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CONTRACT REPORT

No. C880021/3

Tomato fruit quality
1989

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SUMMARY

Procedures developed during HDC funded work on tomato fruit quality (1987 and 1988) were used to assess the quality of 13 varieties grown at Efford EHS during 1989. Fruit were assessed for physical defects on three occasions. Shelf life and dry matter content were tested twice and fruit internal composition once.

Differences between varieties were generally of low magnitude but some consistency was found with similar assessments carried out in 1988. The single biggest reason for downgrading in 1989 was blossom end rot and this showed the biggest differences between varieties. It also demonstrated the difference between breeding lines, with Counter from Van den Berg and all of the Royal Sluis varieties noticeably less susceptible than the varieties produced by Enza or Rijk Zwaan.

Fruit shape was assessed in terms of boxiness, slab sidedness and ribbing. Levels of boxiness were low and only Favorset showed any appreciable amount. Slab sidedness was also not a serious problem but Favorset could again be distinguished along with Liberto and Counter. Differences in the degree of ribbing between varieties were small.

In terms of skin finish there was very little blotchy ripening. Levels of radial cracking were particularly low on two varieties, W1260 and Blizzard and levels of netting were low with W1260 and W1474 performing particularly well.

For flavour characteristics, 670 and Cyclon had slightly higher soluble solid contents but there were no other real differences in composition.

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OBJECTIVE

To investigate the effect of variety on the final fruit quality.

INTRODUCTION

The effects of pre-harvest treatments and variety were reported in detail for a number of experimental sites in 1987 and 1988. (HDC reports C88/0021/1 and C88/0021/2). It was agreed that work should continue at Efford EHS in 1989 in a more limited form and a number of assessments were made on fruit from the variety trial.

MATERIALS AND METHODS

Fruit was taken from the variety trial and assessed three times for physical defects. Blossom end rot occurred later in the season and was assessed only twice. Boxy fruit was not a problem later in the season and the assessment was made only twice. Shelf life tests were carried out on two occasions. Fruit from one harvest was kept in the freezer and assessments done on soluble solids and acidity at a later date. Details of standard assessments are given in Appendix 1. The full list of assessments made was as follows:

1. Physical defects

Boxiness	Weeks 12, 19, 27
Slab sides	" 12, 19, 27
Ribbing	" 12, 19, 27
Blotchy ripening	" 12, 19, 27
Radial Cracking	" 12, 19, 27
Netting	" 12, 19, 27
Blossom end rot	Weeks 19, 27

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2. Composition

Acidity	Week 38
Soluble solids	" 30
% dry matter	Weeks 13, 32

3. Shelf life

% weight loss	Weeks 12, 30
Firmness	Weeks 13, 31

Treatments

Variety	Seed House	Claimed resistances
Blizzard (17902)	Enza	TM C5 V F2 Wi
Calypso	Rijk Zwaan	TM C5 V F2 Wi
Counter	Van den Berg	TM C5 V F2 Wi
Cyclon (17945)	Enza	TM C5 V F2 Wi
Favorset (85042)	Royal Sluis	TM C5 V F2 Wi N
Liberto	Van den Berg	TM C5 V F2 Wi N
Multiset (84065)	Royal Sluis	TM C5 V F2 Wi N
Spectra (669)	Rijk Zwaan	TM C5 V F2 Wi
RS 85022	Royal Sluis	TM C5 V F2 Wi
RS 85018	Royal Sluis	TM C5 V F2 Wi
W1260	Van den Berg	TM C5 V F2 Wi

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Cultural details

Sowing date: 4 November 1988
Blocking on: 16 November
Final spacing: 1 December
Slab contact: 5 January 1989
First pick: 27 February
Stopping date: 14 August
Last pick: 29 September

Nutrition

A standard nutrition and irrigation regime was used.

Temperature (°C)

From standing out, the crop was grown under a fixed temporary screen of anti-condensate polythene. This was removed over a period of 7 days beginning 21 February.

From sowing for four days	- 24N	24D	26V
4 days from sowing to blocking on	- 20N	20D	24V
Blocking on to first truss visible	- 16N	20D	24V
First truss to first anthesis	- 16N	18D	24V
First anthesis (5 Jan)	- 16N	20D	24V

Temperatures lowered at weekly intervals from 13 February in units of 1°C for ventilation and ½°C for minimum day temperature to 16N 18D 21V. Minimum night ventilation was maintained from July onwards.

Carbon dioxide

Enrichment was given at 1000 v.p.m. through propagation and in the growing house until April 3 when 500 v.p.m. was given if vents were less than 7% open and 350 v.p.m. if vents were higher than this.

Training system

High wire layering from 3 m wires.

Flowers were pollinated daily with electric bees until 1 March. From then on this was replaced by daily truncheoning. This was replaced with water jetting on some occasions during the summer when time was limiting and the hot environmental conditions reduced any risk of Botrytis infection.

Pest and Disease Control

Encarsia formosa was introduced weekly for control of Whitefly. Routine sprays of fungicide were given for Botrytis using a rotation of different chemical types.

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RESULTS AND DISCUSSION

Differences between varieties can be small and difficult to detect as breeding houses have in recent years striven to produce a uniform tomato giving maximum yields. It is important for growers to be aware of the detailed varietal characteristics of any variety they might be thinking of growing. To give a better picture of the varieties as a whole, details of yield, Class I gradeout and fruit size have been given as Appendices 2 to 4. This information has been taken together with the assessments of fruit quality to give an overall picture of each variety. The results of the assessments are shown as bar charts in Appendices 5 to 17.

The quality of fruit during 1989 was good despite the difficult (hot) growing conditions which can often lead to fruit disorders. One possible explanation is that constantly changing conditions are known to be more damaging to tomatoes than consistent hot or cool weather and the summer of 1989 was consistently hot.

Blizzard

This was one of the largest fruited varieties. Fruit shape and skin finish can often be related to size but shape generally was good with very low levels of boxiness and moderate levels of slab sidedness. The level of ribbing detected was one of the highest on two of the assessments (weeks 19 and 27) and about average in week 12. This may have contributed to a relatively low gradeout in July and August. In terms of skin finish, blotchy ripening occurred at a low level, particularly in July, but was not generally a problem. The level of radial cracking was below average at all assessments but there was some evidence of fine net cracking, particularly in April, although it was not a serious problem.

The main quality defect with this trial in 1989 was blossom end rot which also caused problems on a number of commercial nurseries. Levels in May were relatively low but in July Blizzard had the second highest number of affected fruits and the highest number of affected plants.



The flavour characteristics were no better than average but there was an indication that weight loss after 8 days shelf life was less than with other varieties particularly in week 12. This result confirms the assessment which was made in 1988. Differences in firmness after 8 days were generally small with Blizzard about average.

This variety gave one of the best financial returns to the end of the season and appears promising. The only negative point is that it appears to respond more adversely to high temperatures than some of the other varieties.

Calypso

This variety has generally been considered to have reliable quality and the overall packing shed gradeout showed this to be the case with that in July and August not falling below 70% Class I.

Fruit shape is a strong feature of this variety and no boxiness was recorded together with very low levels of slab sided fruit, particularly in April when other varieties were relatively poor. The level of ribbing was about average at all assessments and apart from a slightly higher level in May, was not a problem.

No blotchy ripening was recorded and the level of radial cracking was average for week 19 and slightly above average in week 27. The degree of fine net cracking was above average in April and slightly higher in July with average levels in May. This problem has been reported on Calypso in previous years. As net cracking is not easily detectable by cursory inspection it does not generally contribute to reductions in Class I gradeout. It can sometimes contribute to excessive weight loss after harvest, but this was not the case in this trial, although weight loss was slightly higher than average.

The composition of fruit was generally average although the % dry matter was one of the highest when sampled in August. The number of fruit affected by blossom end rot was the highest recorded in July but was relatively low earlier in the season.

Counter

Counter has been one of the standard varieties in the industry for several years, along with calypso. It produced a disappointing yield in 1989 mainly due to a rapid reduction in vigour from July onwards as a result of the continuous hot weather. The early season quality was below average and gradeouts in July and August were some of the lowest in the trial.

The level of slab sidedness was consistently high in all three assessments particularly compared to varieties such as Calypso and 669. The amount of ribbing was also slightly higher than average but there was no problem with boxiness.

Levels of blotchy ripening were generally low but Counter was one of the varieties on which this problem was detected in two out of the three assessments. Of the other main skin defects, radial cracking was average in week 19 and above average in week 27 and netting was generally lower than average. Counter proved to be very 'resistant' to blossom end rot and only very low levels were recorded.

Although differences in composition were small, Counter gave an average level of soluble solids and was slightly less acid. It also had a slightly lower % dry matter. This lack of acidity has been detected in previous work.

Weight loss was slightly higher than average in week 12 but was about average in week 30. The firmness was slightly poorer than average after 8 days.

Cyclon

From the same seed house as Blizzard, this variety gave only average yields but did not suffer the same reduction in quality in July and August. The quality in the early season was, however, lower until May when it began to improve.

