Department of Agriculture and Food
GOVERNMENT OF WESTERN AUSTRALIA

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# Agronomy of barley and barley varieties


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Department of Agriculture and Food


CROP updates

25 Feb 2013

# Making agronomic choices

- Planting density
- Powdery mildew management
- Barley variety

# Seeding rate in barley

- What is the optimum seeding rate (Popt)?

41 plants/$m^2$

99 plants/$m^2$

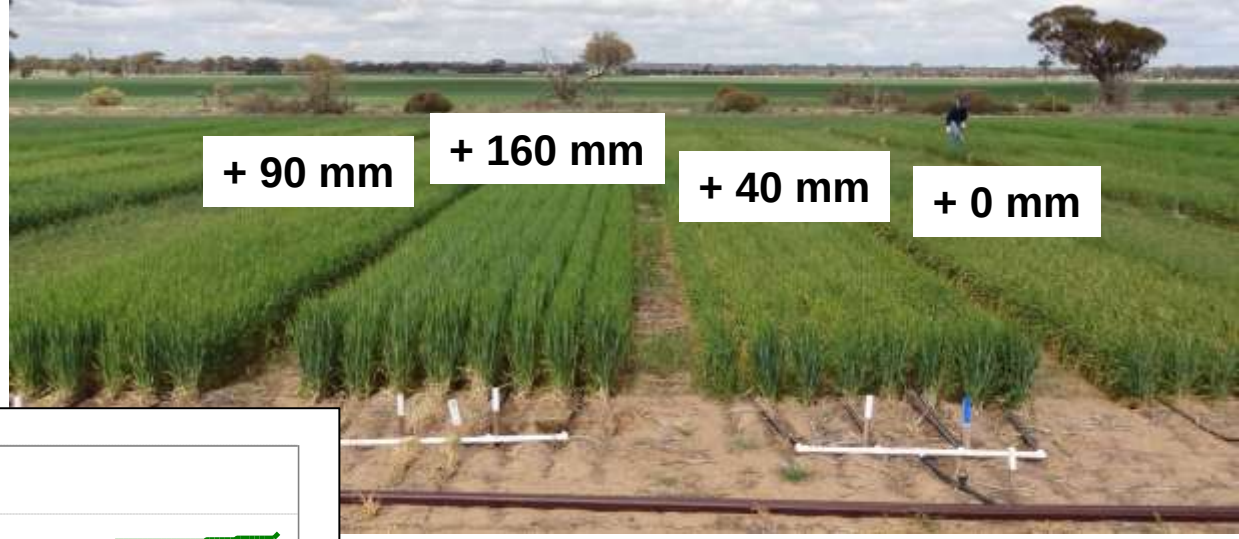
220 plants/$m^2$

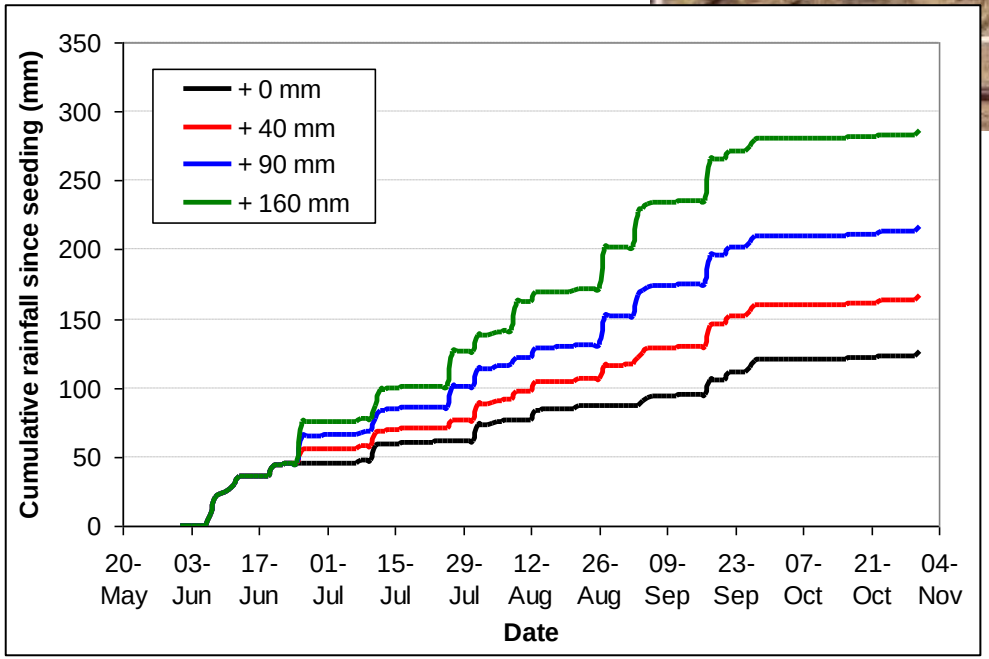
377 plants/$m^2$

- Using field trials to estimate Popt
- Develop a tool to assist with decisions on how much seed to plant in the ground

Source: 2012 Barley agronomy – 12NO24.

