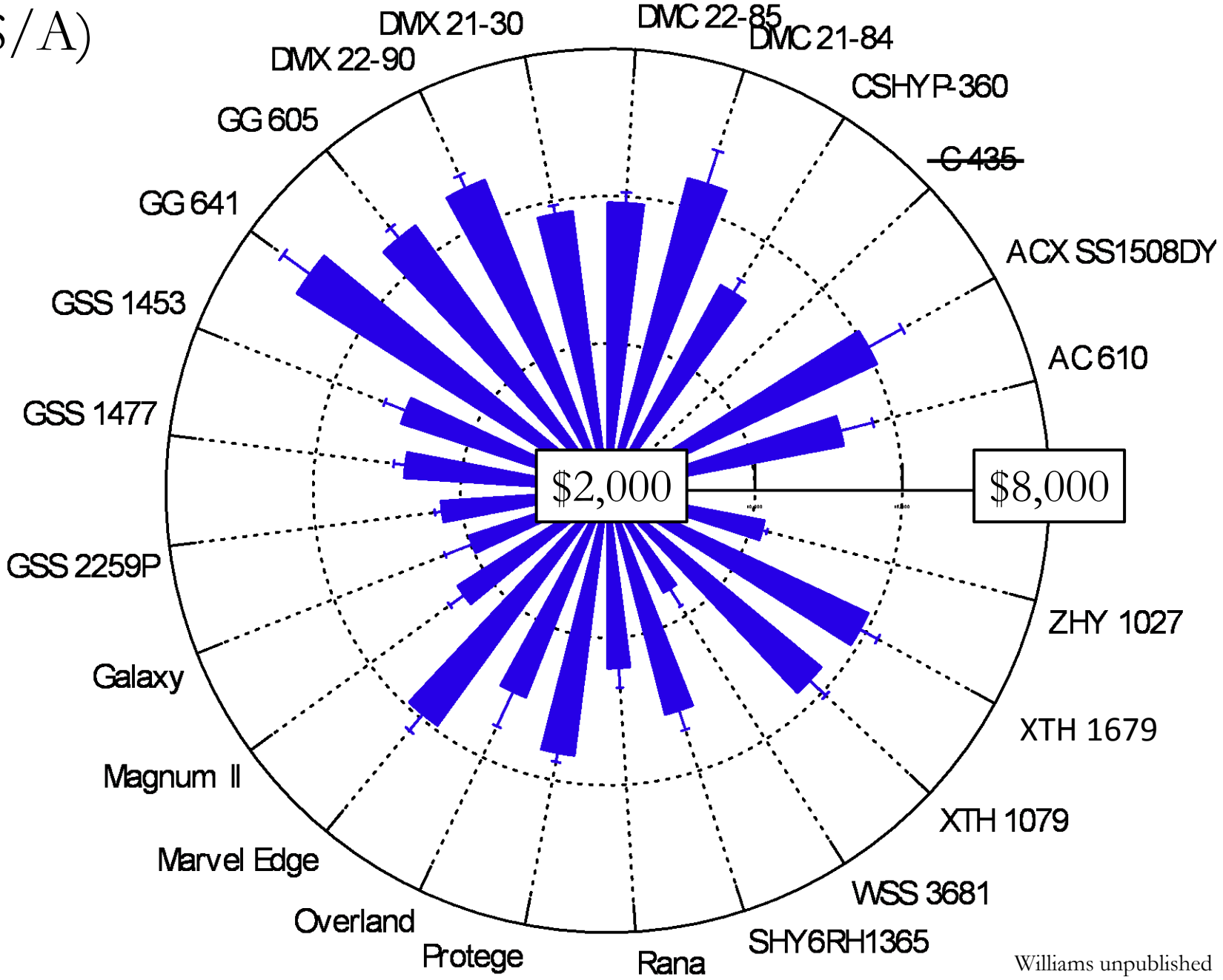
Tolerance to crowding stress

GPM ($/A)



