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PROJECT REPORT

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Horticultural Development Council
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Cucumber: Replanted variety trial

February 1995

Commercial – In Confidence

FINAL REPORT

Project Number: PC21d

Project Title: Cucumber – Replanted Variety Trial 1994

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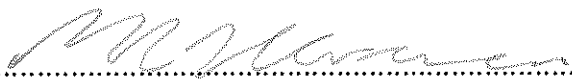
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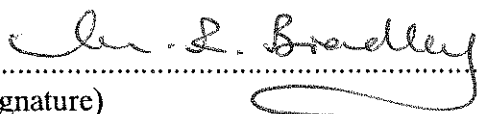
Authentication

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 

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SUMMARY

Six relatively new selections of cucumber varieties were compared with the control variety Jessica for production from a June planted crop.

Varieties

Variety	Seed Company
Jessica	Rijk Zwaan
5102	Nickersons
E2413	Enza Zaden
LM819	Elsoms
Korinda	Nunhems
2429	Rijk Zwaan
K2103	Breeders S & G

RESULTS TO THE END OF THE TRIAL

	Cues/m ² (no.)	Class I (%)	Mean Fruit Weight (g)	Monetary Value (£/m ²)
Jessica	23.4	92.5	533	6.09
5102	23.3	92.1	522	5.99
E2413	26.0	94.0	529	6.90
LM819	25.3	92.3	538	6.75
Korinda	25.6	93.4	502	6.33
2429	22.9	93.3	506	5.74
K2103	24.8	93.3	531	6.53
SED (12 df)	1.06	1.24	5.9	0.275
LSD (P=0.05)	–	–	13	0.60
Significance	NS	NS	*	*

1. Jessica established well in the hot weather, growing quickly and producing fruit early of a high mean fruit weight, but could not sustain the high yield and quality towards the end of the trial in September.
2. E2413 grew quickly producing good yields and maintaining a high percentage of Class I fruit throughout the trial, resulting in the highest monetary returns.
3. 2429 and 5102 produced the lowest yields and mean fruit weights, with a tendency for 5102 to produce soft fruit after 6 days in shelf life conditions.
4. Korinda and LM819 produced high yields in terms of cucumbers/m² but the mean fruit size of Korinda was generally smaller and of LM819 larger than the other varieties.
5. K2103 established and grew quickly producing good yields in July but only maintained average yields in August and September.

EXPERIMENTAL SECTION

Objective

To compare six relatively new selections of cucumber varieties for production from a June planted crop.

Introduction

Cucumber varieties planted in mid-season as a replant crop are required to withstand high temperatures during the early stages of their growth. Plant establishment during the hot conditions must be fast and plant vigour must be maintained when average temperatures are high in the early growth stages of the crop. With unsuitable varieties fruit quality can fall under the hot summer conditions. New varieties must be fully evaluated in as near commercial conditions as possible before large commercial areas can be confidently grown.

Materials and Methods

Varieties

Variety	Seed Company
Jessica	Rijk Zwaan
5102	Nickersons
E2413	Enza Zaden
LM819	Elsoms
Korinda	Nunhems
2429	Rijk Zwaan
K2103	Breeders S & G

Cultural Details

Sown:	9 June 1994
Planted:	30 June 1994
First Harvest:	22 July 1994
Final Harvest:	19 September 1994
Temperature Regime:	The basic regime was 21–23°C day, 18–21°C night, varying according to plant growth. Vent 2°C above heating temperature.

Plant Population:	5625 plants per acre using the Cordon training system.
Plot Size:	11.52 m ² , 16 plants per plot in a double row, 8 plants each side of the plot.
Crop nutrition:	To standard blueprint for rockwool grown crops (see Appendix II).
Carbon Dioxide:	500 vpm down to 350 vpm at 10 % vent, using pure carbon dioxide as the source.
Shelf life conditions:	Fruit was placed into shelf life conditions of 12 hour illumination, temperature of 20°C and humidity of 65% RH for a period of 6 days, following harvest. Fruit was assessed on day 1 and day 6 for changes in fruit firmness and percentage fresh weight loss.
Design:	The 7 varieties were allocated to a 7 x 4 Youden square design with 4 replicates. All 7 varieties were located across 7 double rows for ease of viewing.

Explanation of Statistical Analysis

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%).

Results

Yield

The standard variety Jessica produced the best early yields. However, as the season progressed the number of fruit picked per m² fell until it was significantly lower than other varieties (Tables 1 and 2).

K2103 also produced good early yields in July and average yields in August and September.

2429 produced the lowest fruit numbers and total fruit weight (kg/m²) throughout the trial.

Korinda, LM819 and E2413 produced the best total yields to the end of the trial, producing more cucumbers per square metre than other varieties in August and September.