Levels of boxiness were low but there was a higher than average amount of slab sided fruit in March. The degree of slab sidedness was average in May

and below average in July. The degree of ribbing was almost identical to its sister variety, Blizzard in all assessments.

Blotchy ripening was only detected at any level in May when it was one of only three varieties on which this problem occurred. Radial cracking was average but the level of netting was higher than average for all assessments and except for March, higher than Blizzard. The level of blossom end rot was about average with a greater amount of plants and fruit than Blizzard affected in week 19 and the converse in week 27.

Cyclon was slightly more acid than Blizzard with a noticeably higher level of soluble solids than most other varieties. This good composition was also recorded in 1988.

The dry matter content was higher than average but firmness and weight loss were average.

Favorset

This variety gave a good early yield and maintained its vigour through the season to give one of the highest monetary returns. The packhouse gradeouts were average with the exception of August when there was very low quality fruit.

Favorset gave the highest level of boxiness in week 12 and had the third highest level in week 19. The level of slab sidedness was high in week 12 but around average in the other assessments. The level of ribbing was average.

No blotchy ripening was recorded for this variety but the level of radial cracking in week 19 was above average although it was less of a problem in week 27. Favorset gave the highest level of net cracking in week 12 and had one of the highest incidences in week 19. This variety was only slightly affected by blossom end rot in terms of the number of fruit but a high proportion of the plants had some fruit with the disorder.

Favorset had the lowest level of soluble solids and one of the lowest dry matter percentages. This agrees exactly with the findings of 1988. Shelf life and firmness were average.

Liberto

This variety has been suggested as a replacement for Counter but in terms of yield and monetary returns it appears to have little advantage over Counter. The summer quality was generally lower than that for Counter although it did not suffer from loss of vigour quite so early on.

There were low levels of boxy fruit particularly in week 19. This variety gave one of the highest levels of slab sided fruit at all three assessments but levels of ribbing were average. A low level of blotchy ripening was recorded from all three assessments but as with most varieties in this trial was not enough to cause a problem. The degree of radial cracking was almost identical to both Counter and Calypso. Netting occurred at about average levels in weeks 12 and 19 and below average levels in week 27. There was some blossom end rot in week 19 but relatively little in week 27.

All aspects of composition were average. Fruit lost more weight than average during shelf life tests in week 12 but less than average in week 30.

Multiset

This was a middle of the road, large fruited variety. It had less yield potential than its sister variety Favorset although quality in general was slightly higher.

A negligible amount of boxiness was recorded. Levels of slab sidedness were average in weeks 12 and 27 but slightly higher than average in week 19. Levels of ribbing followed the same pattern with relatively high levels in week 19.

Multiset did not suffer from blotchy ripening but had average levels of radial cracking. There were also higher than average amounts of netting in weeks 12 and 19. Incidence of blossom end rot was low.

This variety had the lowest acidity recorded and was also low in soluble solids. The % weight loss was average as was the firmness after 8 days.

Spectra

Spectra was a late starter in terms of yield but had caught up by May and gave a respectable total yield to the end of September. The fruit size was rather large and may have contributed to the reduction in fruit quality overall compared to its sister variety Calypso.

No boxiness was recorded and the level of slab sidedness was consistently below average. This agrees with assessments made in 1988. The amount of ribbing was average and fruit shape generally from this variety was very good.

A trace of blotchy ripening was noted in week 12 but none in week 19, while in week 27 the highest level of all varieties was recorded. However, this was still only a low score and did not cause a major problem. Radial cracking levels were low in week 19 but as with blotchy ripening a high level was recorded in July. Apart from week 19 the level of fine net cracking was also the highest scored for all varieties. These defects combined to give a lower quality than Calypso as detected by packing shed staff. This variety was also quite badly affected by blossom end rot.

Levels of acidity were relatively low but the soluble solids were one of the highest. The dry matter content was average. In 1988 this variety was reported to have a better acidity than other varieties. Weight loss after 8 days was relatively high but firmness did not appear to be affected. This was consistent with observations in 1988.

RS85022

It often happens with tomato varieties that good quality and high yield potential seem difficult to achieve in the same variety. RS85022 is a good example of this. It was the lowest yielding variety but had consistently high quality throughout the season. There was no boxiness recorded and levels of slab sidedness and ribbing were consistently below average. Skin finish was also excellent with no blotchy ripening and below average levels of fine net cracking although there were slightly higher than average levels of radial cracking. RS85022 was one of the varieties least affected by blossom end rot.

Acidity was one of the highest but soluble solids were average as was the % dry matter. The weight loss after 8 days was slightly above average but firmness was not affected.

RS85018

This variety had a similar early yield to RS85022 but did better in the main season although the final yield was still the second lowest in the trial. As with RS85022 the packhouse gradeout was consistently high.

Fruit shape was good with no boxiness and low levels of slab sidedness although there were moderately high levels of ribbing. Blotchy ripening was only recorded on one occasion and at a very low level. The level of radial cracking was higher than average in week 19 but average in week 27. The amount of netting recorded was below average in week 27 but average in the other two weeks. Very little blossom end rot was detected. Fruit composition was average. The weight loss in week 12 was average but in week 30 was the highest of all the varieties. It was also one of the two softest varieties after 8 days on both occasions it was sampled.

W1260

This variety gave a mediocre yield through the season. As with its sister variety Liberto there were no obvious vigour differences compared to Counter.

Set was vary variable after the start of the hot weather in June and the packing shed gradeouts from July onwards were some of the worst in this trial. Very little boxiness was recorded but levels of slab sidedness were above average. The degree of ribbing was almost identical to Calypso. Some blotchy ripening was recorded in weeks 12 and 19 but thge levels were very low. The amount of radial cracking was low and netting was not a serious problem. The main problem was with blossom end rot, although it was not as high as some other varieties. Composition, firmness and weight loss in shelf life were all average.

W1474

This was the only Van den Berg variety in the trial which lived up to the promise of being more vigorous than Counter in summer conditions. It produced the highest yield in the trial but quality was, unfortunately, poor in July and August. This variety has subsequently been withdrawn by the seed company.

There was no boxiness recorded and levels of slab sidedness were low. No blotchy ripening occurred and levels of radial cracking were low, as were the levels of netting. Although most of the plants were affected with some blossom end rot, the amount of fruit involved overall was small. Composition and dry matter were average and weight loss was not excessive. Firmness after 8 days was average.

670

The yield from this variety was average throughout the season and packing shed gradeouts were consistently in the middle of the range for this trial.

A low level of boxiness was recorded on only one occasion and the amount of slab sidedness was small. Ribbing was quite prominent in week 12 but became less significant in later assessments. A negligible amount of blotchy ripening was recorded in week 27 and the amount of radial cracking was lower than average in week 19 but one of the highest in July. There was a relatively high level of net cracking in week 12 but this was less of a



problem subsequently. A fairly high percentage of plants were affected with blossom end rot in week 27 although it was not the worst variety in terms of number of fruit affected.

Acidity was average level of soluble solids was good. The dry matter content was slightly above average. Weight loss after 8 days was slightly higher than average but the amount of firmness did not seem to be greatly affected.

General discussion

The results of the 1989 work are encouraging as, despite the small differences measured, many varietal characteristics were found to be similar to those noted in 1988. This is particularly pleasing in the light of the somewhat atypical high summer temperatures which were experienced.

Careful examination of the results shows that defects found in the individual detailed assessments are not always reflected in the commercial gradeout figures as a reduction in marketable quality. One reason for this is that some of the assessments carried out are for defects which might not be detected by packing shed staff. One example of this is the fine net cracking which is not normally detected with a naked eye unless it is severe enough to dull the fruit, which is rarely the case. The cracking may effect subsequent shelf life and is therefore important, but often goes undetected over commercial graders.

Other defects, such as ribbing, are only a cause for concern in the packing shed if fruit is obviously of very poor shape. If a variety suffers slightly from ribbing it is not necessarily a commercial problem as long as it can be packed separately and not with other more nearly round fruit. This also would not always reflect in the packing shed gradeout figures but can figure highly in the individual assessments.

The detailed assessments, particularly for fruit composition, are very time consuming. Ideally samples should be taken from every harvest and assessed, but this is not practical. The detailed records made enable varieties to be compared on the sampling date in question and there can be much variation

week to week as environmental conditions and other crop factors change, which are not detected. This makes comparison across more than one year important.

This work has only catalogued the physical defects occurring at particular times. It is not possible, without more regular sampling, to say what triggers these problems. There is still considerable scope for research projects to study causal factors in more detail and to develop strategies to predict and prevent such problems occurring.

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Acknowledgements

Thanks are due to Mrs S Foster for her thorough sampling and analysis of fruit during this trial. The advice of Dr G Hobson at IHR Littlehampton has also been invaluable.

