

A REPORT TO THE HORTICULTURAL DEVELOPMENT COUNCIL
18 LAVANT STREET, PETERSFIELD, HANTS, GU32 3EW

GLASSHOUSE WINTER LETTUCE
VARIETY TRIAL 1993/94

ANNUAL REPORT

Project Number: PC21a

Project Title: Glasshouse winter lettuce variety trial.

Project Leader: Mr M Harriman

Location of Project: Horticulture Research International
Stockbridge House
Cawood
Selby
North Yorkshire
YO8 0TZ

Tel: 0757 268275
Fax: 0757 268996

Project Co-ordinator: Mr D Stokes
ADAS Huntingdon
Chequers Court
Huntingdon
Cambs
PE18 6LT.

Tel: 0480 52161

Report Date: March 1994
Revised May 1994

Date Project Commenced: September 1993

Date Completion Due: February 1994

Key Words: butterhead, lettuce, varieties

Authentication

I declare that this work was done under my supervision according to the procedures described herein and that this report represents a true and accurate record of the results obtained.

Signature 

Mr M Harriman
Project Leader

Date 20/5/94

Report authorised by 
(signature)

M R Bradley
Head of Station
HRI Stockbridge House
Cawood
Selby
North Yorkshire
YO8 0TZ

Date 20.5.94

Contents

	Page
Introduction	5
Objective	5
Materials and Methods	5-7
Results	8-16
Conclusions	17
Appendix I Nitrate Content	18
Appendix II Environmental Climate Data	19

Introduction

As introductions of new lettuce varieties become available, they require evaluation on as near a commercial basis as possible. This evaluation may also need regional replication to take into account climatic and soil type differences. Choice of variety can represent one of the easiest ways of increasing profitability through choosing those with better quality or a shorter production time to existing standard varieties. This trial evaluated 13 relatively new varieties with the control variety Rachel, for winter production of butterhead protected lettuce.

Objective

To assess the performance of 14 varieties of protected butterhead lettuce for cutting in February, grown under commercial conditions in North Yorkshire.

Materials and Methods

Varieties

<u>Supplied by</u>	<u>Variety</u>	<u>Claimed Resistance Characteristics</u>
Breeders Seeds	Kylie	NL 1-15
	Becky	NL 1-15
	S3156	NL 1-16
Elsoms	Ricardo	NL 1-7, 10, 11, 13-15
	Roald	NL 1-7, 10, 11, 13-15
	William	NL 1-7, 10, 11, 13-15
Enza Zaden	Rachel	NL 1-7, 10, 11, 13-15
	E7798	NL 1-7, 10-16
Rijk Zwaan	Elmo	NL 1-7, 10, 11, 13-15
	42-53	NL 1-16
Yates Seeds	Impala	NL 1-7, 10-13
	Polana	NL 1-15
	378/93	NL 1-7, 10-15
Pinetree De Ruiter	42-81	NL 1-16

Cultural Notes

Seed Sown: 15 September 1993

Planted: 15 October 1993

First Harvest: 31 January 1994

Second Harvest: 7 February 1994
Base Dressing: 20 g/m² Nitram
80 g/m² Triple Super Phosphate
Spacing: 8" x 8"

Pest and Disease Control Programme:

Propagation Aliette block incorporation
Alternate sprays of Zineb WP and Thiram WP at 3
day intervals

Pre-Planting Basilex

Post-Planting

18 October	Rovral, Metasystox
19 October	Favour
25 October	Thiram
1 November	Favour
8 November	Filex
15 November	Rovral
16 November	Filex

Temperature: See Appendix I for achieved temperatures.

Trial Design

The trial design was fully randomised with three replicates of each variety. Twenty lettuce were cut per replicate and weighed after trimming to a commercial standard. Plot size: 140 heads.

Explanation of Statistical Terms

Throughout the report a number of statistical terms are referred to; these are:

SED = The standard error of the difference when comparing two means in that column of data.

A statistical term easier to interpret:

LSD 5% = The least (minimum) difference when comparing any two figures within a given column that is required for those figures to be statistically different.