Quality

Fruit quality of Jessica was excellent in July, but rapidly declined in September (Tables 3 and 4).

E2413 produced high quality fruit throughout the season, particularly in September compared to other varieties.

Over the trial as whole, LM819 and 5102 tended to produce less Class I fruit than other varieties.

Fruit Size

Over the trial period, LM819 produced slightly heavier fruit than other varieties, but had average fruit length (Tables 5 and 6).

Jessica and K2103 also produced heavy fruit and were generally longer than other varieties.

Korinda tended to produce shorter and slightly lighter fruit than other varieties in August.

Table 1: Marketable yield (cues/m²).

Variety	July	August	September	Total
Jessica	4.8	13.1	5.5	23.4
Korinda	3.5	14.7	7.4	25.6
LM819	4.3	14.1	6.9	25.3
2429	2.8	13.3	6.8	22.9
E2413	4.0	14.8	7.2	26.0
K2103	4.5	14.1	6.2	24.8
5102	3.8	12.6	6.9	23.3
SED (12 df)	0.51	0.90	0.49	1.06
LSD (P=0.05)	1.1	–	1.07	–
Significance	8%	NS	**	NS

Table 2: Marketable yield (kg/m²).

Variety	July	August	September	Total
Jessica	2.37	7.26	2.82	12.44
Korinda	1.62	7.58	3.65	12.85
LM819	2.07	7.88	3.65	13.60
2429	1.26	6.93	3.42	11.61
E2413	1.87	8.04	3.83	13.74
K2103	2.10	7.76	3.33	13.18
5102	1.71	6.82	3.62	12.15
SED (12 df)	0.187	0.478	0.231	0.544
LSD (P=0.05)	0.41	–	0.5	–
Significance	**	NS	***	NS

Table 3: Percentage Class I by number.

Variety	July	August	September	Total
Jessica	99.8	95.2	79.4	92.5
Korinda	97.9	96.5	84.9	93.4
LM819	96.7	94.5	85.2	92.3
2429	98.4	95.6	86.2	93.3
E2413	98.6	94.7	90.5	94.0
K2103	99.2	95.4	84.0	93.3
5102	97.6	95.5	82.2	92.1
SED (12 df)	1.55	1.50	3.47	1.24
LSD (P=0.05)	–	–	7.6	–
Significance	NS	NS	*	NS

Table 4: Percentage Class II by number.

Variety	July	August	September	Mean Total
Jessica	0.2	4.9	20.6	7.5
Korinda	2.1	3.5	15.1	6.6
LM819	3.3	5.5	14.8	7.7
2429	1.6	4.4	13.8	6.7
K2413	1.4	5.3	9.5	6.0
K2103	0.8	4.6	16.0	6.7
5102	2.4	4.5	17.8	8.0
SED (12 df)	1.55	1.50	3.47	1.24
LSD (P= 0.05)	–	–	7.54	–
Significance	NS	NS	*	NS

Table 5: Mean fruit weight (g).

Variety	July	August	September	Mean Total
Jessica	495	556	511	533
Korinda	467	515	492	502
LM819	483	560	532	538
2429	446	519	508	506
E2413	472	545	527	529
K2103	472	550	534	531
5102	452	541	526	522
SED (12 df)	16.7	9.5	17.8	5.9
LSD (P= 0.05)	-	21	-	13
Significance	NS	**	NS	*

Table 6: Mean Fruit length (cm).

Variety	August	September	Mean
Jessica	37.8	38.2	38.0
Korinda	35.3	38.1	36.7
LM819	36.7	36.7	36.7
2429	36.9	36.7	36.8
E2413	36.3	38.1	37.2
K2103	38.4	37.7	38.1
5102	35.6	37.3	36.5

Table 7: Monetary Value (£/m²).

Variety	Monetary Value
Jessica	6.09
Korinda	6.33
LM819	6.75
2429	5.74
E2413	6.90
K2103	6.53
5102	5.99
SED (df)	0.275
LSD (P = 0.05)	0.60
Significance	*

Plant Growth

Jessica, LM819, E2413, and K2103 all established well and grew very fast producing taller plants by 7 July (Table 8). These differences were maintained until 25th July when plants had reached the wire.

Lateral growth was initially strongest in K2103 and 5102, however, this slowed down in September when LM819 and 2429 had the most vigorous laterals (Table 9).

Differences in vigour were small in August, but in September LM819, 2429, and E2413 were noticeably more vigorous than the other varieties (Table 10).

Table 8: Plant Height (cm).