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APPENDIX 1

Standardised assessment of tomato fruit quality

The three assessments covered are:

1. Product life.
2. Chemical composition
3. Physical characteristics

1. Product life (8 day test)

- 1.1 Sample: 20 fruit harvested on a Monday or Wednesday and taken from all replicates, calyx retained, Class I fruit. Modal size group (usually D's but dependent on variety), ripeness stage 2 (ATB). (5 fruit from each replicate plot x 4 replicates = 20 fruit).
- 1.2 Handling: Fruit to be collected from the packhouse pre-grading and to be passed through the handling simulator (Fig.1) from a height of 50 cm.
- 1.3 Product life room temperature : 20°C Fluorescent lighting 12 hrs day. No direct sunlight.

2. Chemical composition

- 2.1 Sampling: Use the same of 20 fruit compression tested after eight days.
- 2.2 Juice extraction: Cut each fruit in half and place one half of each fruit in a strong polythene bag. (This should produce approximately 400 g of fruit).
 - 2.2.1 Seal bag securely using a heat sealer or stapler.
 - 2.2.2 Freeze overnight in a domestic deep freeze.

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- 2.2.3 Thaw overnight in a fridge and finish using a little hot water the following morning.
- 2.2.4 Wrap fruit in two layers of muslin and press in a fruit press.
- 2.2.5 Collect juice and centrifuge if possible.
- 2.2.6 Filter through glass wool or coffee filters.
- 2.3 % soluble solids: Determine % soluble solids (Brix) with a 0-10% hand held refractometer at 20°C.
- 2.4 Acidity: Dissolve 0.38, of sodium phosphate $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ into 20 ml sample of extracted tomato sap and measure the resulting pH using a previously calibrated pH meter.

This indirect acidity measurement has been found to give results closely correlated to the more accurate titration method (Hobson & Kilby 1984).

Hobson G & Kilby P Rapid assessment of tomato composition during high quality fruit production and distribution. *Acta Horticulturae* 163, (1984), pp 47-54.

All titratable acidity figures quoted were obtained from the pH measurements in this way. For conversion to citric acid multiply by 0.064.

2.5 Percentage dry matter

- 2.51 Take small samples from the remaining halves of compression tested fruit to make up a 100% sample (including a representative sample of juice.)

2.5.2 Dry in an oven for 72 hours at 60°C.

2.5.3 Cool in a desiccator.

2.5.4 Re-weigh sample and calculate % dry matter.

3. Physical characteristics

Scoring systems were used for tomato fruit characteristics/disorders. A sample (20 fruit minimum where possible) were taken at random from ungraded fruit. Every replicate was recorded where possible.

Scoring system: 5-part scale 0-4. In most cases the scores were:

- 0 - none
- 1 - very slight
- 2 - slight
- 3 - moderate
- 4 - severe

3.1 Ribbing

The extent to which raised shoulders of 'ribs' are present at the calyx end of the fruit.

- 0 - none present, shoulder smooth
- 1 -
- 2 -
- 3 -
- 4 - shoulders severely raised and ribs prominent.

3.2 Boxiness

The extent to which the total fruit surface area is flattened or angular:

- 0 - none, fruit spherical
- 1 -
- 2 -
- 3 -
- 4 - More than 75% of fruit surface area flattened to a single plane.

This refers to true boxiness, usually early in the season where fruit is hollow in parts. A similar assessment was made of merely misshapen fruit termed slab sided.

3.3 Fine net cracking

This is a measure of the very fine net cracking or crazing which has been particularly evident on early crops.

- 0 - none present
- 1 - up to 25% of surface area
- 2 - up to 50% of surface area
- 3 - up to 75% of surface area
- 4 - more than 75% of fruit surface area affected

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3.4 Radial cracking

The traditional sealed cracks which can be formed radially around the calyx later in fruit development.

- 0 - none present
- 1 - up to $\frac{1}{4}$ of fruit circumference covered in a few large cracks or several smaller cracks
- 2 - up to $\frac{1}{2}$ fruit circumference affected.
- 3 - up to three quarters fruit circumference affected
- 4 - more than three quarters fruit circumference affected

3.5 Blotchy ripening

The extent to which parts of the fruit surface fail to ripen correctly giving a blotchy appearance.

3.6 Blossom end rot

A disorder affecting the distal end of the fruit resulting in tissue breakdown due to calcium deficiency.

Appendix 2

Monthly yield and cumulations kg m⁻²

Variety	Mar	Apr	Total				Aug	Sep	Total
			May	May	Jun	Jul			to
Blizzard	1.9	4.2	7.8	13.9	8.8	8.1	5.9	5.5	44.0
Calypso	1.6	3.8	7.3	12.7	7.9	8.1	6.0	5.1	41.4
Counter	1.9	3.8	7.6	13.3	7.8	6.6	5.3	4.2	39.0
Cyclon	1.6	3.9	7.1	12.6	7.7	7.4	5.8	4.6	39.7
Favorset	1.9	4.3	7.6	13.8	9.1	7.9	5.7	5.0	43.4
Liberto	1.8	4.2	7.5	13.5	8.0	7.6	5.8	4.8	41.3
Multiset	1.7	4.1	7.4	13.2	8.3	7.1	5.4	4.6	40.3
Spectra	1.4	4.3	7.7	13.4	7.6	7.7	6.0	5.0	41.0
RS 85022	1.8	4.3	6.8	12.9	7.0	5.9	4.2	3.8	35.5
RS 85018	1.6	4.1	7.1	12.8	7.6	6.7	5.1	4.8	38.6
W 1260	1.8	3.9	7.5	13.2	8.3	7.4	5.8	4.7	41.3
W 1474	2.0	4.3	7.7	14.0	9.0	7.7	6.1	5.6	44.5
670	1.7	4.0	7.6	13.3	7.7	7.2	5.6	5.0	40.5

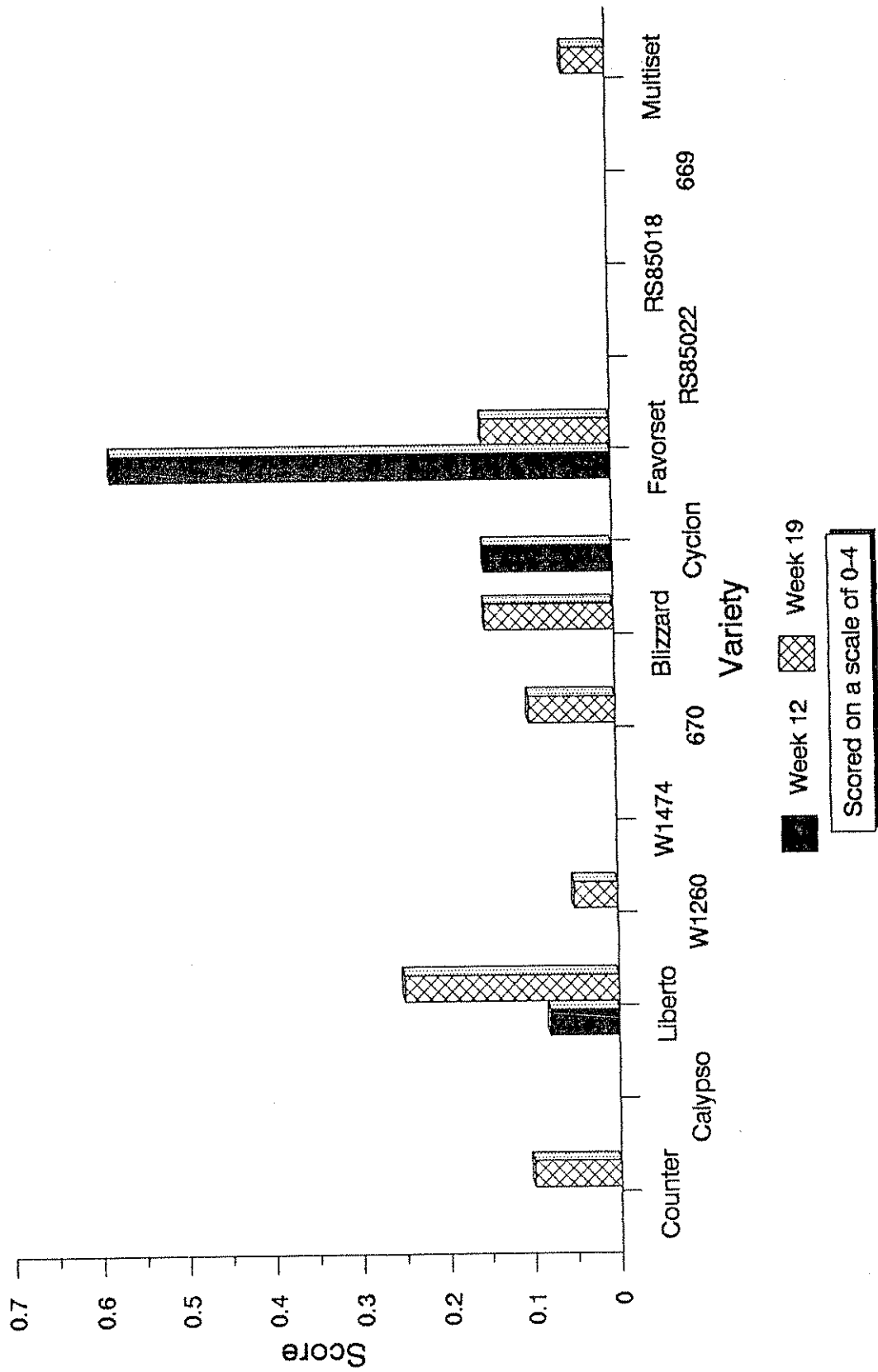
S.E.D. (34 d.f.)	0.12	N.S.	N.S.	N.S.	0.38	0.38	0.46	N.S.	1.69
L.S.D. (5%)	0.24	-	-	-	0.77	0.77	0.93	-	3.43

NB. Due to covariate analyses the totals to the end of September do not necessarily equal the sum of the individual months.