# Rainfall and seeding rate

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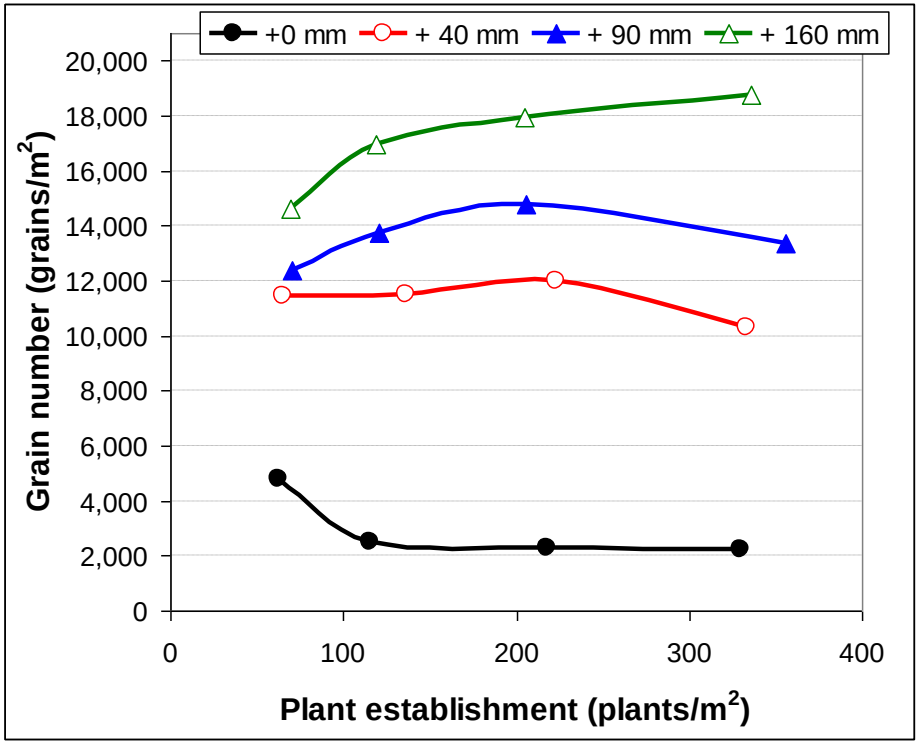
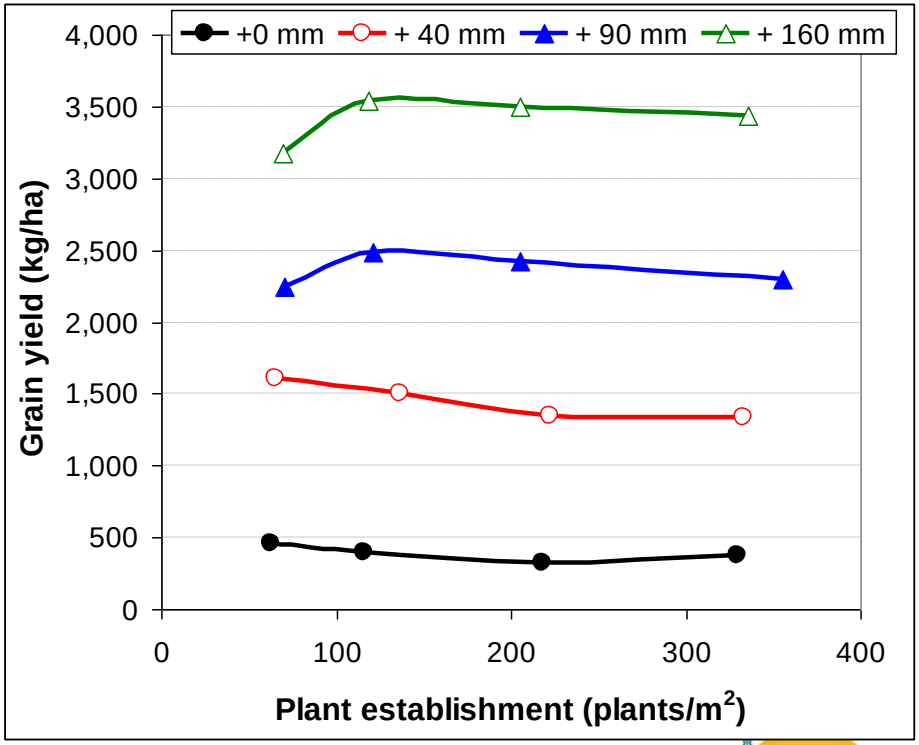
# Grain yield response



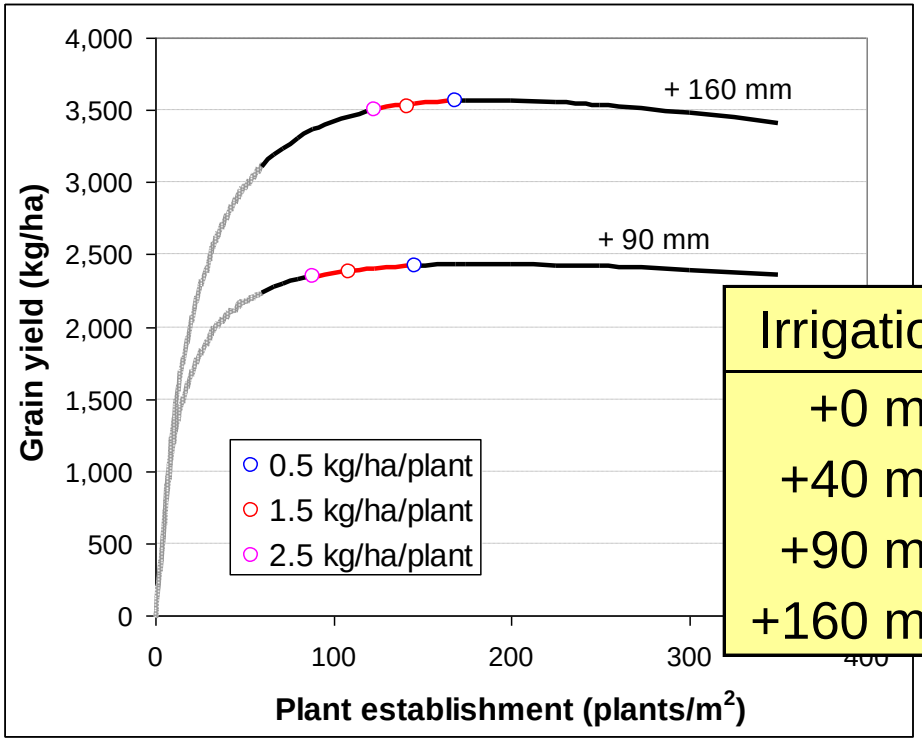

Yield potential




What we yielded

Source: 2012 Barley agronomy – 12MR16.

