

Growing Oats

fulfilling the potential

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Results from ORC trials: Variety performance in organic conditions

By Nick Fradgley



The QUOATS project:

‘Harnessing new technologies for sustainable oat production and utilisation’



ORC trials at Wakelyns Agroforestry

Grown as a 1st cereal

Four trial years

5 Husked varieties:

1. Balado
2. Mascani
3. Brochan
4. Tardis
5. Gerald

3 Naked Oat varieties:

1. Bastion
2. Mason
3. Racoon

Two Fertility Levels:

1. Untreated
2. Organic chicken manure



Results showing:

- **Variety performance over four years**
- **What factors affect variety performance (weeds or disease)?**
- **What crop traits indicate weed competitiveness?**
- **Can crop management increase grain quality?**
- **Should variety selection be based on yield, disease resistance, weed competitiveness or grain quality?**

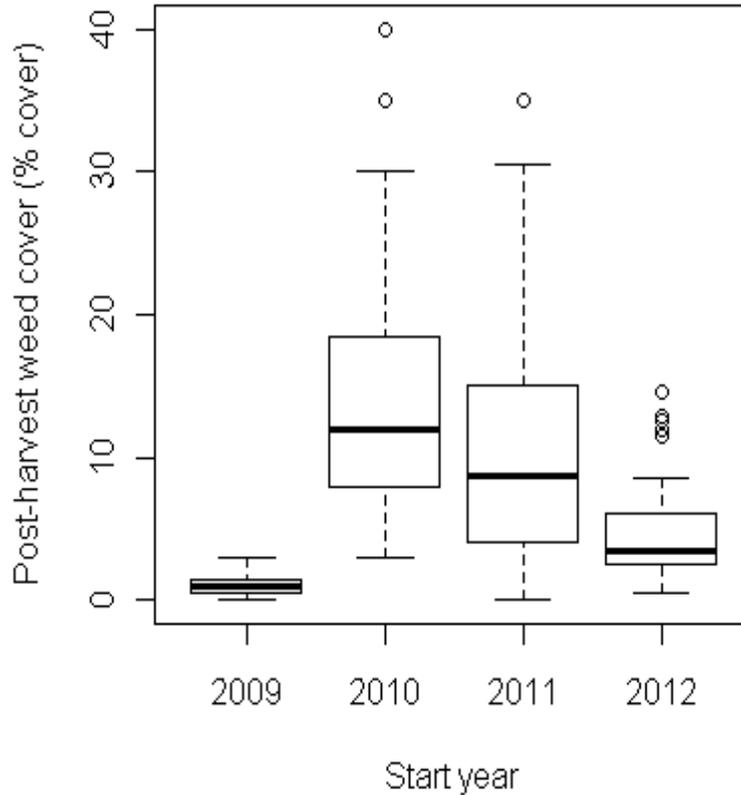
Variety performance over four years:

- Strong year effect on variety performance

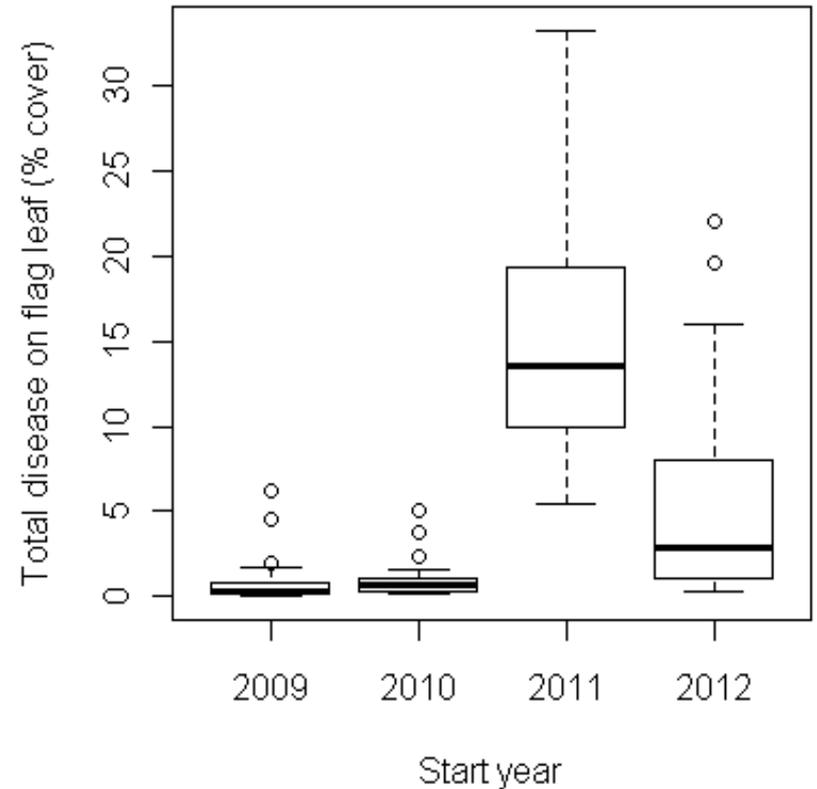
	Yield ranking			
	Year 1	Year 2	Year 3	Year 4
Husked	Mascani	Gerald	Tardis	Mascani
	Brochan	Brochan	Brochan	Balado
	Tardis	Tardis	Mascani	Gerald
	Balado	Mascani	Gerald	Brochan
		Balado	Balado	Tardis
Mean yield (t/ha)	8.7	8.6	6.2	9.2
Naked	Bastion	Bastion	Bastion	Bastion
	Racoon	Racoon	Mason	Racoon
	Mason	Mason	Racoon	Mason
Mean yield (t/ha)	5.7	5.5	3.8	6.4