I on a monthly basis

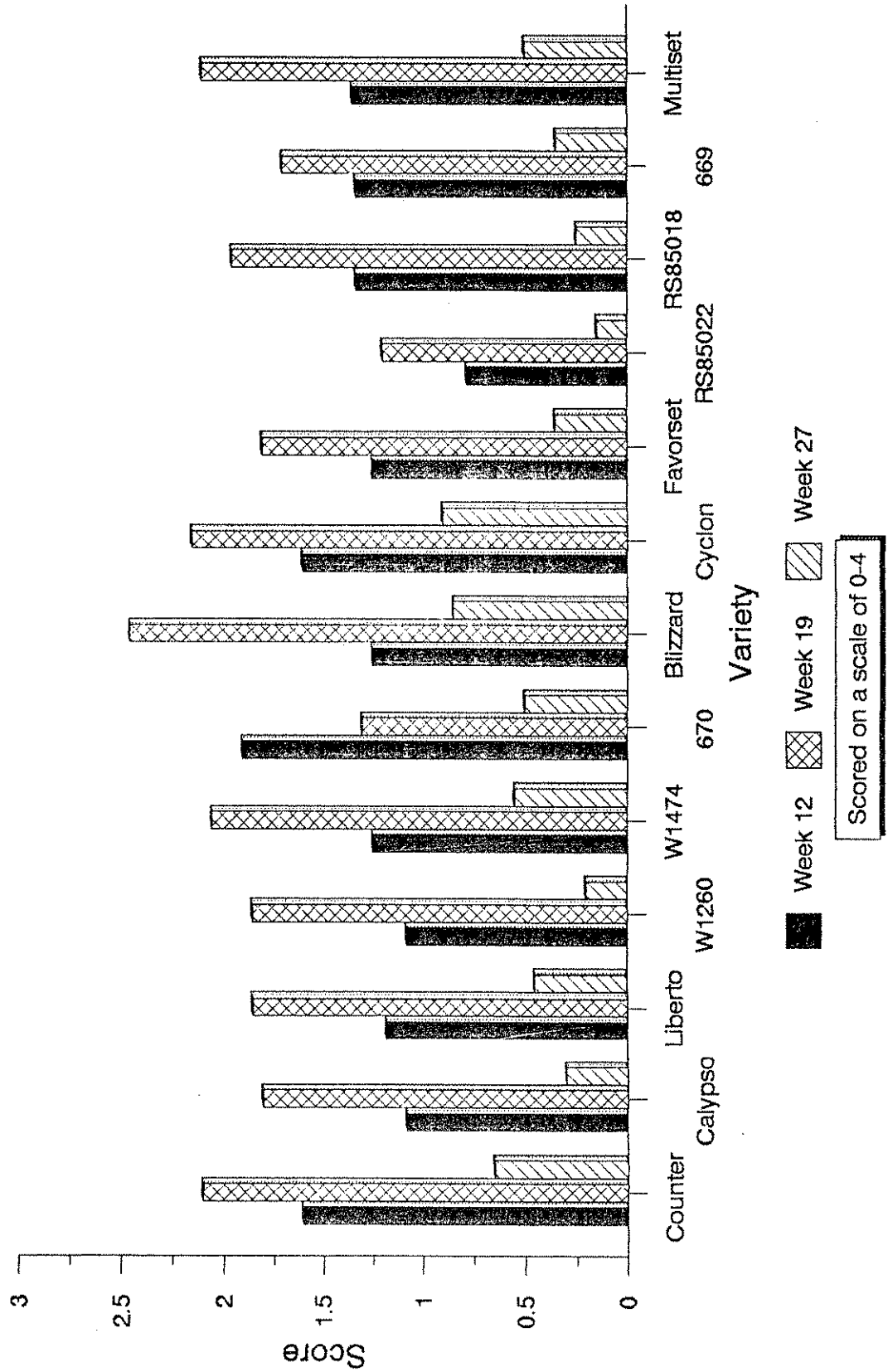
	Mar	Apr	Total to May	May	Jun	Jul	Aug	Sep	Total to Sep	Total to Sep
										19
d	89	86	77	84	81	58	47	65	75	16
)	87	88	83	86	80	72	70	74	80	8
:	80	73	80	78	87	64	59	63	75	14
	85	70	82	79	76	66	67	66	76	15
st	73	78	75	77	86	73	49	70	74	14
)	88	77	78	82	72	52	59	45	83	24
st	81	73	77	77	87	77	65	78	78	19
a	78	86	80	81	81	66	73	64	76	7
22	87	89	86	87	83	76	72	79	83	11
18	90	84	86	87	89	77	72	75	83	13
	90	84	83	85	76	53	54	61	74	18
	90	88	74	85	84	60	55	68	78	13
	83	79	85	82	76	67	67	83	78	
										3.1
	3.6	3.6	N.S.	2.4	4.4	7.1	N.S.	9.6	2.3	
£.)										6.3
	7.3	7.3	-	4.9	8.9	14.4	-	19.5	4.7	

