

<b>Project title:</b>	Onions - Independent assessment of field and storage potential of varieties
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<b>Project leader:</b>	Bruce Napier, NIAB
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<b>Key staff:</b>	Bruce Napier Shaun Coleman
<b>Location of project:</b>	NIAB, Cambridge  Set trials: Lincolnshire and Suffolk  Drilled trials: Essex and Norfolk
<b>Industry Representative:</b>	Tom Will, VCS
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<b>Date project completed (or expected completion date):</b>	30 July 2015

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The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

## ***AUTHENTICATION***

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

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## **GROWER SUMMARY**

### **Headline**

- New varieties add positively to the choices available to growers offering excellent storage potential; a broader range of red varieties; and mildew resistance.

### **Background**

The aim of the work is to provide independent assessment of the yield, quality and storage potential of new onion varieties propagated from seed. There are direct comparisons of new and established varieties and growers have the opportunity to inspect the trials at key stages.

Plant breeders continue to develop improved varieties with characteristics that meet grower requirements e.g. high yield, disease resistance, good quality and storability.

Drilled onions account for approximately 70% of the area grown in the UK. Early maturing varieties such as Hytech, Centro and Vision are becoming increasingly popular, Hybound is a promising new early variety. Maincrop varieties e.g. Arthur, Hybelle and Renate, still hold a large proportion of the acreage. Late maturing varieties such as Armstrong are still important in extending the harvest window.

Overwintered onions are still grown on a small scale but there are not enough varieties to warrant evaluation trials.

### **Results**

#### ***Trial records and data collected –onion trials drilled from seed***

Table A shows key areas of interest – maturity, marketable yield and storage data. A full set of data tables is appended to the full report.

#### ***Trial site details***

Sites were agreed with HDC/BOPA through a steering group, storage was at NIAB in an ambient store and at P G Rix in commercial CE store.

The trials were hosted by (with thanks) and located as follows:

- J Raker Farms, Croxton, Norfolk – drilled onions
- P G Rix Farms, nr Colchester, Essex – drilled onions

The trials were harvested on 5<sup>th</sup> and 11<sup>th</sup> Sept (Norfolk) and 23<sup>rd</sup> Sept and 9<sup>th</sup> Oct (Essex).

The 2013 season was drier than that of 2012 so mildew was not a major issue. A cool and grey April, May and June meant that crops were slow growing. A hot July and August meant that crops caught up well on light soils (i.e. Norfolk) but the heavier soils (Essex) were late maturing and some varieties were taken green.

**Table A. NIAB Spring Sown Onion Trials from seed 2013 – Varieties, Maturities, Yield & Storage**

Varieties in maturity order (mean of both sites); Main 3 replicates; *Preliminary 2 replicates of data*

Variety	Source	Maturity Date of 80% foliage fallover	Yield marketable (t/ha)	Ambient Storage % sound bulbs at end May	CE Storage % sound bulbs at end July
<b>BROWNS</b>					
Hypark	Bejo/DGS	10-Sep	65.4	20	12
Hybound	Bejo/DGS	13-Sep	67.5	29	36
Wellington	Syngenta	15-Sep	62.8	35	45
Hybing	Bejo/DGS	16-Sep	69.1	21	31
<i>Hysky</i>	<i>Bejo/DGS</i>	<i>17-Sep</i>	<i>55.7</i>	<i>46</i>	<i>44</i>
Medaillon	Syngenta	19-Sep	61.0	21	40
NIZ 37-83	Nickerson Zwaan	20-Sep	67.8	29	31
<i>SV3700ND</i>	<i>Seminis</i>	<i>20-Sep</i>	<i>57.1</i>	<i>36</i>	<i>34</i>
Bennito	Seminis	21-Sep	66.9	11	17
Hytech	Bejo/DGS	21-Sep	67.3	18	15
Motion	Syngenta	21-Sep	64.8	31	39
Napoleon	Syngenta	21-Sep	59.2	25	39
Vision	Syngenta	21-Sep	58.1	41	63
Centro	Nickerson Zwaan	21-Sep	62.2	20	21
RS 07751481	Seminis	21-Sep	60.6	13	27
NIZ 37-84	Nickerson Zwaan	22-Sep	66.9	16	25
Paradiso	Advanta	22-Sep	60.9	21	22
Mannito	Seminis	22-Sep	64.9	25	31
<i>SV3557ND</i>	<i>Seminis</i>	<i>23-Sep</i>	<i>56.1</i>	<i>30</i>	<i>21</i>
Tangito	Seminis	23-Sep	63.3	15	20
<i>Hystore</i>	<i>Bejo/DGS</i>	<i>24-Sep</i>	<i>53.9</i>	<i>31</i>	<i>26</i>
Santero	Nickerson Zwaan	25-Sep	62.5	18	38
NIZ 37-89	Nickerson Zwaan	25-Sep	63.7	34	39
<i>SV9249ND</i>	<i>Seminis</i>	<i>25-Sep</i>	<i>68.1</i>	<i>18</i>	<i>8</i>
<i>RX 07764947</i>	<i>Seminis</i>	<i>25-Sep</i>	<i>66.3</i>	<i>19</i>	<i>9</i>
<i>Action</i>	<i>Syngenta</i>	<i>27-Sep</i>	<i>57.2</i>	<i>47</i>	<i>38</i>

Arthur	Advanta	27-Sep	60.2	9	6
<b>Means</b>		<b>21-Sep</b>	<b>62.6</b>	<b>25</b>	<b>29</b>
<b>REDS</b>					
Red Light	Bejo/DGS	30-Aug	69.6	12	54
<i>af 1.11</i>	<i>AFM</i>	<i>07-Sep</i>	<i>50.7</i>	<i>36</i>	<i>35</i>
Red Planet	AFM	15-Sep	52.0	18	18
Red Tide	Bejo/DGS	15-Sep	56.4	22	36
Redspark	Bejo/DGS	17-Sep	58.3	38	42
Red Comet	AFM	19-Sep	55.9	27	23
<i>af 222</i>	<i>AFM</i>	<i>21-Sep</i>	<i>58.0</i>	<i>36</i>	<i>28</i>
Retano	Nickerson Zwaan	21-Sep	51.6	14	28
Red Baron	Bejo/DGS	23-Sep	58.4	21	18
<b>Means</b>		<b>15-Sep</b>	<b>56.8</b>	<b>25</b>	<b>31</b>

*The following varieties are of most interest to the industry. Full information on all varieties can be found in the 'Full Trial Report'.*

There is a good range of maturities allowing growers to spread their harvest period. The later maturing varieties were taken green which meant some varieties were harder to dry and some 'telescoping/tubing' was seen commercially and in the graded trial material.