A number of common notations are also used to indicate the degree to which values are significantly different.

NS = Not significant.

* = P <0.05, ie. the probability of this result occurring by chance is equal to or less than 1 in 20 (0.05 = 5%).

** = P <0.01, ie. the probability of this result occurring by chance is equal to or less than 1 in 100 (0.01 = 1%).

*** = P <0.001, ie. the probability of this result occurring by chance is equal to or less than 1 in 1000 (0.001 = 0.1%).

The crop was grown to commercial standard. The trial was harvested on 31 January and one week later on 7 February. Twenty heads were cut from the centre of each plot, trimmed to a commercial standard and individually weighed.

The crop was assessed for missing plants due to Botrytis, off types and general appearance. An assessment of the number of lettuce affected by basal rots was carried out and expressed as the total number affected per variety (total 420 plants).

Visitors attending the open day on 3 February were asked to score each variety for 'overall usefulness' on a scale of:

5 = Excellent

0 = Poor

The visitors were able to see an uncut plot of each variety (numbered but un-named), market pack cold stored for 48 hours and head weights from the harvested plots of each variety to assist with their assessments.

Results

BECKY (BREEDERS)

Medium green, glossy leaves with a tendency to irregularity in the wrapper leaves giving an uneven appearance to individual heads. Well hearted with 100 % ground cover producing all class I heads. A well-filled, good quality flat base with slow appearance of butt browning.

Given a good score of 'overall usefulness' by visitors to the Open day.

ELMO (RIJK ZWAAN)

Dull, pale green leaves with silvery undersides. Tall, upright, long and slender leaves producing a tulip shaped head. Well hearted giving 95 % ground cover with 2 % off-types but with very low number of missing plants due to botrytis. Butt discoloration occurred relatively slowly. Head weights at harvest 1 were relatively low increasing at harvest 2.

IMPALA (YATES)

Medium-pale green, glossy leaves held well clear from soil producing a very well filled base. An early maturing variety with symmetrical and uniform rounded rosette heads. High head weights were recorded but comparatively low % Class I. A few plants missing due to Botrytis.

Received an excellent score for 'overall usefulness' by visitors to the Open day.

KYLIE (BREEDERS)

Medium-pale green leaves with pale edges and a tendency to uneven height in the wrapper leaves leading to an untidy appearance. Head weights were fairly low but needed little trimming. 98 % ground cover with a low number of plants missing due to Botrytis. Comparatively slow appearance of butt browning.

POLANA (YATES)

Medium-pale green, glossy, large and broad leaves with some contact of lower leaves on ground. Early maturing variety with a flat, well filled base although some unevenness in plant size. Although a lot of trimming was needed the head weights produced were still high and the % Class I excellent. Butt browning appeared rapidly.

Received a very good score for 'overall usefulness' by visitors to the Open day.

RACHEL (ENZA ZADEN)

Medium green, glossy leaves held well off the ground producing a good quality, well filled base. High head weight and large framed variety with high % Class I heads. 98 % ground cover with <1 % off-types. Comparatively slow appearance of butt browning.

Given a good score for 'overall usefulness' by visitors to the Open day.

RICARDO (ELSOMS)

Medium green, slightly wrinkled leaves producing uniform bulb shaped hearts. Lower leaves held well away from ground with a well filled base. Low number of plants missing due to Botrytis and fairly slow appearance of butt browning.

Given a good score for 'overall usefulness' by visitors to the Open day.

ROALD (ELSOMS)

Dull, medium green leaves producing a short, flat lettuce with some contact of lower leaves on ground. An early maturing variety with symmetrical and uniform heads. Although needing comparatively heavy trimming head weights were good and % Class I excellent. Low number of plants missing due to Botrytis but a relatively rapid occurrence of butt browning.

WILLIAM (ELSOMS)

Dull, pale green, small leaves with a rounded appearance. An early maturing variety with a small rounded heart, fairly symmetrical but slightly variable in size giving fairly high head weights. 95 % ground cover with gaps due to small compact nature of plant.