Assessment of Boxiness



Scored on a scale of 0-4

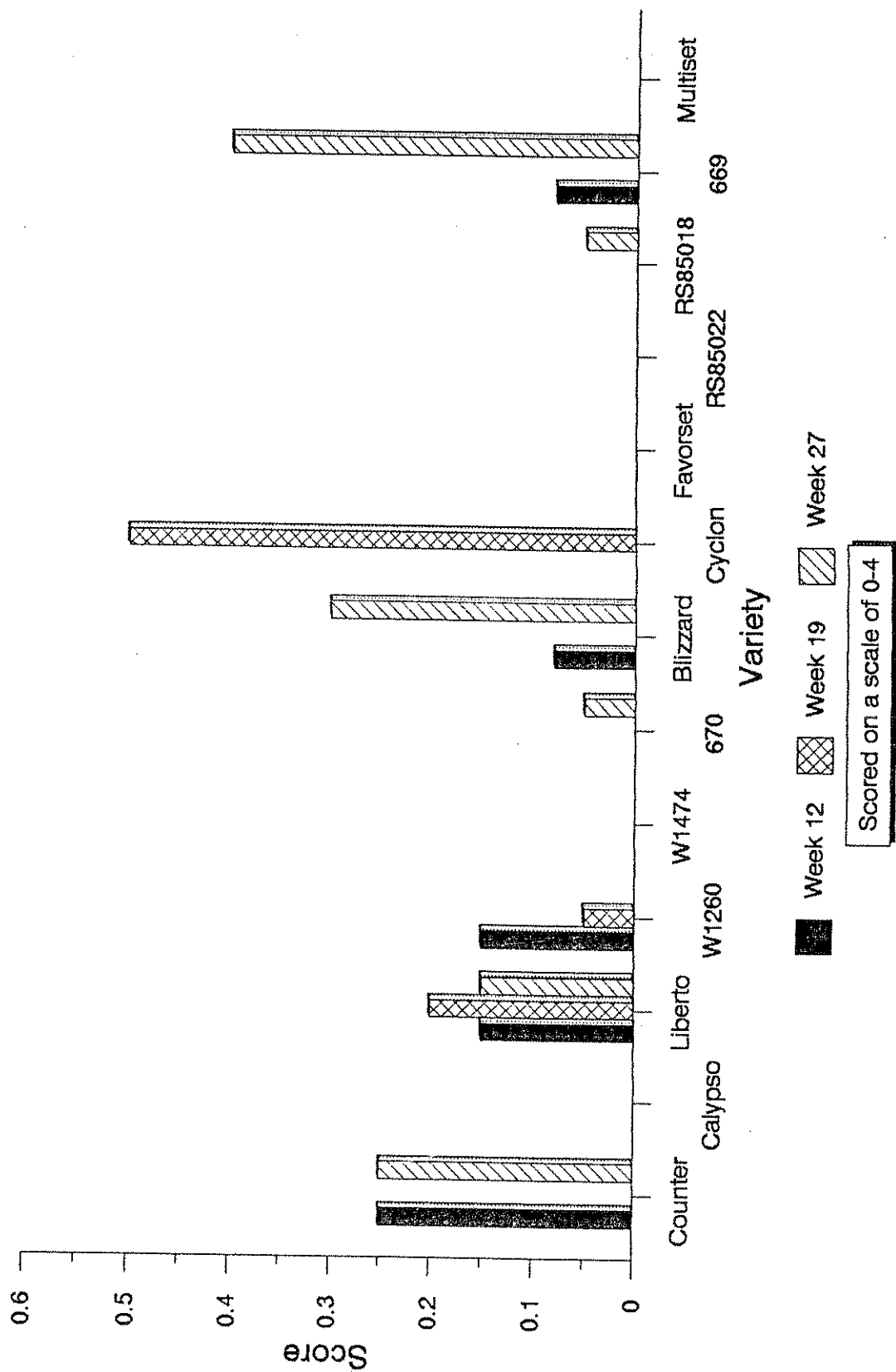
Assessment of Ribbing



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Appendix 8

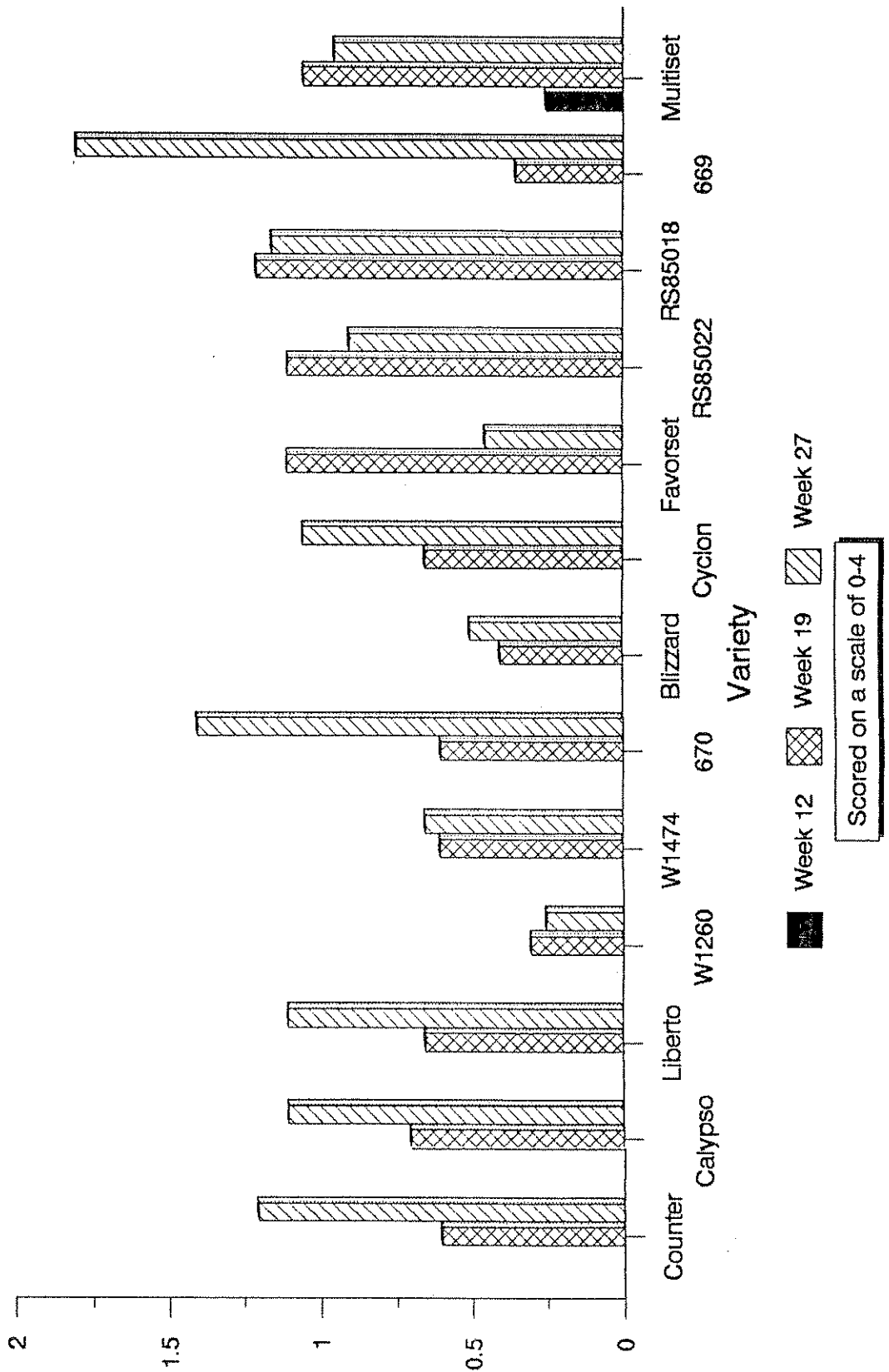
Assessment of Blotchy ripening