# Grain yield response

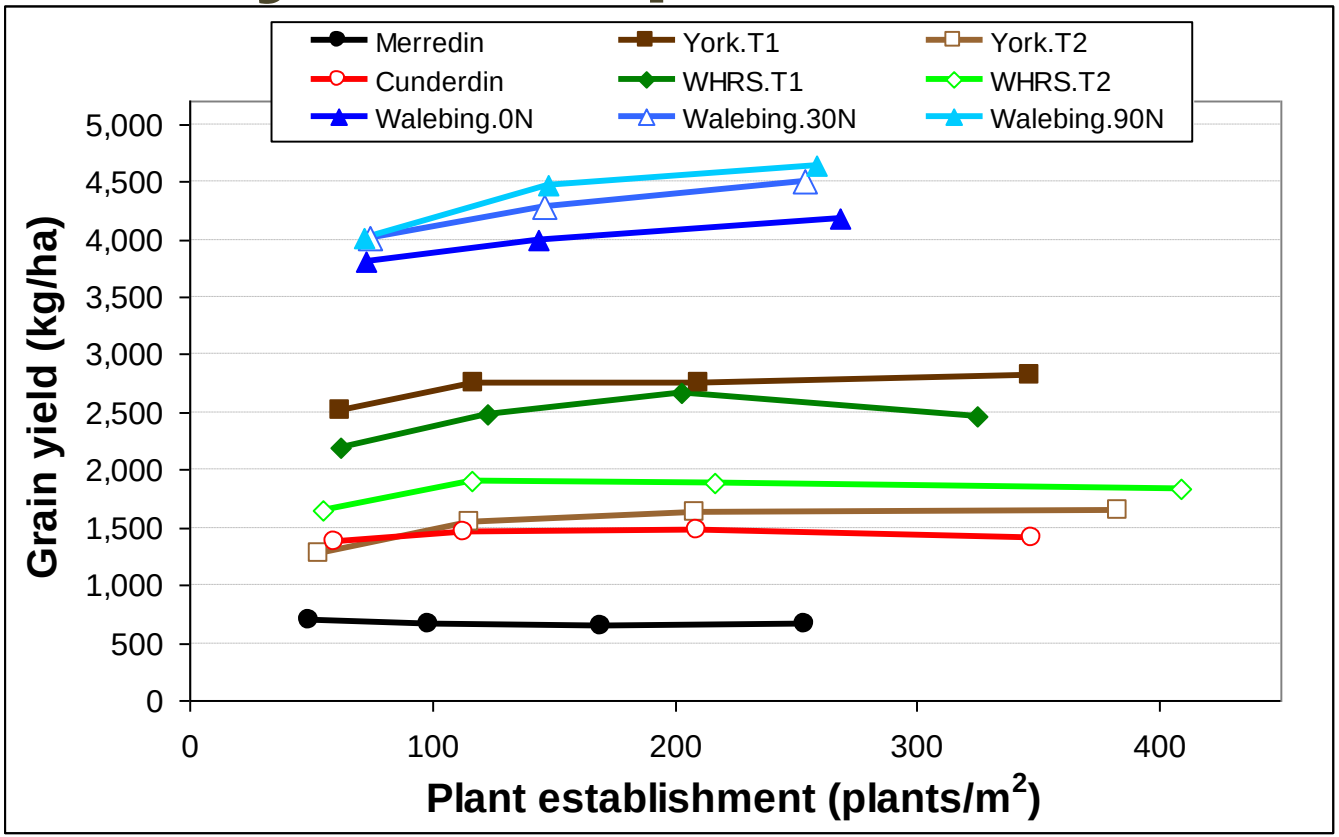



Fitted non-linear curves using replicate data

| Irrigation | Point of inflection (kg/ha/plant established) 2.5 | 2.0 | 1.5 | 1.0 | 0.5 |
|---|---|---|---|---|---|
| | Plant density (plants/m$^2$) at Popt | | | | |
| +0 mm | 66 | 66 | 66 | 66 | 66 |
| +40 mm | 68 | 68 | 68 | 68 | 68 |
| +90 mm | 89 | 98 | 109 | 124 | 146 |
| +160 mm | 123 | 132 | 142 | 154 | 169 |

Popt increased as the yield potential increased

# Grain yield response




Seed rate was significant ($p<0.001$) at all sites but Merredin

Source: 2012 Barley agronomy. Data average of 7 varieties – Bass, Buloke, Commander, Flinders, Grange, IGB1101 and Wimmera.

# Grain yield response

**Over 43 trials (2005-2012):**

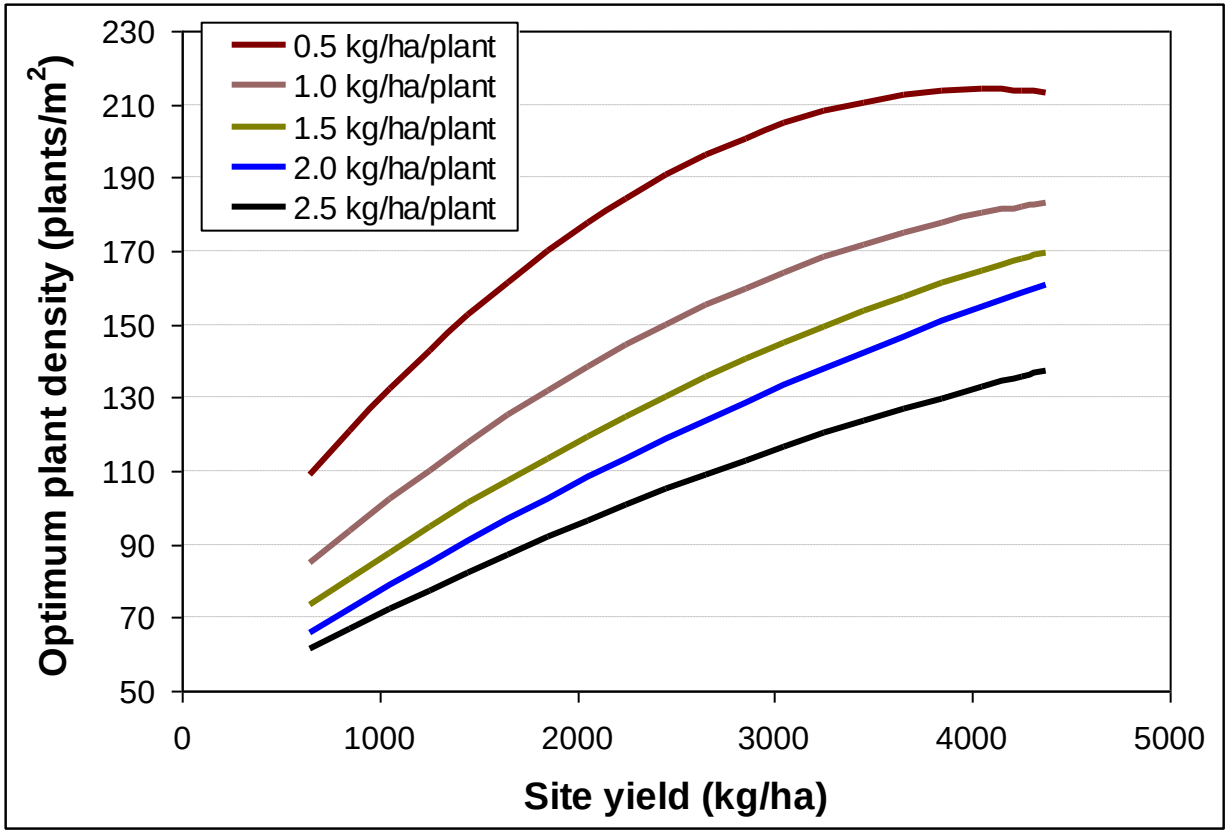
**↑ plant establishment from 50-80 to 220-270 plants/m²**