What is affecting variety performance in different years?

Weeds

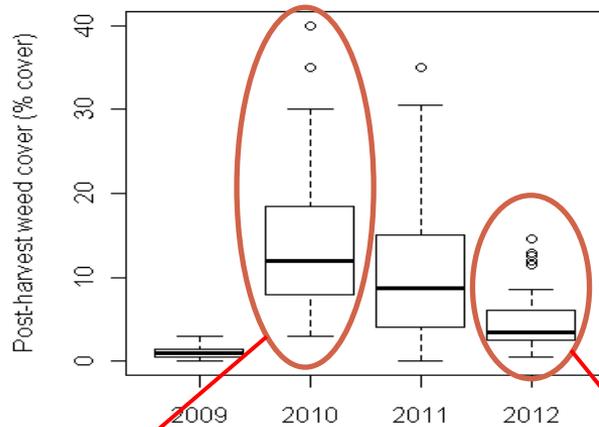


or Disease



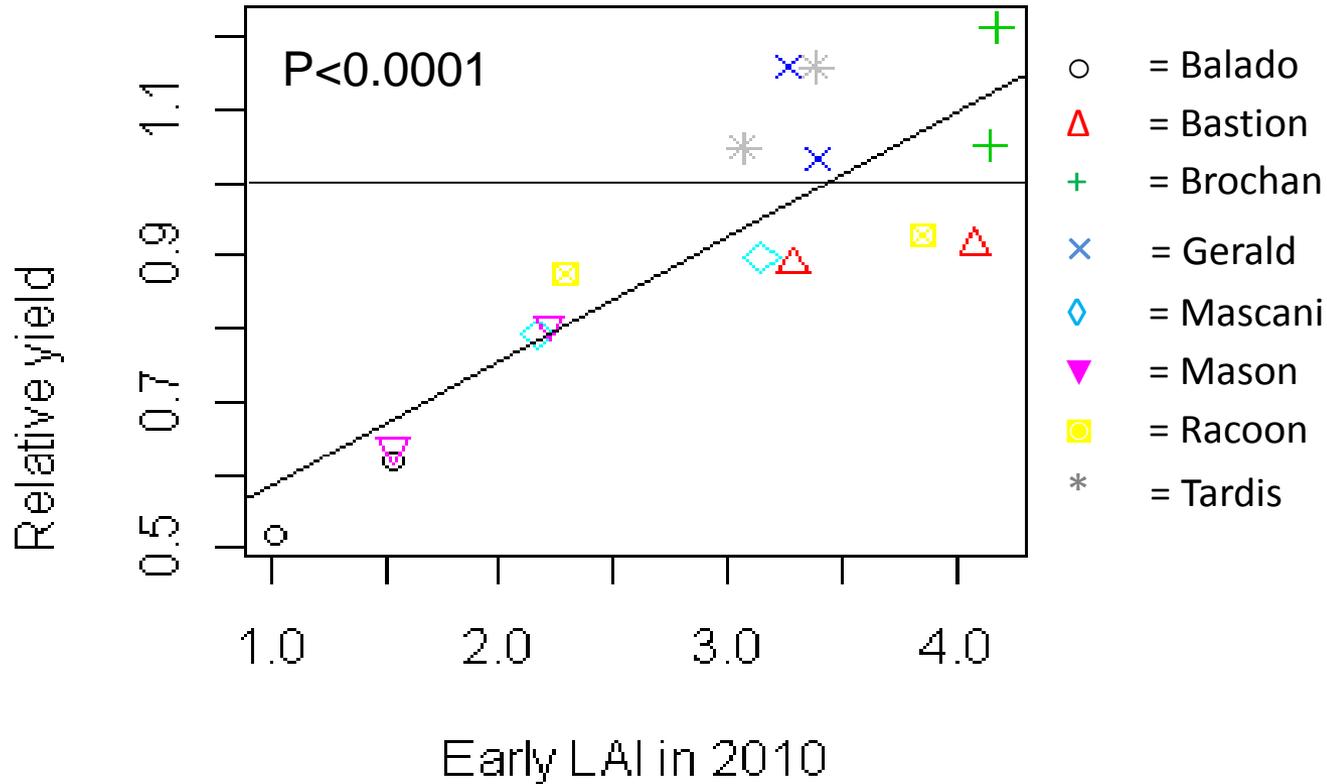
Do weed competitive varieties do relatively better in a high weed year?