Scored on a scale of 0-4

Assessment of Radial Cracking

Appendix 9

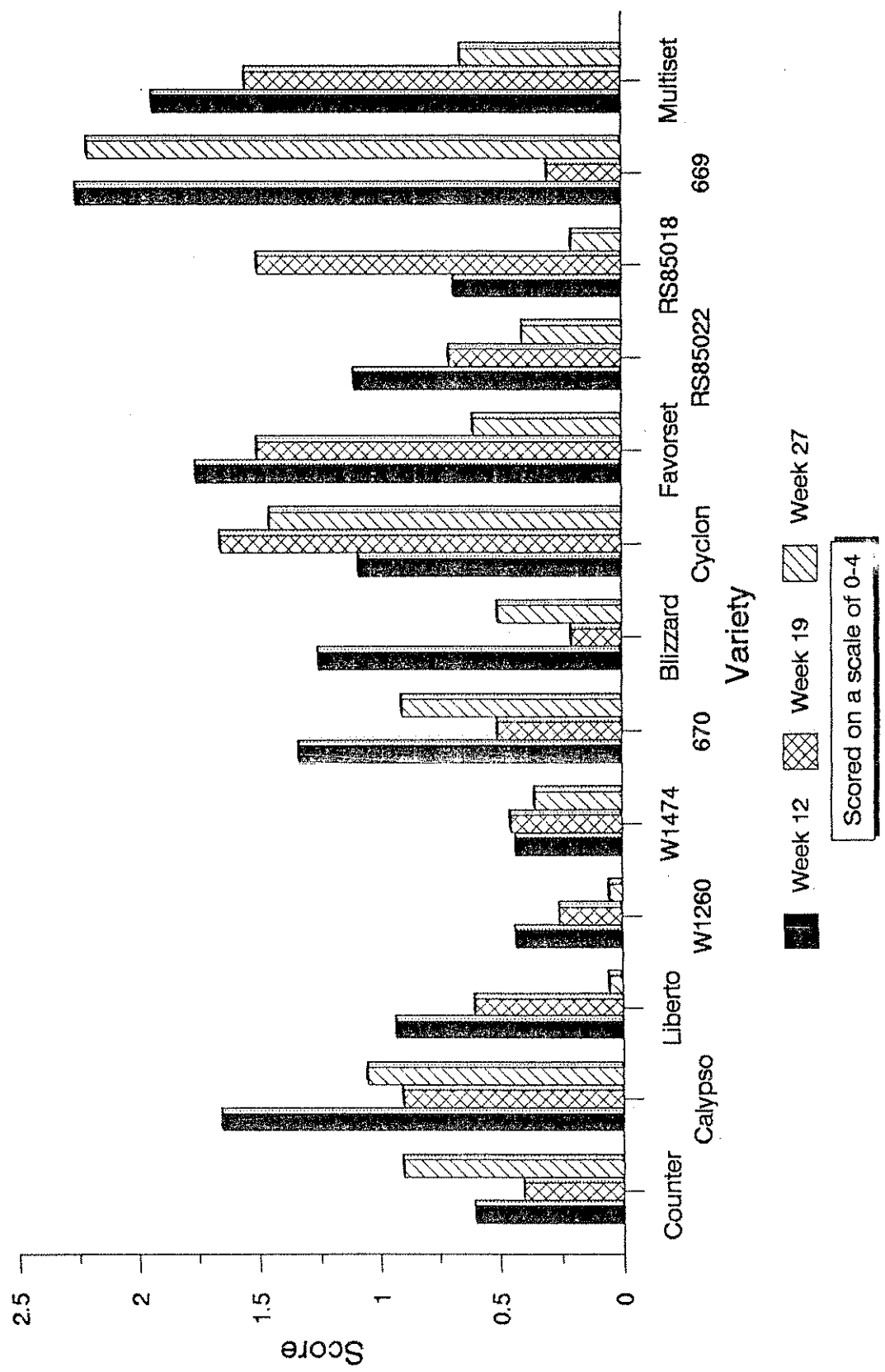


Scored on a scale of 0-4

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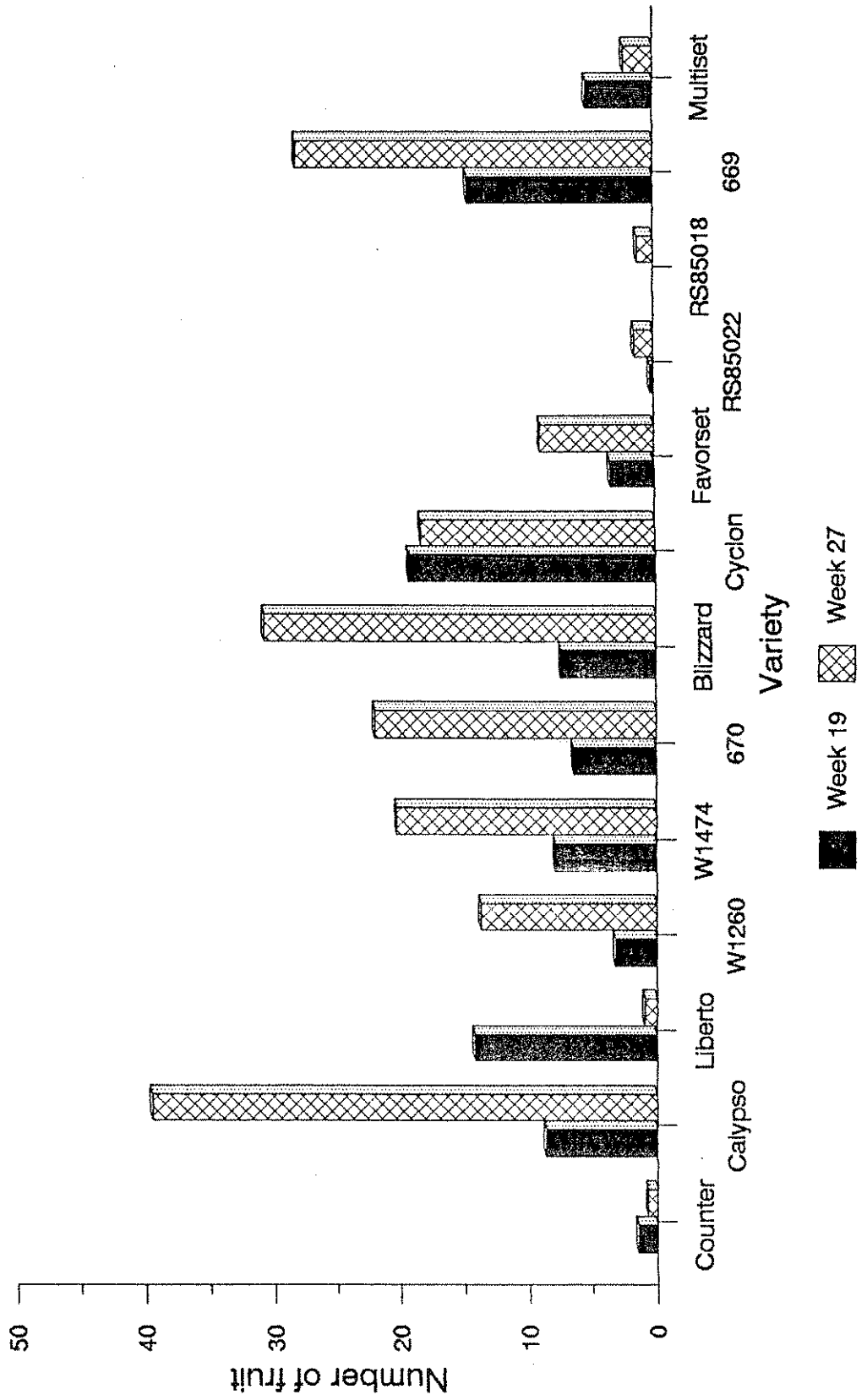
Assessment of Netting