For organic growers and for high disease pressure years the mildew resistant varieties such as Santero offer potential.

Establishment was good but cold grey conditions through April, May and June meant that growth was slow and plants had to catch up in the hot conditions in July and August. Crops on light soils caught up quickly but on heavier soils this did not happen and thus they were harvested late and/or 'green'.

Hybound and Hypark were the earliest maturing varieties of the drilled trials. However the cold start meant that some varieties matured out of sequence.

Mildew was at low enough levels to be kept under control by regular fungicide applications.

The mean trial yields in Norfolk were above the 10 year average but the yield in Essex was below average due to losses from slow development and harvesting green.

In the Essex trial the highest yielding brown varieties were Bennito, NIZ39-89 and RX07764947.

Red Light was the highest yielding red variety.

In the Norfolk trial Hytech, NIZ 37-84 and Hybing were the highest yielding browns. Red Light was the highest yielding red variety.

There were few rots in the harvested material of both the drilled trials but there were double in lots of varieties and there was a large amount of losses due to material harvested green sprouting or having thick necks.

Hypark, Hysky, Motion, Santero and NIZ 37-89 were the best of the varieties for having high percentages of single centres.

Storage assessments in an ambient store were recorded in late-April and late-May 2014.

Storage potential continues to be a key factor for drilled crops. As in 2012/13, Wellington, and Vision had above average percentages of sound bulbs at the late-May assessment.

Hysky, SV3700ND and Action also performed above average in 2012/13.

Redspark and AF1.11 continued to perform well in storage as did AF22 in the reds.

Stored bulb quality was generally very good throughout most of the varieties. Global and Testa Rossa were slightly soft and loose skinned. Neither of these varieties is suitable for storage.

The highest percentage of sound bulbs from the controlled environment store was from Vision, several others performed well Hybound, Wellington, Hysky, Medaillon, Motion, Napoleon, Santero, NIZ37-89 and Action.

Red Light and Redspark had the highest percentage of sound bulbs in the reds.

## **Main Conclusions**

The yield potential of varieties can vary greatly. In the drilled trials this was approx. 20t/ha between the highest and lowest yields (mean of both trials).

Yield out of store is also important. Drilled material show a difference of approx 40% between the best and worst storage potential from ambient store and of almost 60% from CE store.

Mildew resistant varieties require fewer and or cheaper fungicide programmes.



## ***Action Points***

- Select a range of varieties with different maturities to spread the harvest - Earlier varieties are generally favoured such as the Hybing or Hybound (early), Cento or Vision (early main-crop), but late varieties such as Arthur or Armstrong are still used on black soils
- Select varieties best suited to your storage facilities –Vision is consistently the best storing brown variety in ambient and CE stores. Redspark has been the best storing red variety.
- For varieties not suited to long term storage growers must be able to sell their produce quickly - Only produce as many early sets, e.g Jagro, as you have an immediate market for Sturon or similar types for storage until Christmas
- In high disease pressure years growers should take advantage of material with disease resistance e.g. mildew resistance - Santero and Hylander both have resistance to downy mildew

## **SCIENCE SECTION**

### **Introduction**

The aim of the work is to provide independent assessment of the yield, quality and storage potential of new onion varieties, propagated from seed and sets, that meet grower requirements i.e. high marketable yield, disease resistance, good quality and storability. These requirements need to be balanced and compared over a number of years as there can be a great deal of variation between seasons.

There are direct comparisons of new and established varieties.

Varieties can perform very differently in the United Kingdom from Holland and other parts of mainland Europe. Breeding companies have central breeding programmes and they trial their varieties in a number of countries to find the ones that are most suitable to the local conditions and growing practices. UK trials are essential to informing growers when selecting varieties.

Drilled onions account for approximately 70% of the area grown in the UK. Early maturing varieties such as Hytech, Centro and Vision are becoming increasingly popular. Main-crop varieties e.g. Arthur, Hybelle and Renate, still hold a large proportion of the acreage. Late maturing varieties such as Armstrong are still important in extending the harvest window.

Onions grown from sets ensure an early crop which avoids potentially damaging autumn harvest conditions and the earliest of these can attract a premium. Newer entries have brought new genetics - in particular varieties bringing early maturity or mildew resistance. However there are bolting risks associated with some early material as it may be best suited to intermediate day length rather than long day length. Set trials are conducted in alternate years – the last trials were in 2012.

‘Sturon type’ varieties continue to dominate the brown set main-crop maturity varieties. However there are very early maturing varieties which produce high yields that are suitable for the autumn markets. The mildew resistant variety Santero also has good storage potential and is valuable addition for organic growers. Red Baron has previously dominated the red set market but there is strong competition from early maturing material such as Red Emperor and high quality hybrids.

Overwintered onions as still grown on a small scale but there are not enough varieties to warrant evaluation trials.

## **Results of the Variety Trials**

### ***Trial site details***

Sites were agreed with HDC/BOPA through a steering group, storage was at NIAB in an ambient store and at P G Rix in commercial CE store.

The trials were hosted by (with thanks) and located on open aspect, commercial fields as follows:

- J Raker Farms, Croxton, Norfolk – drilled onions on a Breckland soil
- P G Rix Farms, nr Colchester, Essex – drilled onions on a silty soil

Both trials followed local commercial agronomy. No maleic hydrazide was applied.

### ***Trial records and data collected –drilled trials***

Table B shows key areas of interest - selected yield storage data.

A full set of data tables is appended.