**↑ grain yield by:**
**+83 kg/ha in lower rainfall trials**
**+344 kg/ha in medium-high rainfall trials**

Seed rate was significant ($p<0.001$) at all sites but Merredin

Source: 2012 Barley agronomy. Data average of 7 varieties – Bass, Buloke, Commander, Flinders, Grange, IGB1101 and Wimmera.

# Grain yield response

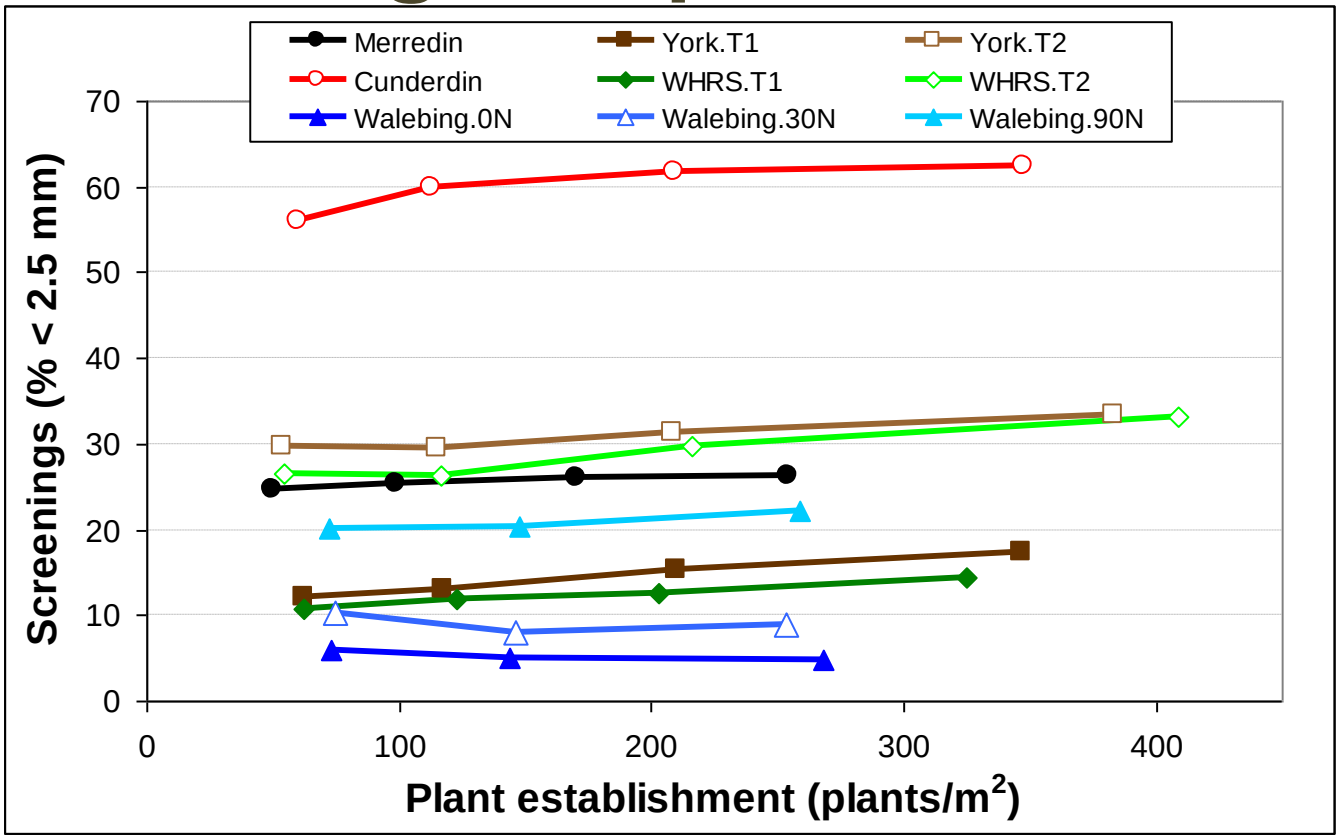



Popt increased as the yield potential of the site increased in 2012

Popt varies according to the rate of return you are seeking

Source: 2012 Barley agronomy. Data average of 7 varieties – Bass, Buloke, Commander, Flinders, Grange, IGB1101 and Wimmera.

# Screenings response




Seed rate was significant ($p<0.001$) at all sites but Merredin and Walebing

Actual change relatively small

Source: 2012 Barley agronomy. Data average of 7 varieties – Bass, Buloke, Commander, Flinders, Grange, IGB1101 and Wimmera.

# Screenings response

**Over 43 trials (2005-2012):**

**↑ plant establishment from 50-80 to 220-270 plants/m²**

**↑ screenings by:**
**+3% in lower rainfall trials**
**+3% in medium-high rainfall trials**

Seed rate was significant ($p<0.001$) at all sites but Merredin and Walebing

Actual change relatively small

Source: 2012 Barley agronomy. Data average of 7 varieties – Bass, Buloke, Commander, Flinders, Grange, IGB1101 and Wimmera.