E7798 (ENZA ZADEN)

Slightly glossy, pale green, pointed leaves. An upright plant with a good quality pointed base. Average head weights were achieved but low % Class I. Low number of plants missing due to Botrytis and comparatively slow appearance of butt discolouring.

S3156 (BREEDERS)

Pale green, dull leaves which are large and long with silver undersides. Wrapper leaves loose with loosely filled base. Low head weights with high trimming in both harvests needed producing low % Class I heads with a loosely filled base. Very high tendency to Botrytis with large number of plants missing.

Received a very low score for 'overall usefulness' by visitors to the Open day.

42-53 (RIJK ZWAAN)

Pale green, pointed leaves held loosely around the heart, coming away too easily. Large framed, uniform, bulb shaped heart. A low % of Class I heads were achieved but with fairly slow butt browning.

42-81 (PINETREE DE RUITER)

Leaves with silver undersides held well off the ground producing a symmetrical, bulb shaped heart. 98 % ground cover with 2 % off-types. Reasonably high head weights with all Class I heads and slow appearance of butt browning.

Given a very high score for 'overall usefulness' by visitors to the Open day.

378/93 (YATES)

Dark green, narrow, pointed leaves producing an upright pointed head. Few leaves touching ground leading to a low amount of trimming and high number of Class I heads although the average head weight was low. 98 % ground cover achieved but a few plants lost to Botrytis. The base was not well filled but butt browning was slow in appearing.

TABLE 1: MEAN MARKETABLE HEAD WEIGHT

Variety	Harvest 1 (g)	Harvest 1 (oz)
Rachel	166	5.9
Polana	159	5.6
William	155	5.5
Impala	154	5.4
Roald	153	5.4
42-81	152	5.4
Ricardo	150	5.3
E7798	146	5.1
Becky	145	5.1
42-53	142	5.0
Kylie	139	4.9
Elmo	138	4.9
378/93	133	4.7
S3156	130	4.6
SED (20 df)	9.7	
LSD (P = 0.05)	-	
Significance	NS	

Variety	Harvest 2 (g)	Harvest 2 (oz)
Rachel	176	6.2
Polana	171	6.1
William	169	6.0
42-81	169	6.0
Ricardo	164	5.8
Roald	163	5.7
Becky	161	5.6
Impala	158	5.6
E7798	155	5.5
Kylie	154	5.5
Elmo	152	5.3
42-53	145	5.1
378/93	145	5.1
S3156	141	5.0
SED (20 df)	10.6	
LSD (P = 0.05)	-	
Significance	NS	

TABLE 2: PERCENTAGE CLASS I AND II BY NUMBER

Variety	Class I %	
	Harvest 1	Harvest 2
Rachel	98	87
Polana	100	95
William	93	95
Impala	88	64
Roald	100	98
42-81	100	93
Ricardo	90	100
E7798	87	52
Becky	100	95
42-53	77	78
Kylie	95	98
Elmo	90	87
378/93	100	90
S3156	88	73
SED (20 df)	8.9	13.7
LSD (P = 0.05)	-	27.7
Significance	NS	*

Class II %	
Harvest 1	Harvest 2
2	3
0	2
0	0
10	22
0	0
0	3
7	0
3	18
0	2
15	10
0	0
0	5
0	5
2	7
5.8	8.8
++	++

++ - As this data is not normally distributed it is not suitable for analysis of variance, but general comparisons can still be made.

TABLE 3: PERCENTAGE WASTE AND TRIMMINGS BY NUMBER

Variety	Waste %	
	Harvest 1	Harvest 2
Rachel	0	10
Polana	0	3
William	7	5
Impala	2	15
Roald	0	2
42-81	0	3
Ricardo	3	0
E7798	10	30
Becky	0	3
42-53	8	12
Kylie	5	2
Elmo	10	8
378/93	0	5
S3156	10	20
SED (20 df)	4.8	8.8
LSD (P = 0.05)		
Significance	++	++

Trimmings %	
Harvest 1	Harvest 2
9	9
11	14
10	10
10	13
12	14
9	9
9	9
9	11
10	12
8	9
6	8
9	9
3	4
11	14
1.3	1.4
2.8	3.0
**	***

++ - As this data is not normally distributed it is not suitable for analysis of variance, but general comparisons can still be made.