The trials were drilled on 19<sup>th</sup> March (Norfolk) and 3<sup>rd</sup> April (Essex). They were harvested on 5<sup>th</sup> and 11<sup>th</sup> Sept (Norfolk) and 23<sup>rd</sup> Sept and 9<sup>th</sup> Oct (Essex). The 2013 season was drier than that of 2012 so mildew was not a major issue. A cool and grey April, May and June meant that crops were slow growing. A hot July and August meant that crops caught up well on light soils (i.e. Norfolk) but the heavier soils (Essex) were late maturing and some varieties were taken green.

The late harvest of some sites was also seen on commercial sites.

**Table B: NIAB Spring Sown Onion Trials from seed 2013 – Varieties, Maturities, Yield & Storage**

Sites: Rix (Essex) and Raker (Norfolk)

Varieties in maturity order (mean of both sites); Main 3 replicates; *Preliminary 2 replicates of data*

Variety	Source	Maturity Date of 80% foliage fallover	Yield marketable (t/ha)	Ambient Storage % sound bulbs at end May	CE Storage % sound bulbs at end July
<b>BROWNS</b>					
Hypark	Bejo/DGS	10-Sep	65.4	20	12
Hybound	Bejo/DGS	13-Sep	67.5	29	36
Wellington	Syngenta	15-Sep	62.8	35	45
Hybing	Bejo/DGS	16-Sep	69.1	21	31
Hysky	Bejo/DGS	17-Sep	55.7	46	44
Medaillon	Syngenta	19-Sep	61.0	21	40
NIZ 37-83	Nickerson	20-Sep	67.8	29	31
SV3700ND	Seminis	20-Sep	57.1	36	34
Bennito	Seminis	21-Sep	66.9	11	17
Hytech	Bejo/DGS	21-Sep	67.3	18	15
Motion	Syngenta	21-Sep	64.8	31	39
Napoleon	Syngenta	21-Sep	59.2	25	39
Vision	Syngenta	21-Sep	58.1	41	63
Centro	Nickerson	21-Sep	62.2	20	21
RS 07751481	Seminis	21-Sep	60.6	13	27
NIZ 37-84	Nickerson	22-Sep	66.9	16	25
Paradiso	Advanta	22-Sep	60.9	21	22
Mannito	Seminis	22-Sep	64.9	25	31
SV3557ND	Seminis	23-Sep	56.1	30	21
Tangito	Seminis	23-Sep	63.3	15	20
Hystore	Bejo/DGS	24-Sep	53.9	31	26
Santero	Nickerson	25-Sep	62.5	18	38
NIZ 37-89	Nickerson	25-Sep	63.7	34	39
SV9249ND	Seminis	25-Sep	68.1	18	8
RX 07764947	Seminis	25-Sep	66.3	19	9
Action	Syngenta	27-Sep	57.2	47	38
Arthur	Advanta	27-Sep	60.2	9	6
<b>Means</b>		<b>21-Sep</b>	<b>62.6</b>	<b>25</b>	<b>29</b>
<b>REDS</b>					
Red Light	Bejo/DGS	30-Aug	69.6	12	54
af 1.11	AFM	07-Sep	50.7	36	35
Red Planet	AFM	15-Sep	52.0	18	18
Red Tide	Bejo/DGS	15-Sep	56.4	22	36
Redspark	Bejo/DGS	17-Sep	58.3	38	42
Red Comet	AFM	19-Sep	55.9	27	23
af 222	AFM	21-Sep	58.0	36	28
Retano	Nickerson	21-Sep	51.6	14	28
Red Baron	Bejo/DGS	23-Sep	58.4	21	18
<b>Means</b>		<b>15-Sep</b>	<b>56.8</b>	<b>25</b>	<b>31</b>

## ***Discussion: Drilled trials***

There is a good range of maturities allowing growers to spread their harvest period. The later maturing varieties were taken green which meant some varieties were harder to dry and some 'telescoping/tubing' was seen commercially and in the graded trial material.

For organic growers and for high disease pressure years the mildew resistant varieties such as Santero offer potential.

Establishment was good but cold grey conditions through April, May and June meant that growth was slow and plants had to catch up in the hot conditions in July and August. Crops on light soils caught up quickly but on heavier soils this did not happen and thus they were harvested late and/or 'green'.

Hybound and Hypark were the earliest maturing varieties of the drilled trials. However the cold start meant that some varieties matured out of sequence.

Mildew was at low enough levels to be kept under control by regular fungicide applications.

The mean trial yields in Norfolk were above the 10 year average but the yield in Essex was below average due to losses from slow development and harvesting green.

The unusual growing season resulted in the two sites performing very differently therefore it is better to look at the yield data individually rather than a mean of the two trials.

In the Essex trial the highest yielding brown varieties were Bennito, NIZ39-89 and RX07764947.

Red Light was the highest yielding red variety.

In the Norfolk trial Hytech, NIZ 37-84 and Hybing were the highest yielding browns.

Red Light was the highest yielding red variety.

There were few rots in the harvested material of both the drilled trials but there were double in lots of varieties and there was a large amount of losses due to material harvested green sprouting or having thicknecks.

Hypark, Hysky, Motion, Santero and NIZ 37-89 were the best of the varieties for having high percentages of single centres.

Storage assessments in an ambient store were recorded in late-April and late-May 2014.

Storage potential continues to be a key factor for drilled crops as yield out of store is essential for extending the availability of UK produced onions. As in 2012/13, Wellington, and Vision had above average percentages of sound bulbs at the late-May assessment. Hysky, SV3700ND and Action also performed above average in 2012/13.

Redspark and AF1.11 continued to perform well in storage as did AF222 in the reds.

Stored bulb quality was generally very good throughout most of the varieties. Global and Testa Rossa were slightly soft and loose skinned. Neither of these varieties is suitable for storage.

The highest percentage of sound bulbs from the controlled environment store was from Vision, several others performed well Hybound, Wellington, Hysky, Medaillon, Motion, Napoleon, Santero, NIZ37-89 and Action.

Red Light and Redspark had the highest percentage of sound bulbs in the reds.

## **Main Conclusions**

The yield data in the drilled trials is a good starting point for selecting varieties but other factors need to be considered.

