



Organic Horticultural Seed Trials in Wales

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December 2004

This report is also available at
<http://www.organic.aber.ac.uk/library/hortseedtrials.pdf>

Published by Organic Centre Wales, Institute of Rural Sciences, University of Wales
Aberystwyth, Ceredigion, SY23 3AL. Tel. 01970 622248

Background

Under the organic standards, producers are required to use organic seed. However, a derogation can be obtained from the appropriate certification body that allows the use of (untreated) non organic seed where appropriate organic material is not available. There are, however, a number of barriers to the wider use of organic seed including:

- Many of the industry's standard varieties are not available in organic seed. The lifting of the derogation would oblige growers to use varieties of which they had little or no experience
- By extension of the previous point, many popular varieties will no longer be available on the organic markets. It is uncertain whether retailers, and in turn their customers, would accept alternative varieties
- There is little information on the agronomic performance of varieties that are available in organic seed, making variety choice a difficult decision for growers.
- The quality of organic seed is perceived to be of lower quality in terms of viability, vigour and freedom from pest and disease problems than conventional seed. As of 1 January 2004, growers cannot obtain a derogation on the basis of quality, and this potentially brings an element of urgency to the situation.

In the long term the organic sector remains committed to lifting the derogation on a crop-by-crop basis as and when conditions allow, and the industry needs to be prepared for this eventuality. This work aims to make a contribution to this end by providing information on the performance of varieties that are available in organic seed, thus helping growers to make a more informed decision about variety choice.

The trials were carried out at Welsh College of Horticulture, and were funded by Farming Connect. They were coordinated by Organic Centre Wales as part of the Farming Connect Organic Development Programme.

Objectives

The objectives of the trial was to assess the performance of selected varieties grown from organic seed in terms of:

- Germination
- Vigour
- Uniformity
- Pest and disease incidence
- Yield
- Marketable yield (as percentage of total yield)
- Faults

Methodology

Variety Selection

The selection of varieties for the trials was based on the results of a survey, also funded by Farming Connect and conducted by OCW, in which growers assessed the performance of varieties they grew from organic seed in the 2002 season. Varieties showed some potential, but which had variable results as indicated by the range of scores, were prioritised.

Trial Site

The trials were based at the Welsh College of Horticulture. The organic unit was established in 2002 on organic land that had been under a grass/clover ley since its conversion in 1999.

The site includes approximately 4 ha of field vegetables and 4 polytunnels. In addition, a 130 tree orchard was established in 2003 which includes apples, pears, plums and damsons. All are on root-stocks that will give half standard trees when mature.



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Growing conditions

For the field crops a four-bed system was employed:

- Brassicas
- Alliums/cucurbits
- Roots
- Legumes/salads

For the protected crops 4 x polytunnels were used, 2 for cucumbers and peppers and 2 for tomatoes.

Transplants were used for Cucurbits, Brassicas, French beans and lettuces. All protected crops were started under glass. Fleece covers were used for early plantings, and on the carrots and parsnips throughout. No other pest and disease control measures were used. Crops were watered as appropriate.

Data collection

The crops were monitored and observed on a weekly basis. Data was collected for the following parameters:

- Emergence
- Vigour
- Uniformity
- Pest and disease incidence
- Yield
- Marketable yield (as percentage of total yield)
- Faults

Uniformity was evaluated on a scale of 1-5 (with 1 being excellent and 5 poor). The harvested date was when the first crop was marketable. Yield was per plant or in the case of individual crops an average for that crop.

Results

Observations on trials

The results are summarised by crop type below. Detailed data on all parameters recorded is available in Appendix I

Alliums/Cucurbits.

- Courgettes. Trialled well, with 4 varieties to compare and reasonable successes. ***Patriot*** (shown below) was particularly good.



- Squash. Only trialed **Geode** from Pro Veg, but a great success.



- Leeks. Still in the ground, but **Oarsman** looking good, the others had uneven growth development.
- Onions. All 4 varieties grown from sets. 70% marketability was the highest achieved on **Jet set & Drago** (o/p). Unexpected poor performance on **Setton** and **Drago** F1. Conditions weren't particularly bad therefore can only assume we had poor quality sets delivered.