	7 July	13 July	18 July	25 July
Jessica	56	102	148	203
Korinda	35	82	129	191
LM819	56	96	137	208
2429	30	74	120	187
E2413	56	107	153	210
K2103	55	106	150	206
5102	45	107	153	210

Table 9: Lateral Diameters (mm)

	August	September	Mean
Jessica	9.6	5.8	7.7
Korinda	8.8	5.4	7.1
LM819	9.4	6.6	8.0
2429	9.4	6.6	8.0
E2413	9.4	6.3	7.9
K2103	10.0	6.0	8.0
5102	10.6	6.2	8.4

Table 10: Vigour Scores (0–5).

	August	September	Mean
Jessica	3.8	3.0	3.4
Korinda	3.8	3.0	3.4
LM819	4.0	4.0	4.0
2429	3.8	4.0	3.9
E2413	4.0	4.0	4.0
K2103	3.8	3.4	3.6
5102	4.0	3.5	3.8

Score 0–5, where 5 = vigorous and 0 = weak.

Shelf Life

After 6 days in shelf life conditions fruit from the varieties 2429 and E2413 were firmer whereas 5102 produced the softest fruit (Table 11).

E2413 produced fruit that lost more weight after 6 days than the other varieties, whereas LM819 lost the least weight in shelf life conditions (Table 12).

Table 11: Shelf Life – Fruit firmness after 6 days shelf life (kN).

	3 August
Jessica	24.0
Korinda	22.9
LM819	23.7
2429	26.3
E2413	27.2
K2103	24.3
5102	21.3

A higher figure represents firmer fruit.

Table 12: Shelf Life – Percentage fresh weight loss.

	3 August
Jessica	9.6
Korinda	9.0
LM819	8.2
2429	9.5
E2413	10.5
K2103	9.4
5102	9.6

Disease Assessments

Plants were assessed for foliar and stem disease on 19 Sept 1994.

LM819, 2429, E2413 and 5102 showed reduced levels of powdery mildew compared to the control variety Jessica that had a high level of infection (Table 13).

LM819 and K2103 had a low number of mycosphaerella lesions while E2413 had the highest level of infection compared to the control variety Jessica.

Jessica, 5102, LM819 and Korinda had no botrytis lesions while other varieties showed only a low level of infection.

Table 13: Mildew disease assessments.

Variety	Score
Jessica	4.25
Korinda	4.75
LM819	1.75
2429	1
E2413	2.38
K2103	4.5
5102	2.75

Score (0–5, where 0 = no mildew, 5 = severe mildew infection).

Table 14: Stem disease assessments.

Variety	Mycosphaerella Mean no. of lesions per plot	Botrytis Mean no. of lesions per plot
Jessica	1.38	0
Korinda	1.25	0
LM819	0.89	0
2429	1.38	0.5
E2413	1.88	0.25
K2103	1	0.13
5102	1.12	0

Discussion

The best yields were produced by the varieties Korinda, LM819 and E2413, of which E2413 had particularly good fruit quality. 2429 produced the lowest yield in terms of fruit number and total weight and generally produced smaller fruit than other varieties. Jessica and K2103 were quick to start production in July, but in August and September Jessica had poor yields and K2103 average yields compared to other varieties.

Fruit quality was good in July and August, but declined significantly in September for most varieties, except E2413 which continued to produce a high percentage of Class I fruit throughout the trial.

Jessica and K2103 produced heavy and slightly longer fruit than the other varieties, whereas LM819 produced heavy fruit with an average length that were well-filled.

Jessica, LM819, E2413 and K2103 established well, growing quickly producing the tallest plants. K2103 was particularly strong growing, producing the thickest laterals in July. LM819 and E2413 but also 2429 were noticeably more vigorous than other varieties in September.