Varieties should be selected on:

- maturity (to stagger the harvest season);
- storage potential (to extend the availability of UK onions) and yield out of store;
- disease resistance (i.e. mildew resistance);
- single centres (for onion ring production which attracts a premium).

Selected varieties have been commented on in the discussion section.

Hybound and Hypark were the earliest maturing varieties.

The highest yielding varieties were different on the two sites.

Wellington, Vision, Hysky, SV3700ND, Action, Redspark, AF1.11 and AF222 all had better than average storage potential in ambient store.

## **Financial Benefits**

The yield potential of varieties can vary greatly. In the drilled trials this was approx. 20t/ha between the highest and lowest yields (mean of both trials).

Yield out of store is also important. Drilled material show a difference of approx 40% between the best and worst storage potential from ambient store and of almost 60% from CE store.

Mildew resistant varieties require fewer and or cheaper fungicide programmes.

## **Knowledge and Technology Transfer**

Updates of trial data were circulated to levy payers by HDC and also to sponsoring breeders and seed companies.

Open days were also hosted on four occasions:

1. Drilled crop field open day in Norfolk – August 2013,
2. Main set and drilled crops harvested produce open day at NIAB, Cambridge – November 2013.
3. Data and a selection of varieties on NIAB stand at Onion and Carrot Conference. November 2013

These events were well attended by a number of growers, seed trade, agronomists, research providers, etc. The farming press always attend the open days and there was significant coverage of the results – particularly in The Vegetable Farmer and Horticulture Week.

## Appendices

**Table 1. NIAB Spring Sown Onion Trials from seed 2013 – varieties**

Sites: Rix (Essex) and Raker (Norfolk)

Varieties in maturity order (mean of both sites)

Main varieties 3 replicates; Preliminary varieties 2 replicates of data

Variety	Status	Source	Maturity		
			Date of 80% foliage fallover		
			Essex	Norfolk	Mean
<b>BROWNS</b>					
Hypark	4	Bejo/DGS	03-Oct	19-Aug	10-Sep
Hybound	4	Bejo/DGS	09-Oct	18-Aug	13-Sep
Wellington	R	Syngenta	10-Oct	22-Aug	15-Sep
Hybing	C	Bejo/DGS	07-Oct	26-Aug	16-Sep
Hysky	P	Bejo/DGS	11-Oct	25-Aug	17-Sep
Medaillon	2	Syngenta	09-Oct	31-Aug	19-Sep
NIZ 37-83	3	Nickerson Zwaan Ltd	07-Oct	04-Sep	20-Sep
SV3700ND	P	Seminis	10-Oct	31-Aug	20-Sep
Bennito	M	Seminis	09-Oct	02-Sep	21-Sep
Hytech	R	Bejo/DGS	11-Oct	31-Aug	21-Sep
Motion	R	Syngenta	12-Oct	31-Aug	21-Sep
Napoleon	R	Syngenta	11-Oct	01-Sep	21-Sep
Vision	C	Syngenta	10-Oct	02-Sep	21-Sep
Centro	C	Nickerson Zwaan Ltd	09-Oct	03-Sep	21-Sep
RS 07751481	M	Seminis	10-Oct	02-Sep	21-Sep
NIZ 37-84	3	Nickerson Zwaan Ltd	08-Oct	06-Sep	22-Sep
Paradiso	2	Advanta	10-Oct	03-Sep	22-Sep
Mannito	M	Seminis	12-Oct	02-Sep	22-Sep
SV3557ND	P	Seminis	13-Oct	03-Sep	23-Sep
Tangito	M	Seminis	13-Oct	04-Sep	23-Sep
Hystore	P	Bejo/DGS	13-Oct	05-Sep	24-Sep
Santero	R	Nickerson Zwaan Ltd	10-Oct	09-Sep	25-Sep
NIZ 37-89	1	Nickerson Zwaan Ltd	10-Oct	11-Sep	25-Sep
SV9249ND	P	Seminis	13-Oct	07-Sep	25-Sep
RX 07764947	P	Seminis	12-Oct	09-Sep	25-Sep
Action	P	Syngenta	13-Oct	11-Sep	27-Sep
Arthur	C	Advanta	14-Oct	11-Sep	27-Sep
<b>Means</b>			<b>10-Oct</b>	<b>02-Sep</b>	<b>21-Sep</b>
<b>REDS</b>					
Red Light	1	Bejo/DGS	12-Sep	17-Aug	30-Aug
af 1.11	P2	AFM	23-Sep	22-Aug	07-Sep
Red Planet	2	AFM	07-Oct	24-Aug	15-Sep
Red Tide	4	Bejo/DGS	04-Oct	28-Aug	15-Sep
Redspark	C	Bejo/DGS	01-Oct	03-Sep	17-Sep
af 1.75	1	AFM	08-Oct	30-Aug	19-Sep
af 222	P	AFM	11-Oct	31-Aug	21-Sep
Retano	3	Nickerson Zwaan Ltd	06-Oct	06-Sep	21-Sep
Red Baron	C	Bejo/DGS	06-Oct	09-Sep	23-Sep
<b>Means</b>			<b>02-Oct</b>	<b>29-Aug</b>	<b>15-Sep</b>



**Table 2. NIAB Spring Sown Onion Trials from seed 2013- Yield data**

Sites: Rix (Essex) and Raker (Norfolk)

Varieties in maturity order (mean of both sites)