Roots.

- Beetroot. Three varieties, with two sowings of each.



Detroit round

Boro

De chioggia

All performed reasonably well, particularly ***Detroit round*** (pictured on the left) and ***De chioggia***. *De chioggia* also had a slight novelty value in terms of its colouring.



- Carrot. Other than the second sowing of ***Merida*** the carrots were a disaster, either caused by poor germination or by the crops being eaten at an early stage.
- Parsnips. Neither were too bad, but ***White gem*** from Demeter were the best.

Legumes/salads.

- Broad beans. Accepting that we sowed quite late there was an unusually high amount of plants where poor bean setting occurred. Rust, chocolate spot and black bean aphid were prevalent. Surprisingly **Super aquadulce** performed the worst of all and **Hangdown green** the best.
- Lettuce. Other than the second sowing of **Xanadu** (shown below) the lettuce trial was not very successful.



But, **Roger** (shown below) would certainly be worth trying again, as it tasted good and other than thrip damage looked good with its unusual leaf colouring.



- French Beans. All germinated well, but we didn't plant them out early enough and therefore failed to develop.

Brassicas

- Orientals. We tried a number of sowings of **Red orache** but couldn't get any to germinate. The **Tatsoi** from Pro Veg were the biggest ones I have ever seen and if we had a slug prevention programme in place would have been a good crop.



- Cabbage. We had some really uneven growth, with **Buscaro** (shown below) providing the best results.



- Calabrese/broccoli. All plantings suffered from early bolting.

Protected cropping

- Tomatoes. Other than **Lido** the tomatoes were a success, with **Sakura** (shown below) being the best.



- Cucumbers. Interesting varieties with **Stimora** being the most successful, but not everyone liked the look and taste (Shown below). **Styx** was a very heavy cropper.



- Peppers. Generally all three were a success (picture of Spirit shown below) although we were unable to identify a small beetle (shown below) that caused small holes in some of the fruit.



Problems

- Delays in selection of varieties for trialing, and subsequently in submitting the list to WCOH staff resulted late plantings in some cases, and difficulties in sourcing seed for some varieties. Other problems included, poor germination (particularly carrots and red orache) and Pest and disease problems.
- Pests. Other than the expected pests (cabbage white, slugs and aphids etc) we had an unusual amount of rabbit (field is fenced) and mice damage. Thrip damage was

also more evident than normal. The only pest damage we could not identify were some holes in the peppers (presumed to be a small beetle)

- Diseases: No blight, but plenty of chocolate spot, rust, canker, botrytis and downy mildew.
- We also observed a number of nutrient deficiency indicators, which need to be corrected for next season.

Recommendations

It is recommended for the next set of trials that:

- Seed varieties for the trial should be selected earlier to ensure that the appropriate varieties are available and the timing of the planting is appropriate.
- The trial is conducted on a more 'commercially orientated' basis.

Appendix I: Variety Trial Datasheets

Crops were monitored and observed on a weekly basis. Data was collected for the following parameters:

- Emergence
- Vigour
- Uniformity
- Pest and disease incidence
- Yield
- Marketable yield (as percentage of total yield)
- Faults

Uniformity was evaluated on a scale of 1-5 (with 1 being excellent and 5 poor).

The harvested date was when the first crop was marketable

Yield was calculated per plant or in the case of individual crops, an average for that crop.