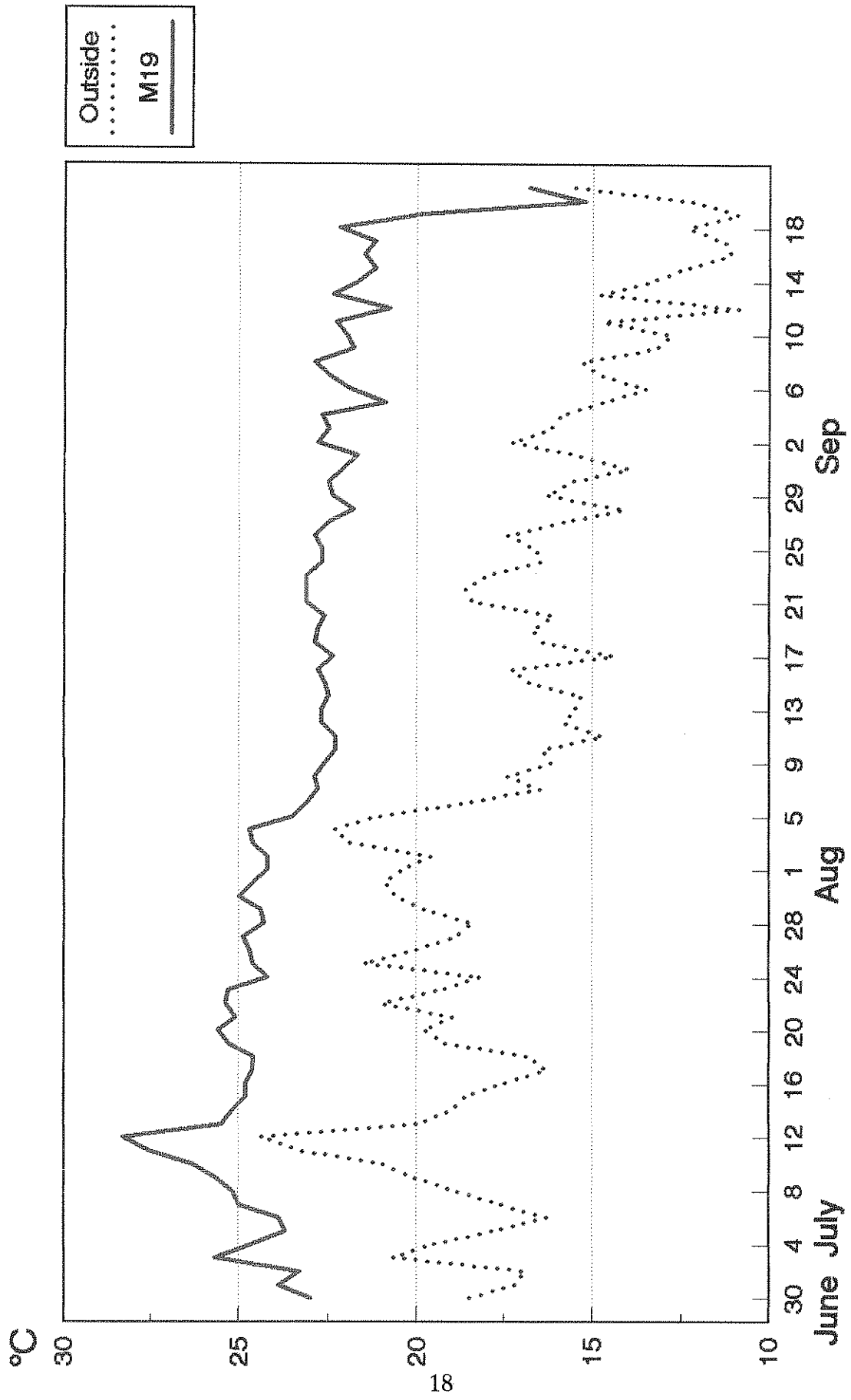
After 6 days in shelf life conditions, fruit from 2429 and E2413 were firmer, and 5102 softer than other varieties. However, E2413 lost the most fresh weight during shelf life and LM819 the least.

In foliar and stem disease assessments on 19 September, LM819, 2429, E2413 and 5102 showed reduced levels of powdery mildew compared to the control variety Jessica. Slightly more mycosphaerella lesions were observed on E2413 and less on LM819 and K2103 than on the control variety Jessica.

Conclusions

1. Jessica established well in the hot weather, growing quickly and producing fruit early of a high mean fruit weight, but could not sustain the high yield and quality towards the end of the trial in September.
2. E2413 grew quickly producing good yields and maintaining a high percentage of Class I fruit throughout the trial, resulting in the highest monetary returns.
3. 2429 and 5102 produced the lowest yields and mean fruit weights, with a tendency for 5102 to produce soft fruit after 6 days in shelf life conditions.
4. Korinda and LM819 produced high yields/m². The mean fruit size of Korinda was generally smaller than other varieties, and LM819 was larger.
5. K2103 established and grew quickly producing good yields in July but only maintained average yields in August and September.

APPENDIX I: ENVIRONMENTAL DATA - 24 HOUR AVERAGE TEMPERATURE



APPENDIX II:

BLUEPRINT NUTRIENT REGIME FOR HYDROPONIC CUCUMBER CROPS

	<u>Optimum Range (mg/ltr)</u>
pH	5.5-6.5
Cond	2000
NO ₃ -N	16-220
NH ₄ -N	0-10
K	200-300
Ca	140-200
Mg	20-40
P	30-50
Fe	1.5-3.0
Zn	0.2-2.0
Mn	0.3-1.0
Cu	0.05-1.0
B	0.2-1.5
Na	0-100
Cl	0-100
S	30-150
HCO ₃	0-50