- Comparing 2010-11 and 2012-13 to get a relative yield
- Relative yield = average yield in 2010 / average yield in 2012



Do weed competitive varieties do relatively better in a high weed year?

YES



Do weed competitive varieties do relatively better in a high weed year?

- Relative importance of competitive traits:

Trait	P value in linear model against relative yield
Early canopy cover	<0.001
Mid canopy cover	<0.001
Late canopy cover	0.014
Crop emergence rate	0.019
Crop density	0.022
Crop height	0.089

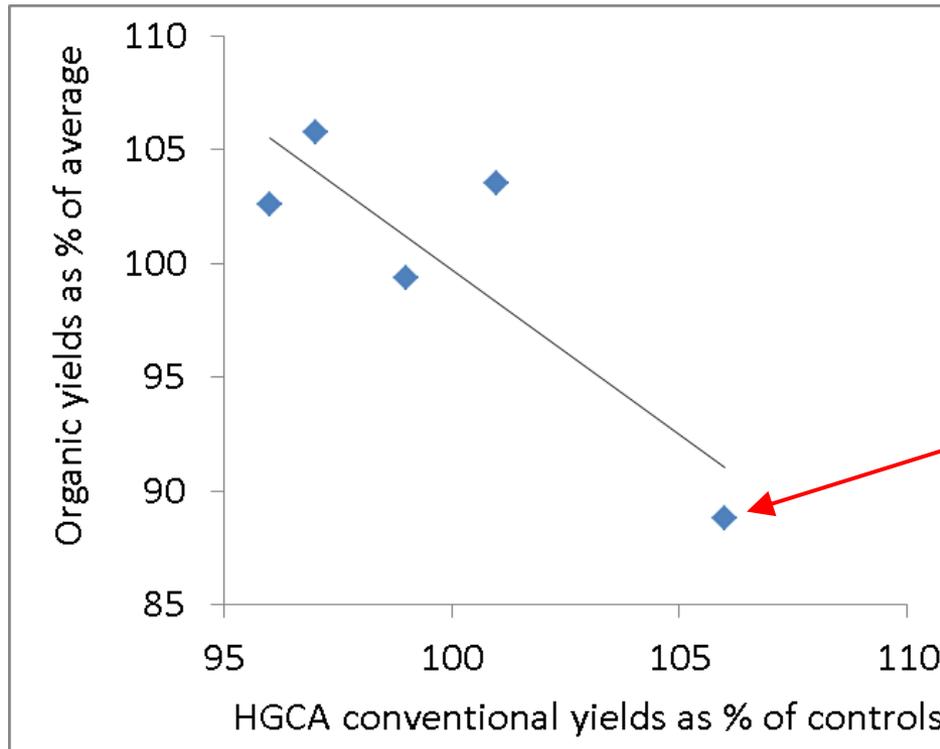
Early season canopy cover is more important than height for weed competition



Variety selection based on conventional yield data?