Bed A

Variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield	Uniformity	% marketable	% disease	% pests	% faults	Remarks
Row 1 (courgettes)												
Defender	Tuckers	26/04/2004	26/05/2004	30/04/2004	07-Jul	4kg	3	75%	10%	5%	10%	1 plant with damaged shoot tip early on. Slight trailing habit. Poor productivity. Least vigorous growth. Slight striping to fruit. Some rotten & chewed fruit tips. Showed some chlorosis.
Black Forest	Pro Veg	26/04/2004	26/05/2004	30/04/2004	07-Jul	4kg	4	65%	5%	5%	5%	2-3ft long plants. Quite smooth dark green foliage. Short dark green fruit. Bulbous ends. Unusual shape. Poor uniformity of fruit. Good early flowering tapered off. Very little P&D. Slightly chewed & rotten fruit tips. Good foliage growth but poor fruiting.
Patriot	Tamar	26/04/2004	26/05/2004	30/04/2004	07-Jul	4.4kg	2	85%	10%	5%	0%	Vigorous growth. Open habit. Large robust foliage. Good yields & uniformity. Slightly ridged fruit. Light green & slight speckling. Little P&D. Some soft & chewed fruit tips.
Tempra	Pro Veg	26/04/2004	26/05/2004	30/04/2004	07-Jul	4.8kg	2	80%	10%	5%	0%	Uniform upright growth. Some rotten & chewed fruit tips. Little P&D. Excellent yields. Standard colour & shape. Slight powdery mildew on foliage towards trial end.
Row 2 (Squashes)												
Geode	Pro Veg	26/04/2004	12/06/2004	30/04/2004	28-Jul	2.7kg	1	90%	5%	5%	0%	Excellent germination flowering and fruiting. Fruit developed close to stem. Excellent uniformity (plants, fruit, size, shape, colour). Early fruiting. 1 plant died due to stem damage. Attractive fruit. Young green speckled, mature to golden skin. Very little P&D. Slight powdery mildew towards trial end.

Bed A Cont.

Variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield	Uniformity	% marketable	% disease	% pests	% faults	Remarks
Row 3 (leeks)												
Maxim	Pro Veg		15/04/2004	29/04/2004			4		20%			Good germination rate. Some rabbit damage early on. Various size plants. Pale green foliage, some with white tips.
Azur	Pro Veg		15/04/2004	29/04/2004			4		25%			Some rabbit damage early on. Good germination. Bluey-green colour foliage. Uneven size plants, possibly due to uneven sowing density. Mostly stocky plants.
Oarsman	Tuckers		15/04/2004	30/04/2004			2		20%			Tall sturdy plants. Few seed may have led to thinner sowing. Thick midrib. Good uniformity of growth and development. Large leaves.
Startrack	Tamar		15/04/2004	30/04/2004			4		20%			Few seed may have led to thinner sowing. Uneven growth and development. Thick foliage, some with white tips. Most plants with large healthy leaf growth.

Bed A Cont.

Variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield	Uniformity	% marketable	% disease	% pests	% faults	Remarks
Row 4 (sets)												
Drago (O/P)	Tuckers		18/04/2004	n/a	03-Sep	8.3	2	70%	15%	0%	15%	Mostly medium size bulbs. Many having yellow leaf tips. Shortest foliage. Fairly even size. Last variety for skins to ripen. Reasonable skins, some splitting and thin.
Setton	Tuckers		18/04/2004	n/a	03-Sep	7.9	5	45%	15%	0%	25%	Mostly small to medium size bulbs. Uneven bulb size and development most likely due to uneven set sizes. Yellow leaf tips to older leaves. Many with pale & split skins.
Drago F1	Tuckers		18/04/2004	n/a	03-Sep	6.4	4	45%	15%	0%	20%	Uneven size, reflecting poor uniformity of sets. Fairly even skins. 2 bulbs bolted. Slight splitting of skins. Mostly small to medium size bulbs.
Jet Set	Tuckers		18/04/2004	n/a	03-Sep	9.2	3	70%	15%	0%	30%	Mostly medium to large size bulbs. Several split into 2 bulbs. Thin, light coloured skins. Some tiny bulbs.