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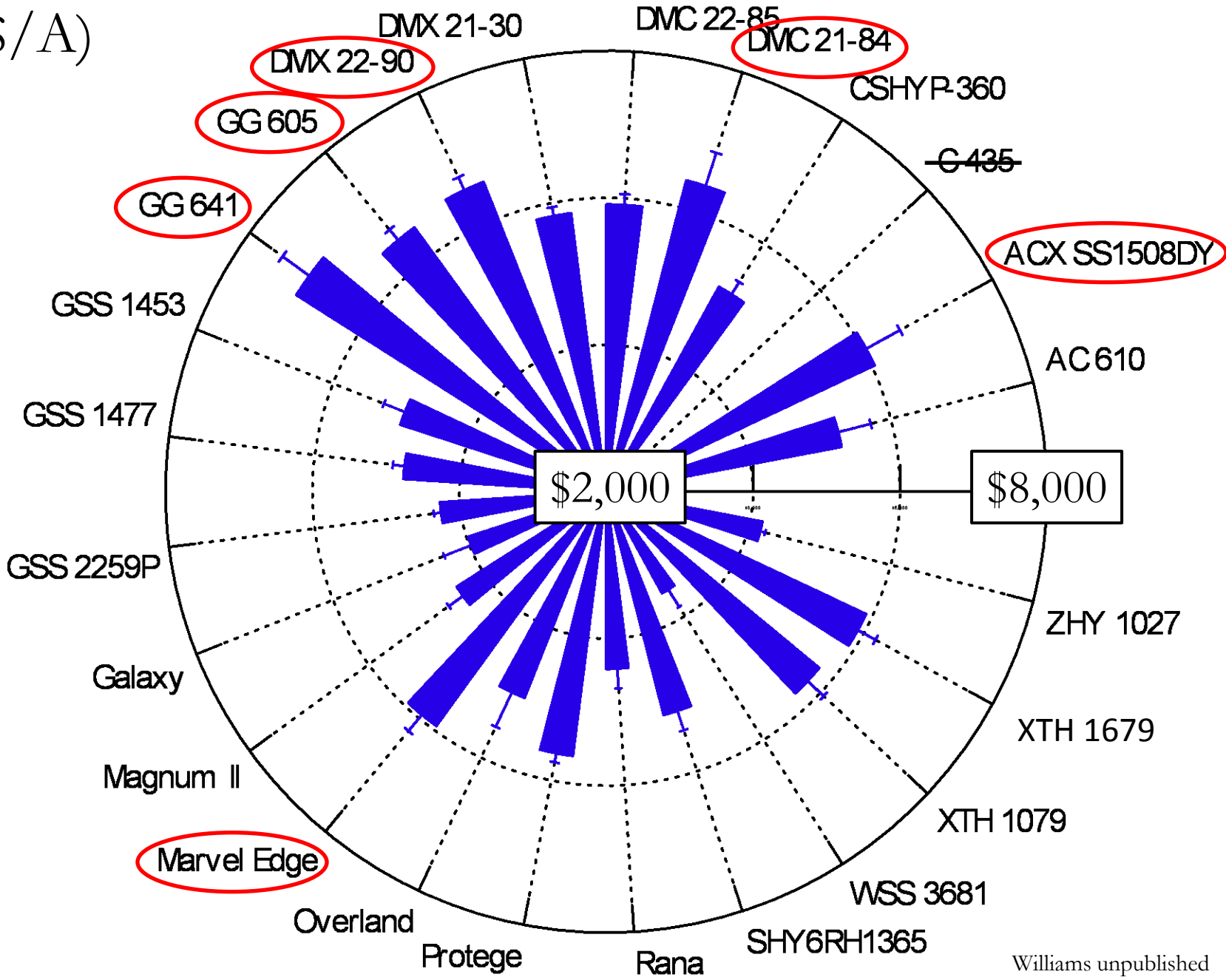
Tolerance to crowding stress

>$6,000/A

GPM ($/A)



Williams unpublished

Tolerance to N stress

$$\text{N tolerance} = \frac{(response\ 150\% - response\ 50\%)}{(response\ 150\% + response\ 50\%)}$$

=0, hybrid is tolerant to N stress

>0, hybrid is susceptible to N stress

Top 10 sh2 processing hybrids

Rank	Cultivar	Gross profit margin ($/A)	Tolerance to N stress
10	XTH 1079	5,833	☺
9	DMX 21-30	5,892	☺ ☺ ☺
8	XTH 1679	5,981	☺
7	DMC 22-85	5,983	☺
6	Marvel Edge	6,012	☺ ☺ ☺
5	ACX SS1508DY	6,113	☺
4	DMC 21-84	6,454	☺ ☺ ☺
3	GG 605	6,523	☺ ☺ ☺
2	DMX 22-90	6,617	
1	GG 641	7,083	☺ ☺ ☺

Williams unpublished

Key points

23 hybrids compared at a population that maximizes gross profit margin to processor

All experienced identical conditions

- excellent pest control
- excess nitrogen
- normal water supply
- in a season that was on the hot side

Certain hybrids performed strongly, others did not

Acknowledgements

- Research crew
  - Jim Moody
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  - Alex Hathcock
  - Brad Tomasek
  - Eunsoo Choe
  - Ronnie Warsaw
  - Bryan Warsaw
- Funding & seed
  - MWFPA
  - Abbott & Cobb
  - Crites Moscow
  - Crookham Company
  - Del Monte
  - IFSI
  - General Mills
  - Seminis
  - Syngenta