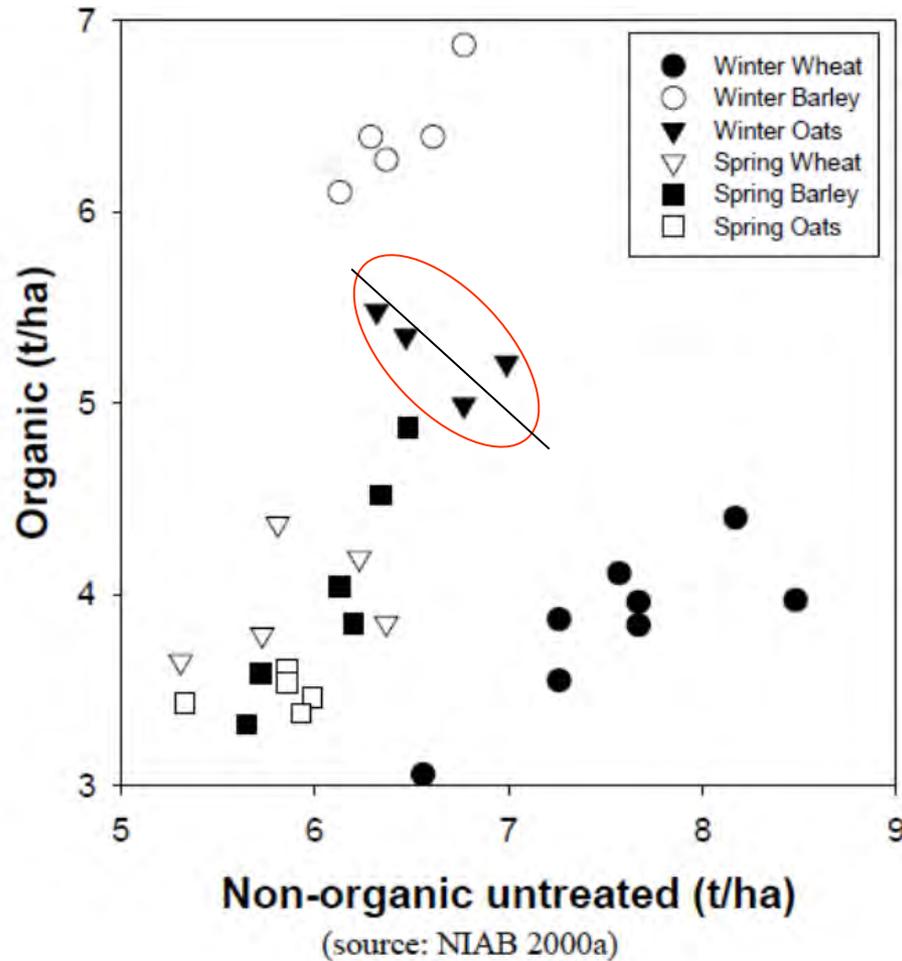


	Rhapsody	Balado \$	Dalguise	Gerald	Mascani -	Fusion \$	Beacon	Grafton	Average LSD (5%)
Variety type	Conventional husked varieties					Naked varieties			
Scope of Recommendation	UK	UK	UK	UK	UK	UK	UK	UK	
UK yield as % treated control (8.2 t/ha)									
Fungicide treated	109	105	101	101	98	76	74	73	5.0



Balado

Results from NIAB:



NIAB (2000a). *Cereal Variety Handbook*. National Institute of Agricultural Botany, Cambridge.

Agronomy to increasing grain quality?

Journal of Agricultural Science (2003), **141**, 249–258. © 2003 Cambridge University Press
DOI: 10.1017/S0021859603003654 Printed in the United Kingdom

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Effect of nitrogen, seed rate and plant growth regulator (chlormequat chloride) on the grain quality of oats (*Avena sativa*)