Bed B

variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield	Uniformity	% marketable	% disease	% pests	% faults	Remarks
Row 1 (beetroot)												
Boro	Tuckers		20/04/2004	28/04/2004	29/07/2004		2	90%	20%	15%	0%	First variety attacked by rust. Fairly uniform roots. Some scab. Some chlorosis to foliage. Sat well. First to have foliage dieback and regrowth. Short leaves. Little foliage compared to root size.
Boro	Tuckers		23/06/2004	05/07/2004	13/08/2004		3	95%	10%	5%	0%	Poor uniformity in germination. Fairly healthy foliage, with slight rust.
Detroit round	Tuckers		29/04/2004	09/05/2004	29/07/2004		1	95%	10%	15%	0%	Uniform. Tall slender foliage. Some slug damage. Good root colour. Even round roots. Stands well. Rust late in development.
Detroit round	Tuckers		22/06/2004	04/07/2004	13/08/2004		1	97%	10%	5%	0%	Uniform & healthy plants.
De chioggia	Tuckers		29/04/2004	09/05/2004	29/07/2004		2	90%	5%	5%	10%	Tall, large healthy foliage. Mixed root size and shape. Uniform foliage. Attractive pink and white rings inside root. Unusual root colour. Little P&D.
De chioggia	Tuckers		22/06/2004	04/07/2004	13/08/2004		2	95%	5%	5%	0%	Uniform roots. Good germination. Smaller roots and foliage than first sowing. Healthy plants.
Row 2 (carrot 1)												
Parano F1	Tamar		20/04/2004	nil	n/a							Very poor germination (<10 seedlings). Short foliage. All disappeared.
Parano F1	Tamar		22/06/2004	05/07/2004	n/a							Good germination then disappeared
Neptune F1	Tamar		20/04/2004	nil	n/a							None germinated.
Neptune F1	Tamar		22/06/2004	05/07/2004	n/a							Good germination then disappeared
Starca F1	Tamar		20/04/2004	nil	n/a							Very poor germination (<12 seedlings). All disappeared.
Starca F1	Tamar		22/06/2004	05/07/2004								Excellent uniform germination. Many seedlings disappeared leaving patchy rows.

variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield	Uniformity	% marketable	% disease	% pests	% faults	Remarks
Row 3 (carrot 2)												
Merida F1	Tamar		29/04/2004	nil	n/a							Very poor germination (<20 seedlings) then disappeared.
Merida F1	Tamar		24/06/2004	05/07/2004	02/09/2004		2	40%	0%	80%	40%	Good germination. Bad slug damage, some forked. Long uniform roots with good colour.
Julia F1	Tamar		20/04/2004	nil	n/a							None germinated or seedlings quickly eaten.
Julia F1	Tamar		24/06/2004	05/07/2004	None 28/7				n/a	100%	n/a	Good, even germination. All seedlings disappeared.
Row 4 (parsnips)												
White spear	Tuckers		29/04/2004	28/05/2004								Uneven germination. Very short foliage. Poor growth & development. Curled, chlorotic & chewed foliage. Dry, brittle older leaves.
White gem	Demeter		29/04/2004	28/05/2004								Good germination. Short foliage. Early signs of interveinal paleness & leaf curling. Foliage attacked by aphids & thrips when young plants. Poor uniformity of foliage.

Bed C

variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield/plant	Uniformity %	marketable %	% disease	% pests	% faults	Remarks
Row 1 (B/Beans)												
Bunyard exb	Tamar		19/04/2004	04/05/2004	21/07/2004	0.065kg	5	60%	75%	80%	15%	Very short, twisted, poor quality pods. Badly attacked by Black Bean & other aphid species. Good flowering followed by poor bean setting. Few beans. Some signs of potassium deficiency & rust.
Bunyard exb	Tamar		21/06/2004	05/07/2004	n/a							Even germination. Late flowering and no pods set.
Hangdown/G	Tamar		19/04/2004	04/05/2004	21/07/2004	0.215	2	80%	60%	75%	5%	Many good quality & size pods. Few curled & spotted pods. Tall, sturdy, multiple plant stems (3/plant). Dark green foliage affected by rust & chocolate spot late in trial. Some Black Bean Aphid.
Hangdown/G	Tamar		21/06/2004	05/07/2004	n/a							Even germination. Late flowering and no pods set. Tall stems.
S/Aquadulce	Tamar		19/04/2004	04/05/2004	21/07/2004	0.041	4	50%	80%	80%	20%	Various size pods. Premature leaf fall. Very short, poor quality plants. Potassium deficiency. Chocolate spot & rust present. No significant aphid presence. Worst plants in trial.
S/Aquadulce	Tamar		21/06/2004	05/07/2004	n/a							Good, even germination. Some chewed leaves. No pods set.