Main varieties 3 replicates; Preliminary varieties 2 replicates of data

Variety	Population & Yield											
	plant pop. (plants / sq. m)			marketable yield (t/ha)			% >60mm by weight			% doubles		
	Rix	Rake r	Mea n	Rix	Rake r	Mea n	Rix	Rake r	Mea n	Rix	Rake r	Mean
<b>BROWNS</b>												
Hypark	52.2	50.3	51.3	58.9	72.0	65.4	74.8	76.5	75.6	0.0	0.1	0.1
Hybound	52.0	49.8	50.9	63.3	71.7	67.5	78.3	78.7	78.5	0.2	0.0	0.1
Wellington	46.3	46.5	46.4	58.8	66.9	62.8	76.6	77.7	77.1	0.2	0.0	0.1
Hybing	47.7	45.3	46.5	60.5	77.6	69.1	81.9	86.8	84.4	0.2	0.0	0.1
Hysky	46.6	45.6	46.1	36.8	74.6	55.7	79.5	85.9	82.7	0.0	0.0	0.0
Medaillon	47.1	45.8	46.5	52.4	69.5	61.0	79.5	80.9	80.2	0.0	0.7	0.3
NIZ 37-83	46.9	43.1	45.0	64.8	70.8	67.8	80.0	87.1	83.5	0.0	0.2	0.1
SV3700ND	48.7	47.2	48.0	46.2	68.0	57.1	71.7	76.2	73.9	0.3	0.0	0.2
Bennito	47.7	45.1	46.4	65.5	68.4	66.9	75.0	82.0	78.5	0.3	1.0	0.7
Hytech	49.0	48.3	48.7	64.7	70.0	67.3	77.2	80.5	78.8	0.0	0.3	0.2
Motion	47.9	47.4	47.6	60.6	69.1	64.8	78.4	81.4	79.9	0.2	0.0	0.1
Napoleon	49.8	45.2	47.5	54.1	64.3	59.2	70.7	78.7	74.7	0.2	0.9	0.5
Vision	46.1	42.8	44.5	46.5	69.8	58.1	79.9	89.5	84.7	0.4	0.4	0.4
Centro	50.0	50.1	50.1	56.3	68.1	62.2	74.8	72.2	73.5	0.2	0.3	0.2
RS	44.3	50.1	47.2	52.2	69.0	60.6	75.4	76.4	75.9	1.9	1.1	1.5
NIZ 37-84	46.5	45.2	45.9	57.1	76.8	66.9	75.9	88.4	82.2	0.6	0.7	0.6
Paradiso	48.1	46.4	47.2	50.3	71.5	60.9	73.1	84.2	78.6	0.2	0.2	0.2
Mannito	48.2	45.1	46.7	62.1	67.7	64.9	78.0	80.7	79.4	0.2	0.2	0.2
SV3557ND	49.4	52.1	50.8	40.1	72.2	56.1	70.8	77.2	74.0	0.0	0.0	0.0
Tangito	49.0	46.3	47.7	55.3	71.4	63.3	74.4	82.8	78.6	0.0	0.7	0.3
Hystore	44.2	41.7	43.0	37.4	70.4	53.9	77.3	87.2	82.3	0.0	0.0	0.0
Santero	44.4	44.7	44.6	59.9	65.0	62.5	76.9	82.4	79.7	0.0	0.0	0.0
NIZ 37-89	49.9	41.9	45.9	65.6	61.8	63.7	67.0	80.8	73.9	0.3	0.2	0.2
SV9249ND	50.4	50.3	50.3	61.4	74.8	68.1	79.8	79.0	79.4	0.5	0.9	0.7
RX0776494	53.8	46.9	50.3	66.4	66.2	66.3	72.9	83.6	78.3	0.9	2.3	1.6
Action	40.8	42.5	41.6	45.6	68.8	57.2	82.0	86.2	84.1	0.0	0.5	0.3
Arthur	44.7	43.7	44.2	50.4	70.0	60.2	83.8	85.8	84.8	0.9	1.6	1.2
<b>Means</b>	<b>47.8</b>	<b>46.3</b>	<b>47.1</b>	<b>55.3</b>	<b>69.9</b>	<b>62.6</b>	<b>76.5</b>	<b>81.8</b>	<b>79.2</b>	<b>0.3</b>	<b>0.4</b>	<b>0.4</b>
<b>REDS</b>												
Red Light	44.4	44.3	44.3	66.8	72.5	69.6	80.7	86.3	83.5	0.0	0.3	0.2
af 1.11	43.7	44.6	44.2	46.0	55.5	50.7	55.4	68.2	61.8	0.0	0.0	0.0
Red Planet	33.7	40.9	37.3	44.9	59.2	52.0	59.5	79.6	69.5	0.3	0.4	0.3
Red Tide	46.8	39.9	43.4	56.5	56.3	56.4	74.2	79.4	76.8	0.0	0.0	0.0
Redspark	44.2	44.7	44.4	53.6	63.1	58.3	67.2	79.3	73.3	0.0	0.5	0.2
Red Comet	48.3	44.9	46.6	46.7	65.1	55.9	67.2	79.9	73.6	0.0	0.0	0.0
af 222	45.8	45.1	45.5	51.0	65.0	58.0	71.4	78.4	74.9	0.0	0.3	0.1
Retano	46.1	45.2	45.6	46.5	56.6	51.6	59.8	71.2	65.5	0.0	0.2	0.1
Red Baron	40.7	35.5	38.1	58.5	58.3	58.4	81.2	87.0	84.1	0.0	0.0	0.0
<b>Means</b>	<b>43.8</b>	<b>42.8</b>	<b>43.3</b>	<b>52.3</b>	<b>61.3</b>	<b>56.8</b>	<b>68.5</b>	<b>78.8</b>	<b>73.7</b>	<b>0.0</b>	<b>0.2</b>	<b>0.1</b>

**Table 3. NIAB Spring Sown Onion Trials from seed 2013- rots by category**

Sites: Rix (Essex) and Raker (Norfolk)

Varieties in maturity order (mean of both sites)