TABLE 4: COLOUR AND BASE SCORES

Variety	Colour	
	Harvest 1	Harvest 2
Rachel	3.0	2.8
Polana	2.7	2.8
William	2.5	2.8
Impala	3.3	3.2
Roald	3.3	3.2
42-81	3.0	2.7
Ricardo	3.0	2.8
E7798	2.7	2.7
Becky	3.3	3.2
42-53	2.7	2.5
Kylie	3.3	2.7
Elmo	3.2	3.5
378/93	4.0	4.0
S3156	3.2	2.8

Base	
Harvest 1	Harvest 2
3.4	3.3
3.2	3.0
3.0	3.4
3.1	3.0
3.4	3.6
3.2	3.3
3.0	3.2
2.9	2.8
3.1	3.4
3.0	3.3
2.7	2.9
2.9	3.2
2.4	2.2
2.6	2.5

Colour Scores
Base Scores

1 - 5, where 5 = dark
1 - 5, where 5 = well filled

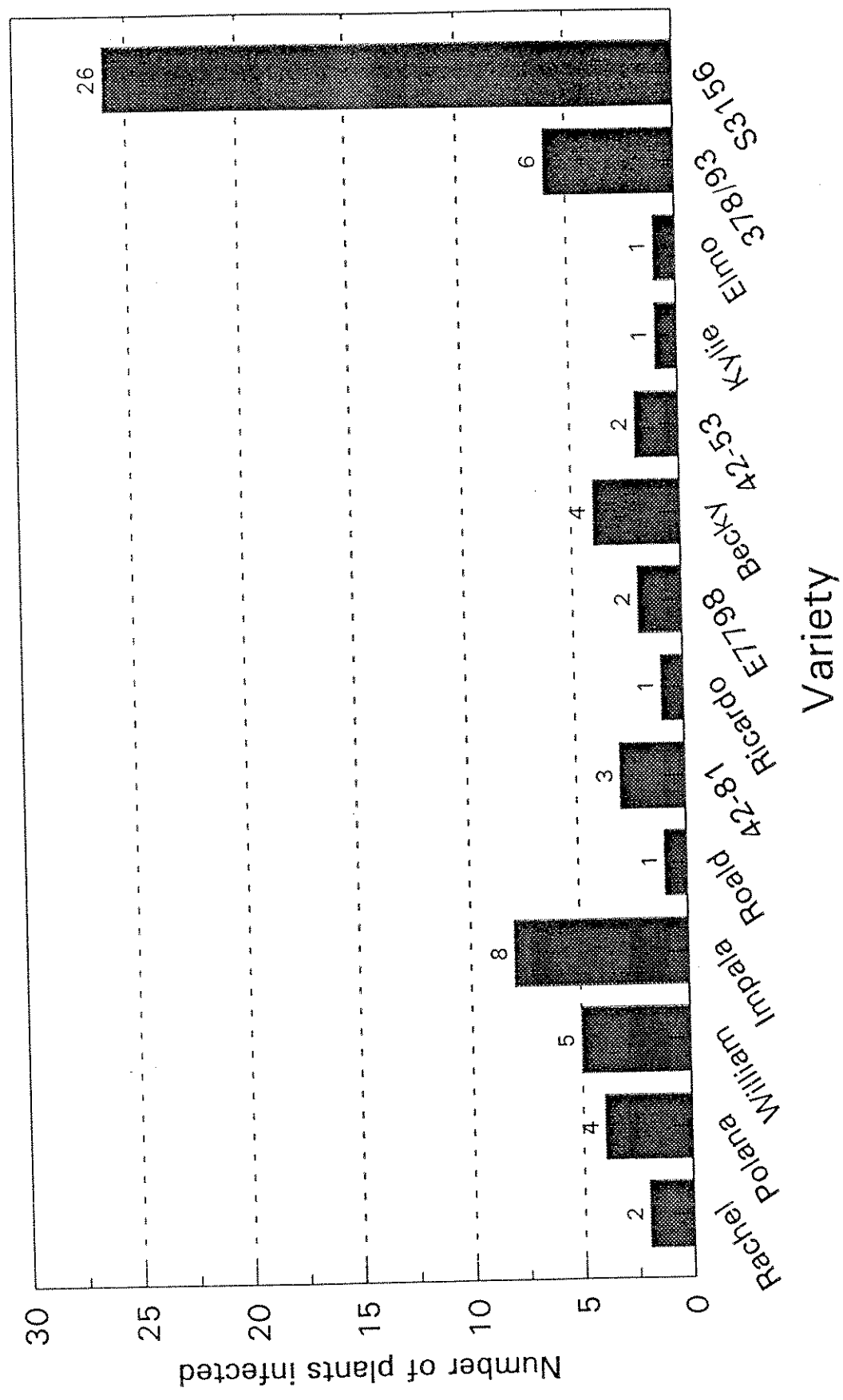
TABLE 5: HEAD SIZE AND GROWER USEFULNESS SCORES

Variety	Head Size		Usefulness Harvest 1
	Harvest 1	Harvest 2	
Rachel	3.7	3.2	2.8
Polana	3.2	3.1	3.1
William	2.9	3.4	2.5
Impala	3.1	3.0	3.2
Roald	3.2	3.0	1.9
42-81	3.5	3.2	3.1
Ricardo	3.2	3.1	3.0
E7798	3.0	2.9	2.0
Becky	3.4	3.4	3.0
42-53	3.4	3.2	2.5
Kylie	3.0	2.9	2.2
Elmo	3.2	3.0	1.5
378/93	2.9	2.7	1.8
S3156	2.8	2.7	0.7

Head Size Scores 1 - 5, where 5 = large
 Growers Usefulness Scores 0 - 5, where 5 = excellent

Infection of Lettuce with Basal Rot (Botrytis)

- Number of plants infected per variety



* HDC funded trial 1993

CONCLUSIONS

1. All varieties had reached an acceptable head weight, over 130g, by the first harvest date increasing to an average head weight of 150 g by the second.
2. Rachel achieved the highest head weight at both harvests.