Bed C Cont.

variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield/plant	Uniformity	% marketable	% disease	% pests	% faults	Remarks
Row 2 (Lettuce)												
Focea	Pro Veg	15/04/2004	10/05/2004	29/04/2004	n/a		2	0%	100%	20%	20%	Even germination. Uniform growth. Attractive looking early on. Some slug damage. Downy mildew soon spread destroying crop.
Focea	Pro Veg	26/05/2004	15/06/2004	07/06/2004	n/a		2	0%	90%	40%	0%	Even plants. Suffered thrip damage & badly affected by downy mildew.
Xanadu	Tamar	15/04/2004	10/05/2004	30/04/2004	n/a		2	0%	75%	30%	20%	Good uniformity. Some slug damage. Never hearted before bolting. Small plants. Very rubbery leaves.
Xanadu	Tamar	26/05/2004	15/06/2004	07/06/2004	28/07/2004	0.182	3	70%	30%	30%	20%	Fairly uniform. Badly slug damaged. Rubbery leaves. Small plants. Hearted well.
Lobjoits	Tamar	15/04/2004	10/05/2004	26/04/2004	n/a		1	0%	5%	10%	30%	Excellent uniformity. Some slug damage. Slow to heart. Large plants. Some plants affected by bacterial soft rot. Bolted quickly.
Lobjoits	Tamar	26/05/2004	15/06/2004	04/06/2004	14/07/2004	0.198	1	20%	5%	10%	30%	Excellent uniformity. Slight slug damage. Never hearted. Large, loose-leaved plants. Bolted very quickly and uniformly.

Bed D

variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield	Uniformity	% marketable	% disease	% pests	% faults	Remarks
Row 1 (oriental)												
Red orache	Pro Veg		24/06/2004	nil	n/a							None germinated.
Tatsoi	Pro Veg		24/06/2004	05/07/2004			1	50%	nil	70%	50%	Good germination. Seedlings attacked by slugs. Remaining plants grew evenly and developed large prostrate rosettes of dark green spoon-shaped leaves. Little further slug damage to mature plants. Slow to bolt.
Row 2 (cabbage 1)												
Premier	Tamar	15/04/2004	24/05/2004	26/04/2004	09/09/2004	0.664	2	30%	0%	40%	60%	Very uniform growth and development. Some slug damage to older leaves. Formed quite small plants. Small leaves. Formed tight, compact, white cabbage heads. Uneven head development, some too small to be marketable.
Buscaro	Tuckers	15/04/2004	24/05/2004	26/04/2004	09/09/2004	0.823	2	60%	0%	20%	5%	Large amount of foliage compared to harvestable head. Uniform growth. Uneven head formation. Little P&D damage. Large, attractive purple-coloured leaves. Form dense medium sized heads.
Buscaro	Tuckers	28/04/2004	15/06/2004	10/05/2004			2	50%	0%	30%	10%	Uniform growth and development. More P&D damage. Large leafy purple plants.

Bed D Cont.

variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield	Uniformity	% marketable	% disease	% pests	% faults	Remarks
Row 3 (cabbage 2)												
Vertus	Tamar	15/04/2004	24/05/2004	26/04/2004			5		0%	75%	90%	Uneven size and coloured plants. Unappealing rubbery foliage. Some purple leaf midribs, others white. Badly chewed by caterpillars and slugs. Poor quality plants.
Vertus	Tamar	28/05/2004	05/07/2004	07/06/2004			5		0%	60%	90%	Poor uniformity of growth and colour. Slug & caterpillar damaged. Appear to be mixed seed.
Pyramid	Tamar	16/09/2004		24/09/2004								
Jan King	Tamar	15/04/2004	24/05/2004	26/04/2004			4		0%	40%	30%	Began as uniform young plants but growth was uneven. Unappealing leathery textured foliage. Dark green with purple colouring to leaves. Bad caterpillar damage. Some slug damage.
variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield	Uniformity	% marketable	% disease	% pests	% faults	Remarks

Bed D Cont.

variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield	Uniformity	% marketable	% disease	% pests	% faults	Remarks
Row 4 (mixed)												
Marathon (cal)	Tamar	15/04/2004	24/05/2004	26/04/2004	20/08/2004 4	0.189	2	20%	0%	90%	80%	Bad damage after planting (rabbits or pigeons). Uniform plants and development. Poor growth. Small central heads formed. Damaged by caterpillars. Several side shoots formed. Bolted quickly.
Marathon (cal)	Tamar	28/04/2004	15/06/2004	10/05/2004	n/a		2	0%	0%	80%	100%	Uniform size plants. Bad slug damage. Soon bolted. Poor growth and development.
Fiesta (broc)	Tuckers	28/05/2004	05/07/2004	03/06/2004	01/09/2004 4		2	20%	0%	30%	90%	3 plants completely destroyed after planting (rabbits or pigeons). Uniform development. Poor growth. Stunted plants, little foliage. Single small flowerhead quickly bolted. Few secondary shoots.
Roulette (cab)	Tuckers	15/04/2004	24/05/2004	26/04/2004			3	10%	0%	90%	30%	Fairly uniform growth & size. Robust looking plants. Badly damaged by caterpillars and slugs.

Poly Tunnels 1 and 2 Cont.

variety	Seed source	Seed sown	Established in tunnel	Germination	Harvested	Yield/plant (kg)	Uniformity	% marketable	% disease	% pests	% faults	Remarks
Peppers												
Spirit F1	Tamar	27/04/2004	05/07/2004	17/05/2004	02/08/2004	1.8 52	2	75%	15%	25%	5%	Some slug damaged and misshapen fruit. Good uniformity. Thick walled fruit. Overall, even size plants and fruit. Some botrytis beginning towards trial end.
Saigon F1	Tamar	27/04/2004	05/07/2004	21/05/2004	07/09/2004	0.4 04	3	90%	0%	15%	5%	Small plants. Uneven development. Thin foliage on less sturdy plants. Good quality fruit in small numbers.
Bendigo F1	Tamar	27/04/2004	05/07/2004	17/05/2004	02/08/2004	7.2 82	2	90%	10%	10%	5%	Tall uniform plants. Excellent fruiting. Thin walled fruit. Suffered aphid infestation by the trial end. Some damage to fruit from slugs and unidentified beetle. Large leaves. Sturdy stem holds branches & fruit well above ground.

Poly Tunnels 3 and 4

variety	Seed source	Seed sown	Established in field	Germination	Harvested	Yield	Uniformity	% marketable	% disease	% pests	% faults	Remarks
Tomatoes												
Maribel F1	Tamar	27/04/2004	11/06/2004	10/05/2004	20/08/2004		1	90%	30%	30%	10%	Excellent uniformity in development. Very healthy, sturdy-looking plants. Uniform size fruit. Some aphids & botrytis towards trial end. Slow to ripen. Holds firmness once ripe.
Diplom F1	Tuckers	15/04/2004	11/06/2004	29/04/2004	09/08/2004		2	75%	10%	0%	10%	Fairly uniform plants. Uneven ripening of fruit. Medium size, good quality fruit. Split & softened quickly. Healthy plants. Good yield per plant. Average taste.
Money maker	Tuckers	15/04/2004	11/06/2004	28/04/2004	20/08/2004		1	80%	40%	30%	20%	Excellent uniformity in growth & development. Quick to curl lower leaves. Large trusses. Good taste. First to be affected by botrytis & aphids. Slow to ripen.
Sakura F1	Tamar	18/03/2004	11/06/2004	06/04/2004	21/07/2004		1	95%	0%	0%	10%	Excellent quality. Good colour & taste. Very tall thin plants. Small narrow foliage. Some chlorosis to lower leaves. Uneven succession of ripening on trusses. Large cherry. Uniform size. Holds firmness once ripe. Large trusses.
Lido F1	Tamar	18/03/2004	11/06/2004	06/04/2004	09/08/2004		2	40%	5%	0%	75%	Very uneven size and ripening. Green shoulders. 1 beefsteak size fruit = 563g. Not attractive fruit. Pointed blossom-end to fruit. Little taste. Narrow foliage. Softens quickly once ripe.