# Seeding rate in barley

- Across 43 trials, as seed rate increased:
  - Grain yield
    - ↑ in 86% of trials (↓ in only 5% of trials)
    - varieties reacted similarly in 77% of trials
  - Screenings
    - ↑ in 71% of trials (↓ in only 2% of trials)
    - varieties reacted similarly in 55% of trials
- In 2012, Popt increased as site yield increased
- Next step - development of the seed rate tool

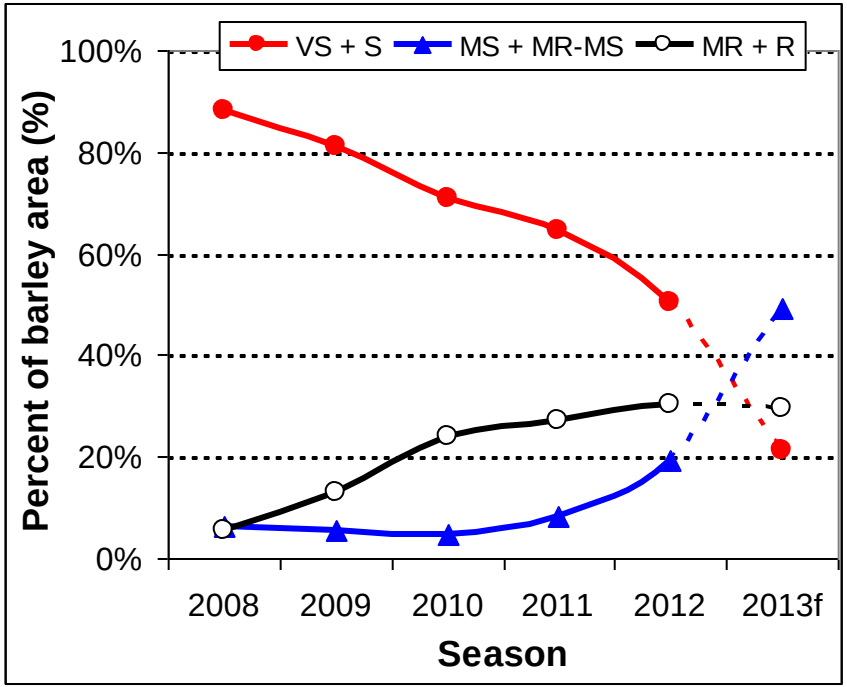
# Powdery mildew – fungicide resistance

- More than one mutation detected
- Seed protection:
  - fluquinconazole still effective (use with VS and S varieties)
  - don't use flutriafol or triadimenol (no longer effective)
- Foliar protection:
  - spray these effective fungicides only once (rotate) -
    - Amistar Xtra, Opera, Opus, Prosaro and Tilt Xtra
  - spray before 5% laa (preventative not curative)
  - don't spray tebuconazole or triadimefon (no longer effective)
- New actives being assessed:
  - spiroxamine very effective (but mildew only control)

# Powdery mildew – varietal resistance

- Amount of inoculum decreasing as we move away from susceptible varieties
- Try not to plant VS or S rated varieties
- Virulence on major *Ml* genes has been detected
- Varietal resistance still exists:
  - variety reactions may vary from paddock to paddock
  - active mildew detected on MR-MS, MR and R varieties should be sent to ACNFP at Curtin University
- Varieties with durable resistance (*mlo*) coming

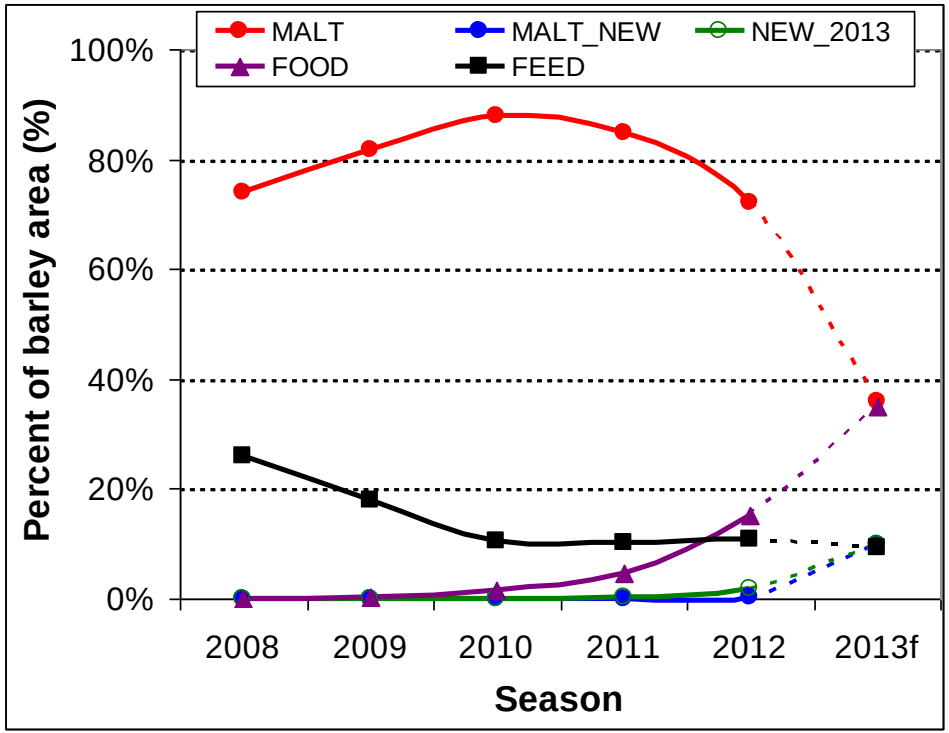
# Powdery mildew – varietal resistance




| Varietal resistance to powdery mildew | | | |
|---|---|---|---|
| MS | MR-MS | MR | R |
| Bass | Commander | Buloke | Barque |
| Hindmarsh | Fleet | Scope | Dash |
| Roe | Lockyer | | Grange |
| Skiff | Yagan | | Henley |
| | | | Oxford |
| | | | Westminster |

Source: Barley variety popularity - CBH Operations. Disease – Sanjiv Gupta and Jason Bradley.