Appendix 10

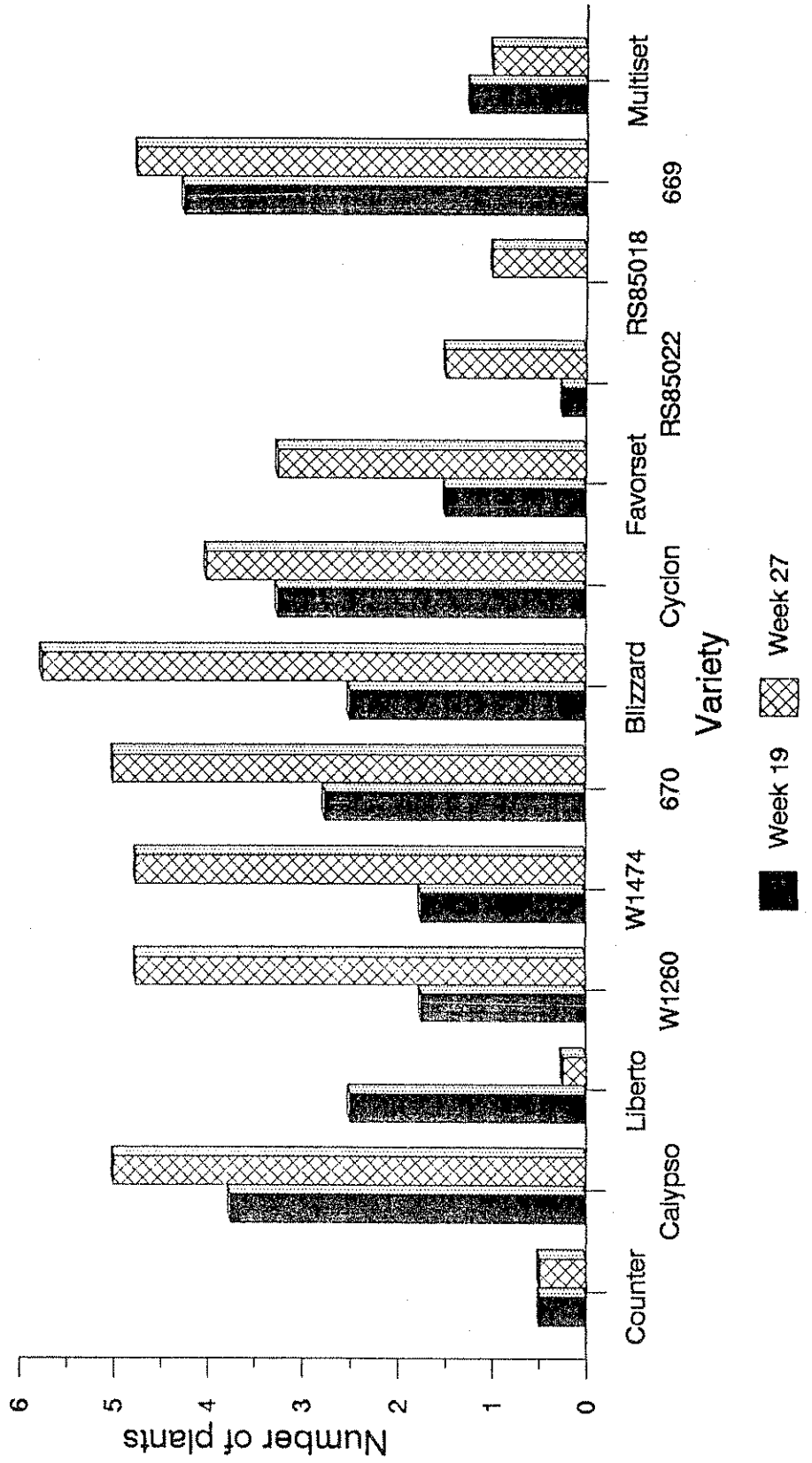


Appendix 11

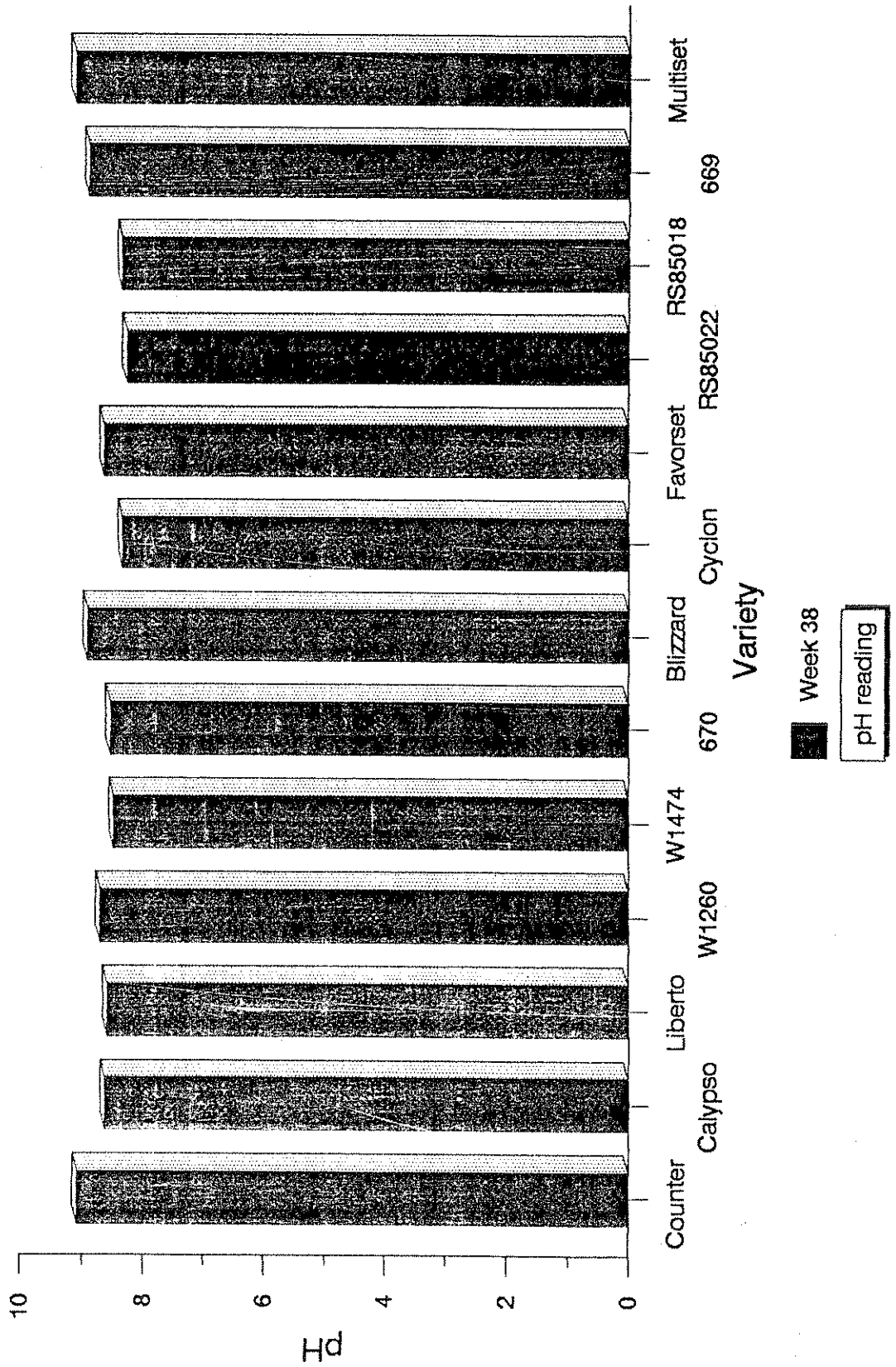
Number of fruit affected by blossom end rot
per six plants assessed