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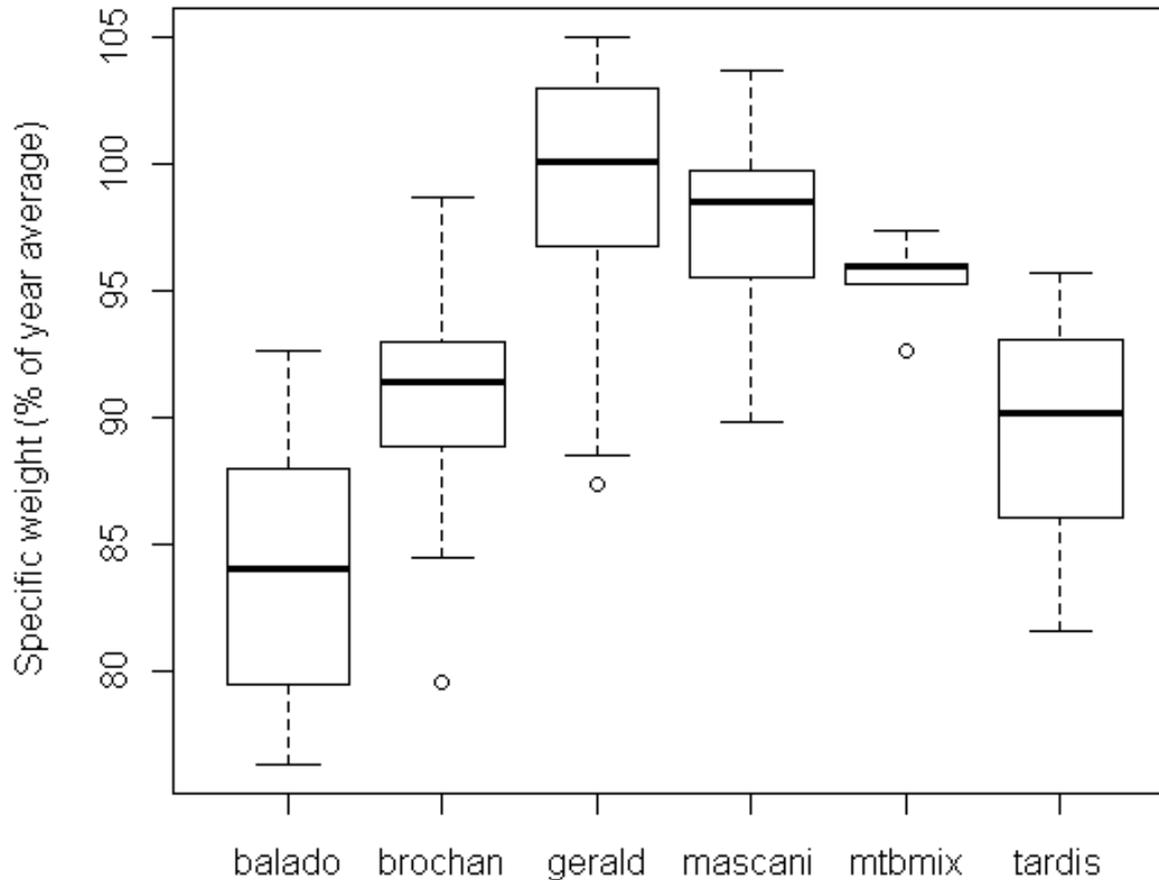
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(Revised MS received 9 October 2003)

- Found a decrease in specific weight with added fertility and higher seed rates.
- An effect of incomplete grain filling or secondary tillers?

Agronomy to increasing grain quality?

- Variety choice has biggest influences on quality.



An Organic Recommended List?

	Husked					Naked		
 ORGANIC RESEARCH CENTRE ELM FARM www.QUOATS.ORG	Balado	Brochan	Gerald	Mascani	Tardis	Bastion	Mason	Racoon
Yield (% of average)								
Grain (Husked 8.1 t/ha, Naked 5.4 t/ha)	89	103	104	106	99	111	87	101
Straw	96	100	96	112	96	95	92	112
Yield stability	6.1	8.0	6.5	7.3	8.8	8.0	8.8	7.1
Disease resistance								
Septoria avenae	0	3	4	10	1	8	3	0
Crown rust	0	6	7	9	5	3	10	3
Agronomic features								
Resistance to lodging	10	10	4	0	8	3	10	5
Straw length (cm)	73	95	105	105	97	103	88	121
Early canopy cover (Leaf area Index)	2.5	3.5	2.3	2.6	2.9	2.8	2.5	2.9
Late canopy cover (Leaf area Index)	5.2	5.8	5.1	5.5	5.0	5.6	5.4	5.3
Tillering ability (stems/m ²)	350	417	402	469	410	438	384	343
Grain quality								
Specific weight (kg/hl)	48.1	51.9	55.1	55.7	51.2	63.5	64.1	67.3

Conclusions:

1. **Weed competition** affects variety performance more than **disease**.
2. **Early crop establishment** is a more useful trait for weed competition than **late canopy cover** or **crop height**.
3. Organic yields cannot easily be predicted by conventional RL data
4. Grain quality is more influenced by variety choice than crop management.
5. Variety choice should be based on **weed competitiveness** and **grain quality** rather than yield.