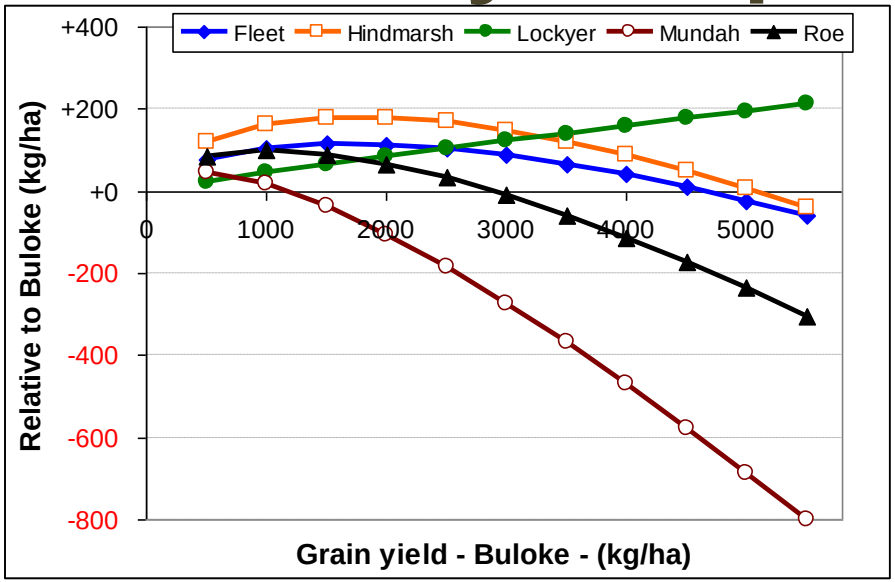
# Which barley variety will you plant?




- Hindmarsh is the ‘Mace’ of barley
- It will be planted everywhere in 2013
- Can it be beaten?
- What is around the corner?

Source: CBH Operations.

# Feed barley competitors



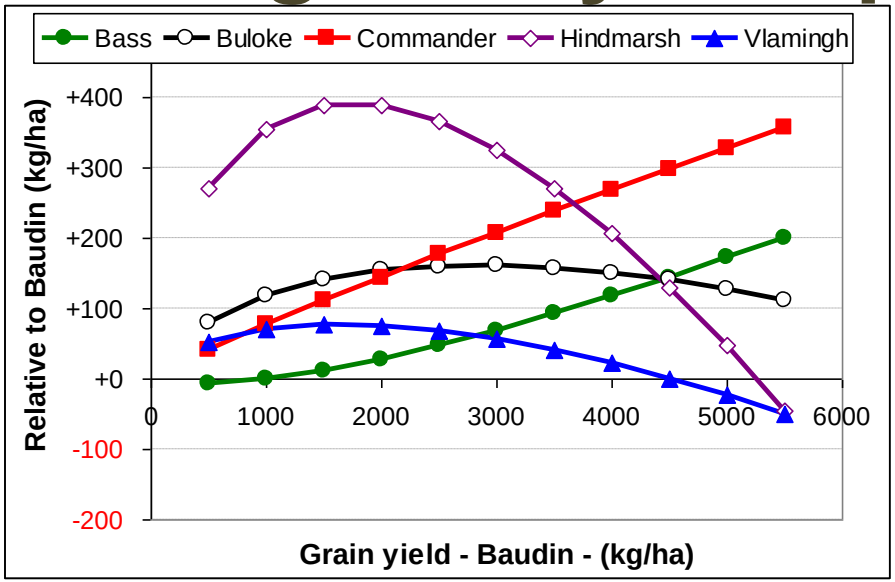

## Barley variety options:

- < 3.5 t/ha = Hindmarsh
  (Fleet - if there is a BLR risk)
- > 3.5 t/ha = Dash, Lockyer and Oxford

| Variety | Scald | NTNB | STNB | PM | BYDV | BLR |
|---|---|---|---|---|---|---|
| Dash | R | MR-MS | S | R | S | R |
| Hindmarsh | MR-MS | MS | S | MS | S | S |
| Lockyer | MR-MS | MR-MS | S | MR-MS | S | S |
| Oxford | MS | MR | S | R | MR*p* | R |

Source: Grain yield - 225 observations: 2006-2008 CVT, 2008-2012 NVT, 2007-2011 Barley Agronomy. Disease – Sanjiv Gupta and Jason Bradley.

# Malting barley competitors




## Barley variety options:

- < 2.5 t/ha = Hindmarsh
- 2.5-3.5 t/ha = malt premium & cost to grow decide which
- > 3.5 t/ha = Bass, Buloke and Commander

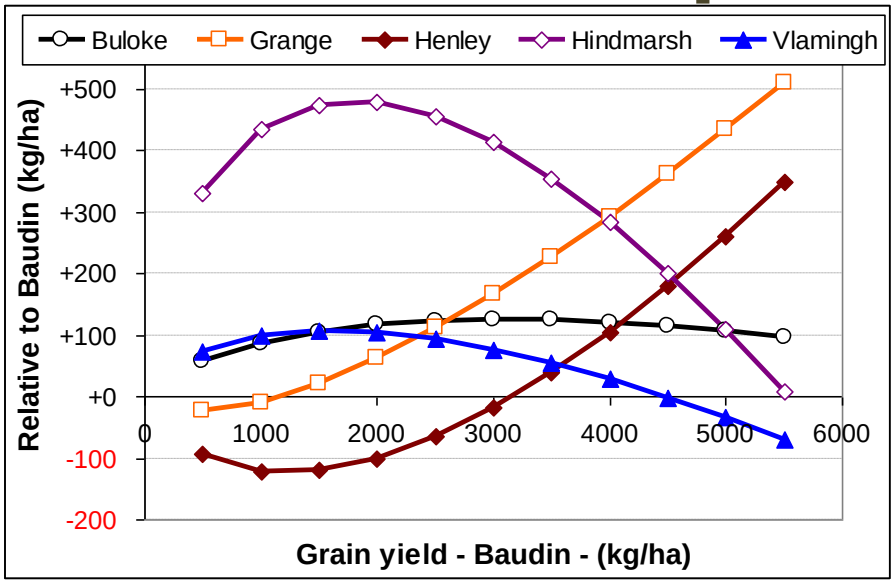
| Variety | Scald | NTNB | STNB | PM | BYDV | BLR |
|---|---|---|---|---|---|---|
| Bass | MR-MS | MS*p* | S | MS | MR | MR* |
| Buloke | MS | MR-MS | MS | MR | MR-MS | S |
| Commander | MS-S | S | MS-S | MR-MS | - | *Sp* |
| Hindmarsh | MR-MS | MS | S | MS | S | S |

Source: Grain yield - 254 observations: 2005, 2008 CVT, 2009, 2010, 2012 NVT, 2007-2012 Barley Agronomy. Disease – Sanjiv Gupta and Jason Bradley.