3. Impala, Polana and 42-81 were given the highest scores for 'overall usefulness'.
4. S3156 was infected by Botrytis the most and received a low 'overall usefulness' score compared to the other varieties.
5. By the second harvest quality (percentage Class I) was poor for S3156, E7798, 42-53 and Impala with less than 80% Class I heads. These varieties had a high percentage Class II and waste compared to other varieties.

APPENDIX I

NITRATE CONTENTS OF LETTUCE VARIETIES

Variety	Nitrate (mg/kg)
Rachel	4917
Polana	5626
William	3717
Impala	4696
Roald	4297
42-81	5582
Ricardo	4186
E7798	3548
Becky	4607
42-53	5538
Kylie	3655
Elmo	4355
378/93	5006
S3156	3956

The nitrate content was analysed by sub-sampling 8 heads per variety. These figures form a useful guide but more detailed analysis should be carried out before precise commercial statements should be made.

APPENDIX II

ENVIRONMENTAL CLIMATE DATA

Week	Temp (°C)			CO ₂ ppm	MJ/m ²
	Day	Night	24 hr	Day	Radiation
41 (4 Oct)	11.9	7.0	9.1	-	40.2
42	11.8	7.8	9.5	-	38.5
43	10.2	8.8	9.4	-	11.0
44	10.7	8.9	9.6	423.3	10.7
45	9.7	6.7	7.8	448.5	14.3
46	9.0	4.7	6.2	474.5	18.2
47	8.5	5.1	6.3	482.5	12.7
48	9.9	7.7	8.4	422.1	10.7
49	8.5	5.7	6.6	436.4	11.4
50	8.3	6.0	6.8	424.8	9.0
51	7.4	4.3	5.3	449.9	12.3
52	7.5	4.4	5.4	430.6	12.9
1	7.1	4.8	5.6	461.9	7.2
2	8.4	5.3	6.4	391.0	13.0
3	8.2	5.8	6.6	384.4	17.8