Main varieties 3 replicates; Preliminary varieties 2 replicates of data

	Population & Yield											
Variety	% Base Rots			% Neck Rots			% Bacterial Rots			% Penicillium		
	Rix	Rake r	Mea n	Rix	Rake r	Mea n	Rix	Rake r	Mea n	Rix	Raker	Mean
<b>BROWNS</b>												
Hypark	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0
Hybound	0.0	0.0	0.0	0.3	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Wellington	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0
Hybing	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.0	0.1	0.0	0.0	0.0
<i>Hysky</i>	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.3</i>	<i>0.2</i>	0.2	<i>0.0</i>	<i>0.0</i>	0.0
Medaillon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0
NIZ 37-83	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.1	0.0	0.0	0.0
<i>SV3700ND</i>	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.2</i>	<i>0.0</i>	0.1	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.0</i>	<i>0.0</i>	0.0
Bennito	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0
Hytech	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.3	0.2	0.0	0.0	0.0
Motion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0
Napoleon	0.1	0.0	0.1	0.0	0.2	0.1	0.0	0.3	0.2	0.0	0.0	0.0
Vision	0.0	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Centro	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.3	0.0	0.0	0.0
RS	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0
NIZ 37-84	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.0	0.0
Paradiso	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mannito	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.2	0.1	0.0	0.0	0.0
<i>SV3557ND</i>	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.2</i>	<i>0.0</i>	0.1	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.0</i>	<i>0.0</i>	0.0
Tangito	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Hystore</i>	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.5</i>	<i>0.0</i>	0.3	<i>0.2</i>	<i>0.3</i>	0.3	<i>0.0</i>	<i>0.0</i>	0.0
Santero	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0
NIZ 37-89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.4	0.0	0.0	0.0
<i>SV9249ND</i>	<i>0.0</i>	<i>0.2</i>	0.1	<i>0.0</i>	<i>0.2</i>	0.1	<i>0.2</i>	<i>0.0</i>	0.1	<i>0.0</i>	<i>0.0</i>	0.0
<i>RX</i>	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.2</i>	<i>0.0</i>	0.1	<i>0.0</i>	<i>0.0</i>	0.0
<i>Action</i>	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.0</i>	<i>0.0</i>	0.0
Arthur	0.0	0.0	0.0	1.3	0.0	0.6	0.0	0.2	0.1	0.0	0.0	0.0
<b>Means</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.1</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>REDS</b>												
Red Light	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.2	0.0	0.0	0.0
<i>af 1.11</i>	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.0</i>	<i>0.0</i>	0.0	9.5	<i>0.0</i>	4.7	<i>0.0</i>	<i>0.0</i>	0.0
Red Planet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Tide	0.0	0.0	0.0	0.6	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Redspark	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0
af 1.75	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.0	0.0
<i>af 222</i>	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.0</i>	<i>0.3</i>	0.1	<i>0.0</i>	<i>0.0</i>	0.0	<i>0.0</i>	<i>0.0</i>	0.0
Retano	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.2	0.1
Red Baron	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Means</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>	<b>0.0</b>	<b>0.1</b>	<b>1.1</b>	<b>0.1</b>	<b>0.6</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

**Table 4. NIAB Spring Onion Trials from seed 2013– Bulb Quality data**

Sites: Rix (Essex) and Raker (Norfolk)

Varieties in maturity order (mean of both sites)

Main varieties 3 replicates; Preliminary varieties 2 replicates of data

Variety	Bulb Quality (1-9)														
	Skin Colour 1=pale 9=dark			Skin Protection 1=poor 9=good			Bulb Shape 1=flat 5=round 9=elongate			Uniformity 1=poor 9=good			Firmness 1=poor 9=good		
	Rix	Rake r	Av	Rix	Rake r	Av	Rix	Rake r	Av	Rix	Rake r	Av	Rix	Rake r	Av
<b>BROWNS</b>															
Hypark	6.0	6.0	6.0	7.0	7.0	7.0	5.0	4.5	4.8	7.0	7.0	7.0	7.0	7.0	7.0
Hybound	6.0	6.0	6.0	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
Wellington	6.5	6.5	6.5	7.0	7.0	7.0	5.0	5.0	5.0	6.5	7.0	6.8	7.0	7.0	7.0
Hybing	6.0	5.5	5.8	7.0	7.0	7.0	5.0	4.5	4.8	6.5	6.5	6.5	7.0	7.0	7.0
<i>Hysky</i>	6.0	5.5	5.8	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
Medaillon	6.0	5.5	5.8	7.0	7.0	7.0	5.0	4.5	4.8	7.0	6.5	6.8	7.0	7.0	7.0
NIZ 37-83	6.0	6.0	6.0	7.0	7.0	7.0	5.0	4.5	4.8	7.0	7.0	7.0	7.0	7.0	7.0
<i>SV3700ND</i>	6.5	6.5	6.5	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
Bennito	6.5	6.5	6.5	7.0	7.0	7.0	5.0	4.5	4.8	7.0	7.0	7.0	7.0	7.0	7.0
Hytech	5.5	6.0	5.8	7.0	6.5	6.8	5.0	4.5	4.8	7.0	6.5	6.8	7.0	7.0	7.0
Motion	6.0	6.0	6.0	7.0	7.0	7.0	5.0	4.5	4.8	6.5	6.5	6.5	7.0	7.0	7.0
Napoleon	5.5	5.5	5.5	7.0	7.0	7.0	5.0	4.5	4.8	7.0	7.0	7.0	7.0	7.0	7.0
Vision	6.0	6.0	6.0	7.0	7.0	7.0	5.0	4.5	4.8	6.5	7.0	6.8	7.0	7.0	7.0
Centro	6.0	6.0	6.0	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
RS	6.0	6.0	6.0	7.0	7.0	7.0	5.0	5.0	5.0	6.5	6.0	6.3	7.0	7.0	7.0
NIZ 37-84	6.0	6.0	6.0	7.0	7.0	7.0	5.0	4.5	4.8	6.5	6.5	6.5	7.0	7.0	7.0
Paradiso	6.5	6.0	6.3	7.0	7.0	7.0	5.0	5.0	5.0	6.5	6.5	6.5	7.0	7.0	7.0
Mannito	6.0	6.0	6.0	7.0	7.0	7.0	5.0	5.0	5.0	6.5	6.5	6.5	7.0	7.0	7.0
<i>SV3557ND</i>	6.0	5.5	5.8	7.0	7.0	7.0	5.0	5.0	5.0	6.5	6.5	6.5	7.0	7.0	7.0
Tangito	6.0	6.0	6.0	7.0	6.0	6.5	5.0	5.0	5.0	7.0	6.5	6.8	7.0	7.0	7.0
<i>Hystore</i>	6.0	6.0	6.0	7.0	6.0	6.5	5.0	5.0	5.0	6.5	7.0	6.8	7.0	7.0	7.0
Santero	6.0	6.5	6.3	7.0	7.0	7.0	5.0	5.0	5.0	7.0	6.5	6.8	7.0	7.0	7.0
NIZ 37-89	6.0	6.0	6.0	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
<i>SV9249ND</i>	6.0	6.0	6.0	7.0	7.0	7.0	5.0	5.0	5.0	7.0	6.5	6.8	7.0	7.0	7.0
<i>RX</i>	6.0	6.0	6.0	7.0	7.0	7.0	5.0	5.0	5.0	6.5	7.0	6.8	7.0	7.0	7.0
<i>Action</i>	7.0	6.0	6.5	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
Arthur	6.5	6.0	6.3	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
<b>Means</b>	<b>6.1</b>	<b>6.0</b>	<b>6.0</b>	<b>7.0</b>	<b>6.9</b>	<b>7.0</b>	<b>5.0</b>	<b>4.8</b>	<b>4.9</b>	<b>6.8</b>	<b>6.8</b>	<b>6.8</b>	<b>7.0</b>	<b>7.0</b>	<b>7.0</b>
<b>REDS</b>															
Red Light	7.0	7.0	7.0	6.0	6.0	6.0	5.0	4.5	4.8	6.5	6.5	6.5	7.0	7.0	7.0
<i>af 1.11</i>	6.0	6.5	6.3	7.0	7.0	7.0	5.0	4.5	4.8	6.5	6.5	6.5	7.0	7.0	7.0
Red Planet	5.5	6.0	5.8	7.0	7.0	7.0	5.0	4.5	4.8	6.5	6.5	6.5	7.0	7.0	7.0
Red Tide	6.5	6.5	6.5	7.0	7.0	7.0	5.0	4.5	4.8	7.0	6.5	6.8	7.0	7.0	7.0
Redspark	6.5	7.0	6.8	7.0	7.0	7.0	5.0	4.5	4.8	6.5	6.5	6.5	7.0	7.0	7.0
<i>af 1.75</i>	6.5	6.5	6.5	7.0	7.0	7.0	5.0	4.5	4.8	6.5	7.0	6.8	7.0	7.0	7.0
<i>af 222</i>	6.5	6.5	6.5	7.0	7.0	7.0	5.0	4.5	4.8	6.5	7.0	6.8	7.0	7.0	7.0
Retano	7.0	7.0	7.0	7.0	7.0	7.0	5.0	4.5	4.8	7.0	7.0	7.0	7.0	7.0	7.0
Red Baron	7.0	7.0	7.0	7.0	7.0	7.0	5.0	4.5	4.8	6.5	6.0	6.3	7.0	7.0	7.0
<b>Means</b>	<b>6.5</b>	<b>6.7</b>	<b>6.6</b>	<b>6.9</b>	<b>6.9</b>	<b>6.9</b>	<b>5.0</b>	<b>4.5</b>	<b>4.8</b>	<b>6.6</b>	<b>6.6</b>	<b>6.6</b>	<b>7.0</b>	<b>7.0</b>	<b>7.0</b>