Number of plants affected by blossom end rot per six plants assessed

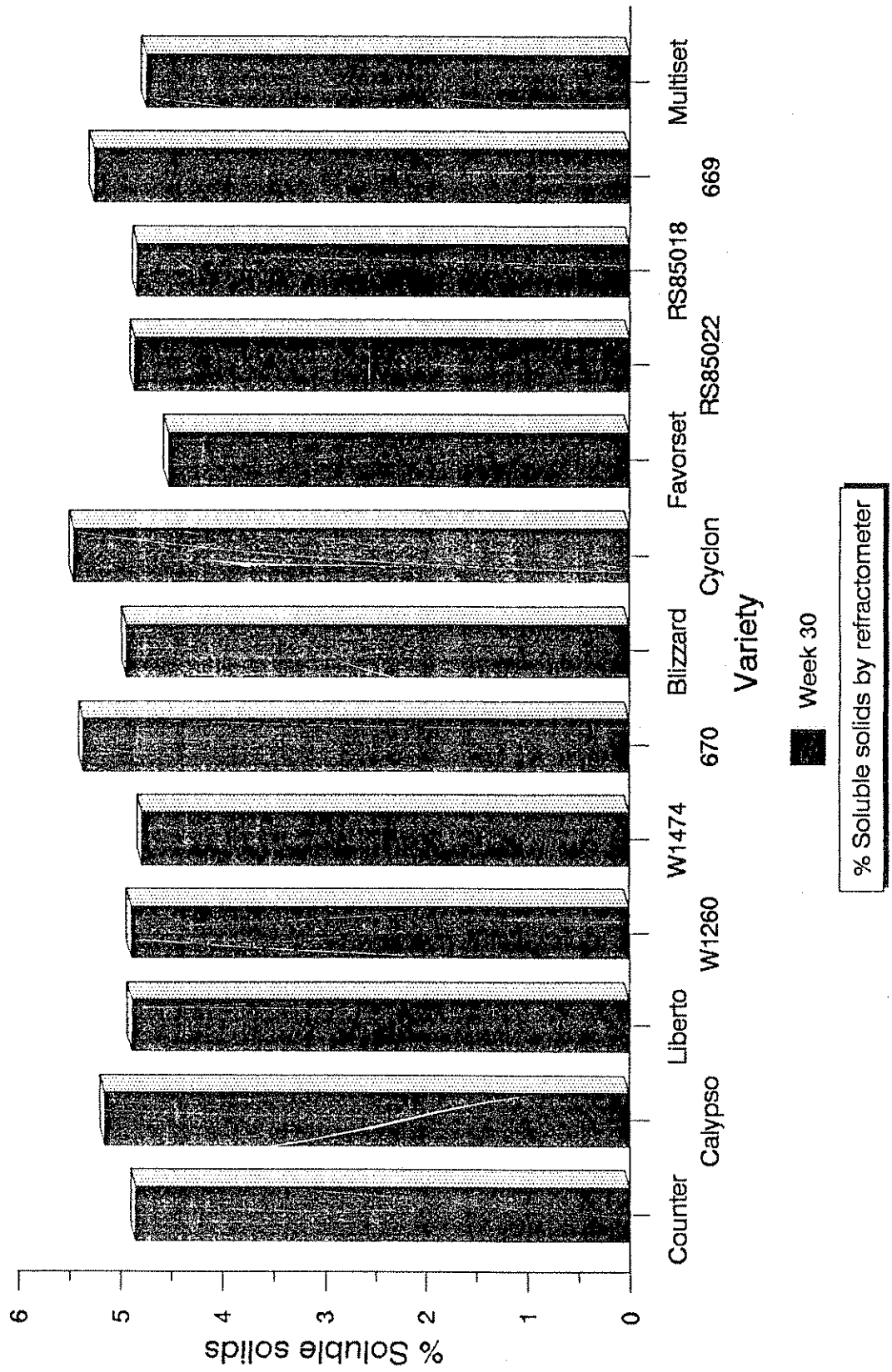


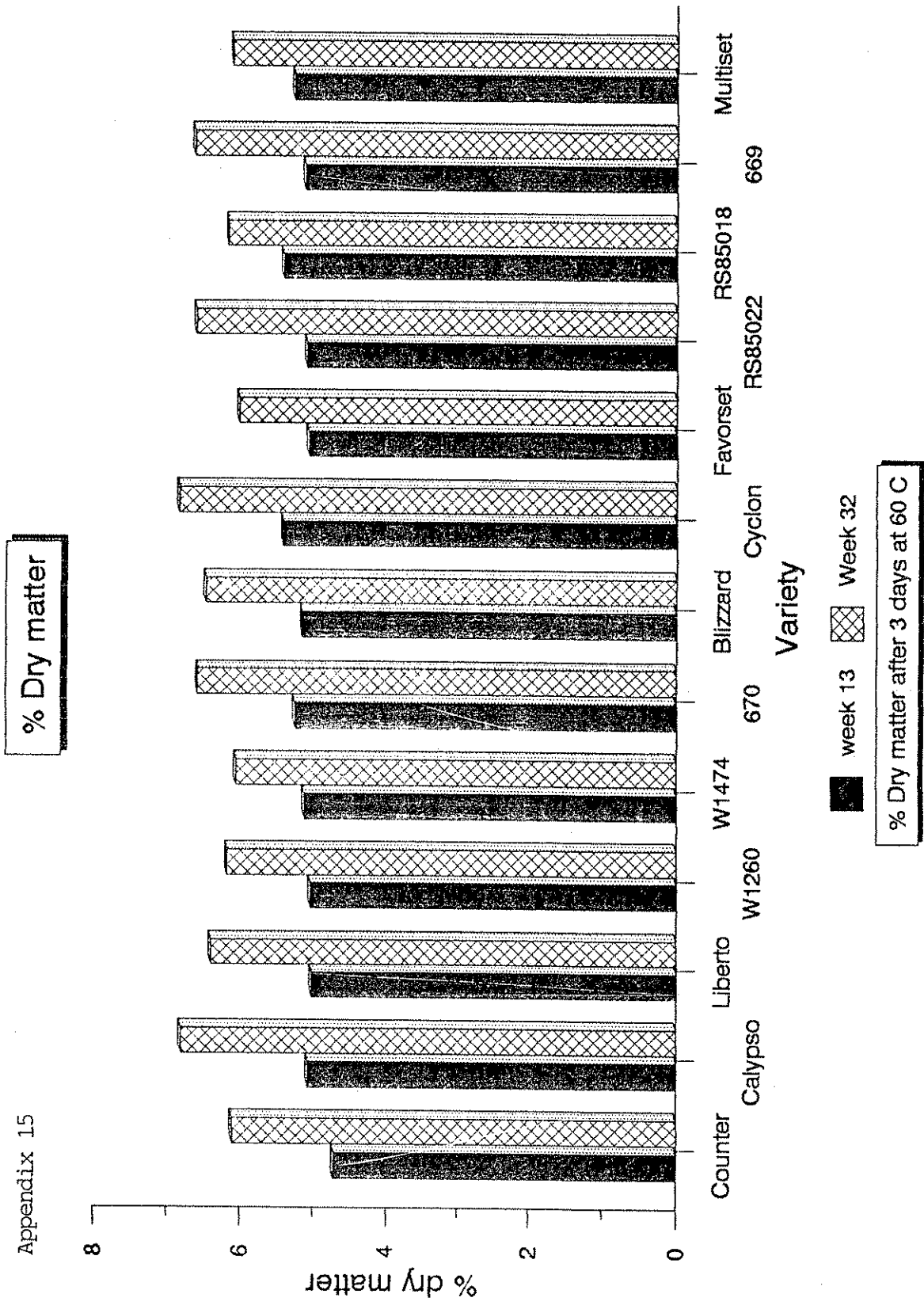
Acidity



Appendix 14

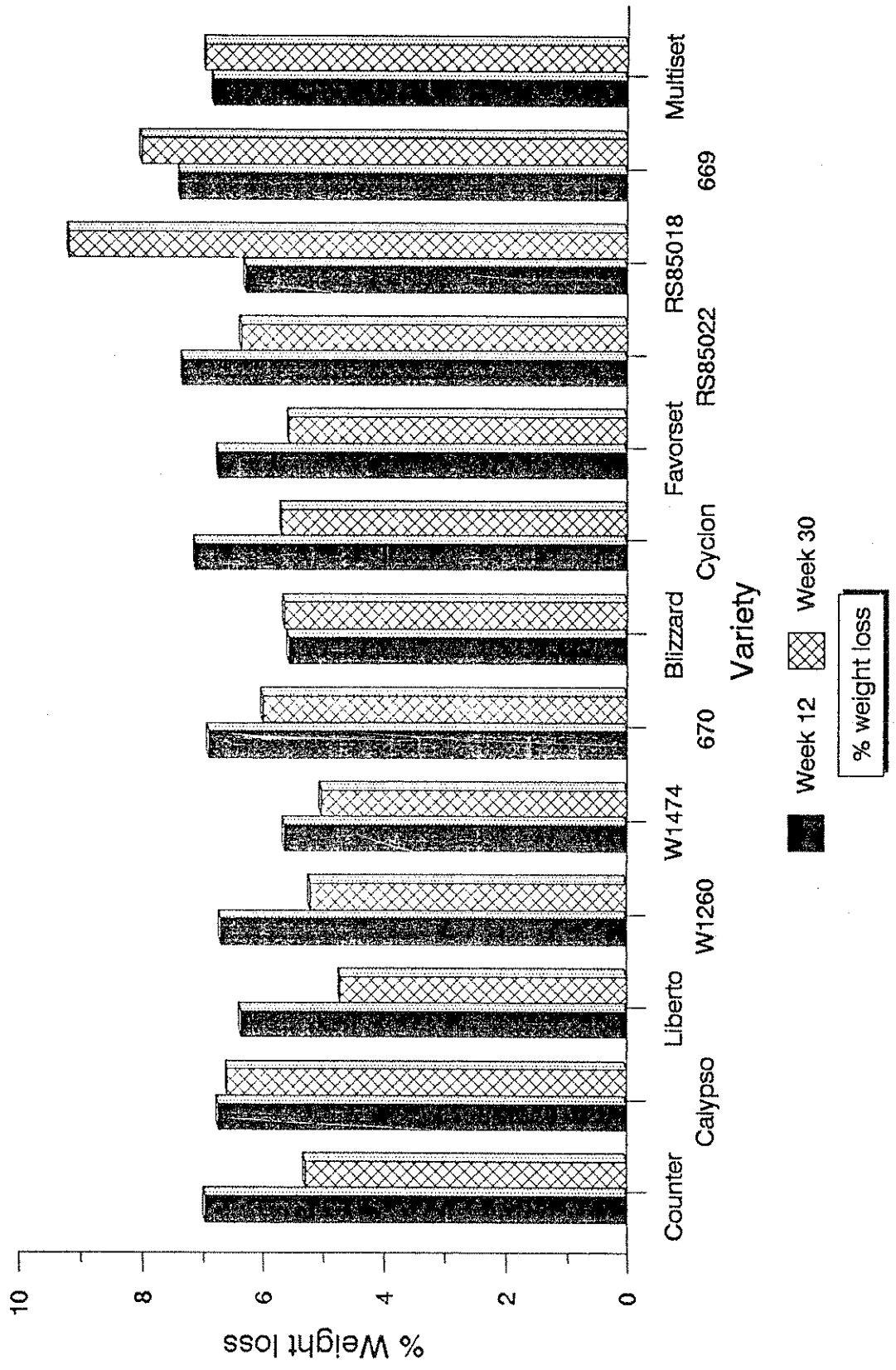
Soluble solids





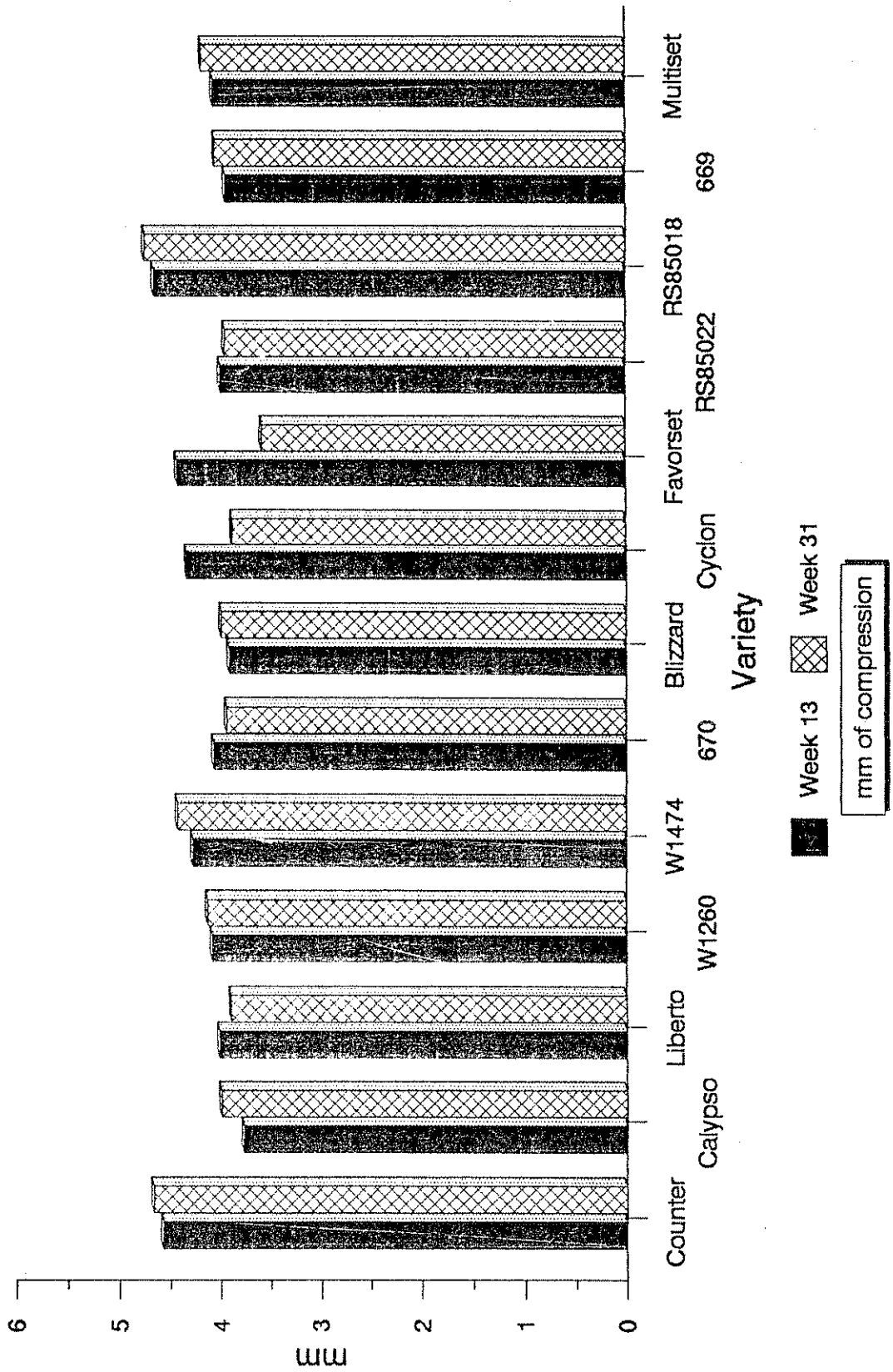
% Weight loss after 8 days

Appendix 16



Appendix 17

Firmness after 8 days



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37.