# Malting barley competitors

- Bass
  - New to the market (so unknown market demand) (time)
  - Reasonable agronomic package with plump grain
  - Better disease profile than Baudin but …..
- Commander
  - Strong domestic demand from Joe White Maltings
  - Growing international demand for grain
  - Watch out for straw strength under high yields

# Potential new options




## Barley variety options:

- < 2.5 t/ha = Hindmarsh
- 2.5-3.5 t/ha = malt premium & cost to grow decide which
- > 3.5 t/ha = Grange, Henley and Scope

| Variety | Scald | NTNB | STNB | PM | BYDV | BLR |
|---|---|---|---|---|---|---|
| Grange | S | MR-MS | S | R | MR*p* | R-MR |
| Henley | S | MR-MS | S | R | MR*p* | R |
| Hindmarsh | MR-MS | MS | S | MS | S | S |
| Scope | MS | MR-MS | S | MR | - | S |

Source: Grain yield - 119 observations: 2009, 2010, 2012 NVT, 2010-2012 Barley Agronomy. Disease – Sanjiv Gupta and Jason Bradley.

# Potential new options

- Grange
  - If accredited, will undergo full market development (time)
  - Great agronomic package and high yielding
  - Durable PM resistance and APR for BLR
- Henley
  - If accredited, old variety, but new to market from Australia
  - Potential issues: head loss, hectolitre weight …
  - Durable PM resistance and APR for BLR

# Potential new options

- Scope
  - If accredited, need to undergo market development (time)
  - Scope = Buloke in the paddock except weed control
  - Is becoming a tool in fighting brome and barley grass

# Which barley variety will you plant?

| | Malting premium ($/t) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $5 | $10 | $15 | $20 | $25 | $30 | $35 | $40 | $45 | $50 |
| **Feed price ($/t)** | Equivalent yield of Hindmarsh barley (%) to return the same profit as 1 t of malting barley | | | | | | | | | |
| $100 | 5% | 10% | 15% | 20% | 25% | 30% | 35% | 40% | 45% | 50% |
| $120 | 4% | 8% | 13% | 17% | 21% | 25% | 29% | 33% | 38% | 42% |
| $140 | 4% | 7% | 11% | 14% | 18% | 21% | 25% | 29% | 32% | 36% |
| $160 | 3% | 6% | 9% | 13% | 16% | 19% | 22% | 25% | 28% | 31% |
| $180 | 3% | 6% | 8% | 11% | 14% | 17% | 19% | 22% | 25% | 28% |
| $200 | 2% | 5% | 8% | 10% | 13% | 15% | 18% | 20% | 23% | 25% |
| $220 | 2% | 5% | 7% | 9% | 11% | 14% | 16% | 18% | 20% | 23% |
| $240 | 2% | 4% | 6% | 8% | 10% | 13% | 15% | 17% | 19% | 21% |
| $260 | 2% | 4% | 6% | 8% | 10% | 12% | 13% | 15% | 17% | 19% |
| $280 | 2% | 4% | 5% | 7% | 9% | 11% | 13% | 14% | 16% | 18% |
| $300 | 2% | 3% | 5% | 7% | 8% | 10% | 12% | 13% | 15% | 17% |

| | **Example #1** | | | | **Example #2** | | | |
|---|---|---|---|---|---|---|---|---|
| Premiums and costs | Grade | $/t | malt % | $/t | Grade | $/t | malt % | $/t |
| Premium over feed barley | Malt | $20 | 50% | $10 | Malt | $50 | 60% | $30 |
| Extra cost to grow for malt & deliver | | | | $5 | | | | $3 |
| Premium for Hindmarsh | Food | $5 | 40% | $2 | Food | $5 | 40% | $2 |
| | **REALISED PREMIUM** | | | **$3** | **REALISED PREMIUM** | | | **$25** |

CROP updates

# Key messages

- Sow more seed to get more yield
- Powdery mildew is still a major issue until we get:
  - new modes of action, and
  - more durable resistance in our varieties

New factsheet coming

- There are other varieties other than Hindmarsh:
  - Hindmarsh will dominate plantings where yields < 2.5 t/ha
  - Bass, Commander, Grange* and Henley* are all viable competitors where malting barley grows best
  - IWM and weeds will drive the adoption of Scope

*subject to accreditation – decision should be known by mid March

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# Questions?

Thanks to the following contributors to this presentation:
- Agronomy RO: Andrea Hills, Raj Malik
- Agronomy TO: Sue Cartledge, Aidan Sinnott, Bruce Simmonds, casuals
- DAFWA and Murdoch pathologists, ACNFP at Curtin
- DAFWA Research Support Units
- Barley breeding companies and NVT