**Table 5. NIAB Spring Sown Trials from seed 2012 – vigour and plant characteristics**

Sites: Rix (Essex) and Raker (Norfolk)

Varieties in maturity order (mean of both sites)

*Main varieties 3 replicates; Preliminary varieties 2 replicates of data x*

	Early vigour 1-9 9=vigorous			Establishment %			Habit/density (July) 1-9 9=dense		
variety	Rix	Rake r	Mean	Rix	Rake r	Mean	Rix	Raker	Mean
<b>BROWNS</b>									
Hypark	7.2	7.0	7.1	87	90	88	7.3	7.0	7.2
Hybound	7.7	6.3	7.0	90	90	90	7.0	7.0	7.0
Wellington	7.2	7.0	7.1	90	90	90	8.0	7.3	7.7
Hybing	7.0	7.3	7.2	82	90	86	7.3	7.3	7.3
Hysky	7.3	7.0	7.1	85	90	88	7.0	7.5	7.3
Medaillon	7.0	6.7	6.8	87	90	88	7.0	7.3	7.2
NIZ 37-83	7.0	7.7	7.3	82	90	86	8.0	7.0	7.5
SV3700ND	7.5	7.0	7.3	88	90	89	7.0	7.0	7.0
Bennito	7.3	7.3	7.3	85	90	88	7.3	7.0	7.2
Hytech	7.2	7.0	7.1	90	90	90	6.3	7.0	6.7
Motion	7.5	7.3	7.4	90	90	90	7.0	7.3	7.2
Napoleon	6.8	7.3	7.1	82	90	86	7.0	7.0	7.0
Vision	7.3	7.3	7.3	85	90	88	7.7	7.3	7.5
Centro	7.2	7.0	7.1	87	90	88	7.0	7.0	7.0
RS	7.3	7.7	7.5	90	90	90	6.7	7.3	7.0
NIZ 37-84	7.0	8.0	7.5	82	90	86	7.3	7.0	7.2
Paradiso	7.7	7.3	7.5	90	90	90	7.0	7.0	7.0
Mannito	7.7	7.7	7.7	90	90	90	7.0	7.0	7.0
SV3557ND	7.0	7.0	7.0	80	90	85	6.5	7.0	6.8
Tangito	7.2	7.7	7.4	83	90	87	7.0	7.3	7.2
Hystore	7.0	7.0	7.0	90	90	90	7.0	7.0	7.0
Santero	6.8	7.7	7.3	87	90	88	6.0	6.7	6.4
NIZ 37-89	7.3	7.7	7.5	85	90	88	7.3	6.7	7.0
SV9249ND	7.0	7.0	7.0	85	90	88	7.0	7.0	7.0
RX	7.0	7.0	7.0	90	90	90	7.0	7.5	7.3
Action	8.0	7.5	7.8	90	90	90	6.5	7.0	6.8
Arthur	7.2	7.0	7.1	87	90	88	7.0	7.0	7.0
<b>Means</b>	<b>7.2</b>	<b>7.2</b>	<b>7.2</b>	<b>87</b>	<b>90</b>	<b>88</b>	<b>7.0</b>	<b>7.1</b>	<b>7.1</b>
<b>REDS</b>									
Red Light	7.0	8.0	7.5	87	90	88	8.0	7.3	7.7
af 1.11	6.0	7.5	6.8	80	90	85	8.0	7.0	7.5
Red Planet	6.7	7.0	6.8	80	90	85	7.3	8.0	7.7
Red Tide	6.8	7.3	7.1	82	90	86	8.0	7.3	7.7
Redspark	7.0	7.7	7.3	87	90	88	7.7	7.3	7.5
af 1.75	6.8	7.7	7.3	88	90	89	7.7	7.7	7.7
af 222	6.8	7.5	7.1	85	90	88	8.0	7.5	7.8
Retano	6.8	8.0	7.4	83	90	87	7.3	6.7	7.0
Red Baron	7.0	7.3	7.2	83	90	87	7.7	7.3	7.5
<b>Means</b>	<b>6.8</b>	<b>7.6</b>	<b>7.2</b>	<b>84</b>	<b>90</b>	<b>87</b>	<b>7.7</b>	<b>7.3</b>	<b>7.5</b>

**Table 6. NIAB Spring Sown Onion Trials from seed 2013 - Onion Ring Data**

Sites: Rix (Essex) and Raker (Norfolk)

Varieties in maturity order (mean of both sites)

*Preliminary varieties 2 replicates of data*

	% Bulbs with single centres		
Variety	Essex	Norfolk	Mean
<b>BROWNS</b>			
Hypark	87.0	77.8	82.4
Hybound	71.0	82.2	76.6
Wellington	78.0	77.8	77.9
Hybing	80.0	77.8	78.9
<i>Hysky</i>	<i>100.0</i>	73.3	86.7
Medaillon	81.6	73.3	77.5
NIZ 37-83	57.8	48.9	53.3
<i>SV3700ND</i>	<i>100.0</i>	86.7	93.3
Bennito	75.6	66.7	71.1
Hytech	83.3	71.1	77.2
Motion	88.1	75.6	81.8
Napoleon	73.3	75.6	74.4
Vision	73.3	71.1	72.2
Centro	91.1	66.7	78.9
RS 07751481	75.0	44.4	59.7
NIZ 37-84	59.5	48.9	54.2
Paradiso	64.4	44.4	54.4
Mannito	75.6	48.9	62.2
<i>SV3557ND</i>	<i>93.3</i>	63.3	78.3
Tangito	83.3	62.2	72.8
<i>Hystore</i>	<i>71.4</i>	86.7	79.0
Santero	93.3	88.9	91.1
NIZ 37-89	86.1	76.7	81.4
<i>SV9249ND</i>	<i>44.4</i>	66.7	55.6
<i>RX 07764947</i>	<i>75.0</i>	80.0	77.5
<i>Action</i>	<i>75.0</i>	70.0	72.5
Arthur	60.9	40.0	50.4
<b>Means</b>	<b>77.7</b>	<b>68.4</b>	<b>73.0</b>
<b>REDS</b>			
Red Light	71.1	66.7	68.9
<i>af 1.11</i>	<i>100.0</i>	90.0	95.0
Red Planet	78.4	88.9	83.6
Red Tide	91.1	75.6	83.3
Redspark	80.0	44.4	62.2
af 1.75	91.1	77.8	84.4
<i>af 222</i>	<i>90.0</i>	73.3	81.7
Retano	82.2	80.0	81.1
Red Baron	82.2	73.3	77.8
<b>Means</b>	<b>85.1</b>	<b>74.4</b>	<b>79.8</b>

**Table 7. NIAB Spring Sown Onion Trials from seed 2013 – Storage data (Ambient) Assessments April/May 2014**

Sites: Rix (Essex) and Raker (Norfolk)  
 Varieties in maturity order (mean of both sites)  
*Preliminary varieties 2 replicates of data*

Variety	% sound Late April			% sound Late May			% sound CE storage late July
	Rix	Raker	Mean	Rix	Raker	Mean	Rix
<b>BROWNS</b>							
Hypark	74	70	72	16	24	20	12
Hybound	82	80	81	22	36	29	36
Wellington	73	83	78	26	44	35	45
Hybing	75	67	71	19	22	21	31
<i>Hysky</i>	78	94	86	26	66	46	44
Medaillon	85	82	83	16	27	21	40
NIZ 37-83	83	72	78	22	36	29	31
<i>SV3700ND</i>	74	86	80	18	54	36	34
Bennito	69	52	60	8	14	11	17
Hytech	63	71	67	13	23	18	15
Motion	82	88	85	19	44	31	39
Napoleon	64	79	72	16	33	25	39
Vision	88	82	85	37	46	41	63
Centro	54	71	62	14	27	20	21
RS 07751481	43	57	50	9	17	13	27
NIZ 37-84	76	60	68	15	17	16	25
Paradiso	72	65	68	17	24	21	22
Mannito	53	70	62	17	34	25	31
<i>SV3557ND</i>	76	84	80	18	41	30	21
Tangito	51	63	57	11	20	15	20
<i>Hystore</i>	65	75	70	21	41	31	26
Santero	74	76	75	12	25	18	38
NIZ 37-89	84	84	84	21	46	34	39
<i>SV9249ND</i>	71	59	65	13	23	18	8
<i>RX 07764947</i>	75	58	66	10	28	19	9
<i>Action</i>	75	89	82	35	60	47	38
Arthur	62	37	50	5	13	9	6
<b>Means</b>	<b>71</b>	<b>72</b>	<b>72</b>	<b>18</b>	<b>33</b>	<b>25</b>	<b>29</b>
<b>REDS</b>							
Red Light	59	32	45	11	13	12	54
<i>af 1.11</i>	89	86	87	35	37	36	35
Red Planet	80	67	73	14	21	18	18
Red Tide	87	79	83	14	29	22	36
Redspark	79	69	74	42	34	38	42
Red Comet	82	81	82	14	40	27	23
<i>af 222</i>	66	81	74	28	44	36	28
Retano	80	54	67	14	15	14	28
Red Baron	70	74	72	14	28	21	18
<b>Means</b>	<b>77</b>	<b>69</b>	<b>73</b>	<b>21</b>	<b>29</b>	<b>25</b>	<b>31</b>