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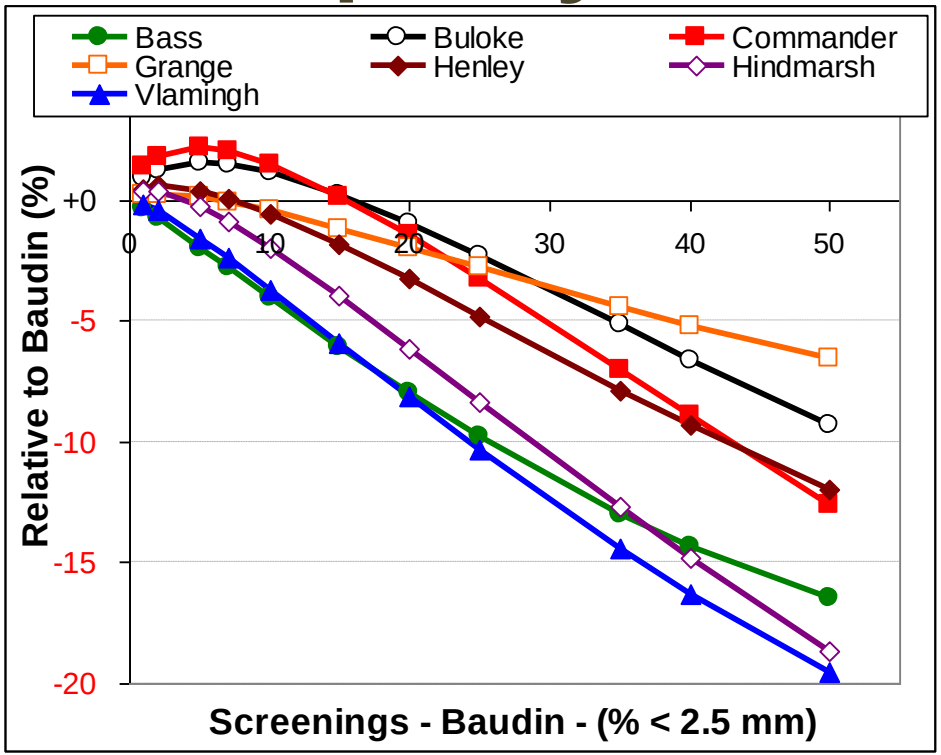
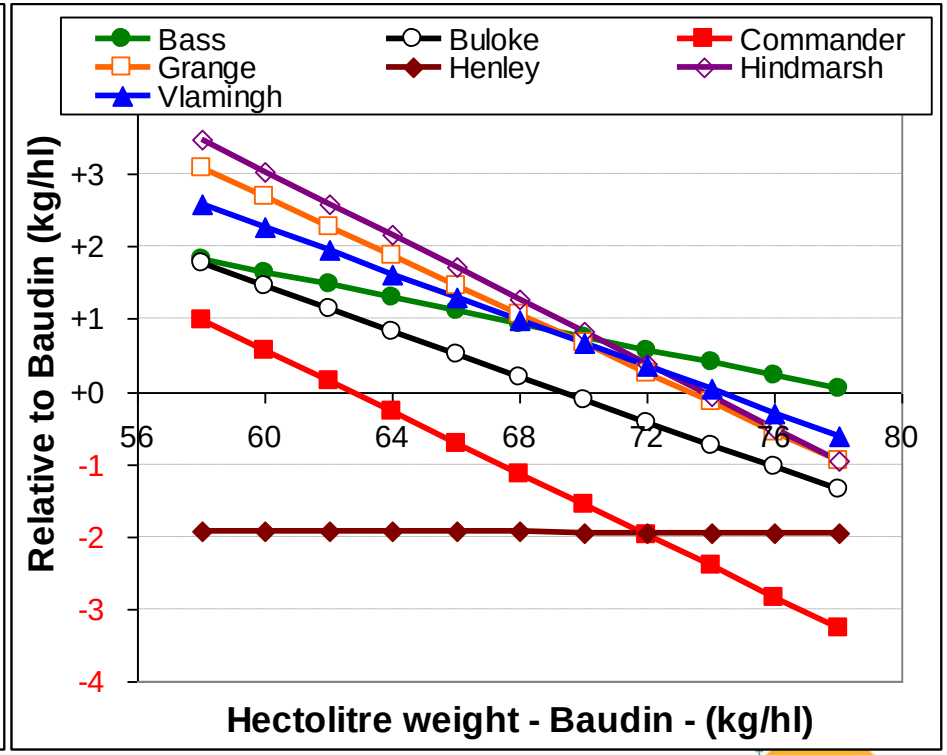
**Funders: DAFWA and GRDC (DAW00148, 00190 and 00224)**

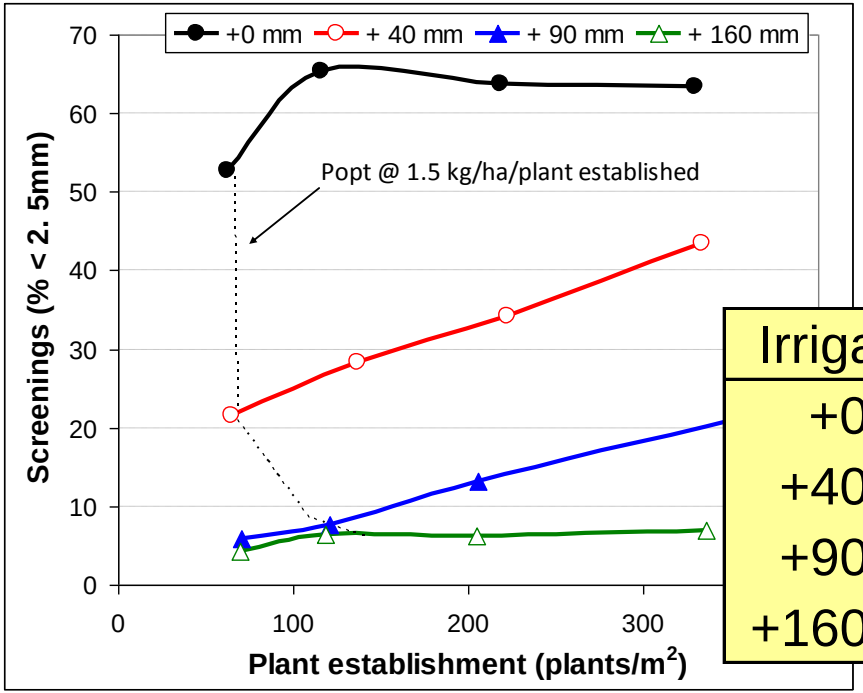
# Grain quality




Source: Grain yield - 119 observations: 2009, 2010, 2012 NVT, 2010-2012 Barley Agronomy. Disease – Sanjiv Gupta and Jason Bradley.

# Screenings response




| Irrigation | Point of inflection (kg/ha/plant established) Screenings (% < 2. 5mm) at Popt | | | | |
|---|---|---|---|---|---|
| | 2.5 | 2.0 | 1.5 | 1.0 | 0.5 |
| +0 mm | 48 | 48 | 48 | 48 | 48 |
| +40 mm | 19 | 19 | 19 | 19 | 19 |
| +90 mm | 7 | 7 | 8 | 8 | 10 |
| +160 mm | 6 | 6 | 6 | 6 | 7 |

Source: 2012 Barley agronomy – 12MR16.