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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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CONTENTS

Headline 5
Background 5
Results of the Onion Trials 6
Results – Onion varieties 6
Trial records and data collected –onion trials drilled from seed 6
Table A. NIAB Spring Sown Onion Trials drilled from seed 2019 – Varieties, Maturities, Yield & Storage 7
Trial site details 8
Production details 8
Trial design 8
Trial records and data collected 8
Discussion 8
Conclusions 11
Financial Benefits 12
Action Points 13
Technology transfer 13
Appendices 15
Table 1. NIAB Spring Sown Onion Trials from seed 2019 – varieties 15
Table 2. NIAB Spring Sown Onion Trials from seed 2019- Yield data 16
Table 3. NIAB Spring Sown Onion Trials from seed 2019 - rots by category 17
Table 4. NIAB Spring Onion Trials from seed 2019 – Bulb Quality data 18
Table 5. NIAB Spring Sown Trials from seed 2019 – vigour and plant characteristics 19
Table 6. NIAB Spring Sown Onion Trials from seed 2019 - Onion Ring Data 20
Table 7. NIAB Spring Sown Onion Trials from seed 2018 – Storage data (Ambient) Assessments Apr/May 2019 21
Table 8. NIAB Spring Sown Onion Trials from seed 2018 – Storage data (Ambient) Assessments May 2019 (cold storage late June 2019) 22

ONIONS

Headline

- New varieties add positively to the choices available to growers offering excellent storage potential; a broader range of red varieties; and mildew resistance.
- Lower plant populations will see an increase in the percentage of larger bulbs but the lower number of bulbs may affect gross yield and there may be issues with quality e.g. higher number of bolters

Background

The aim of the work is to provide independent assessment of the growth habit, yield, quality and storage potential of new onion varieties, propagated from seed, to 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. Establish varieties are included to give comparison with newer varieties and to evaluate performance stability. Growers have the opportunity to inspect the trials at key stages.

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 trial field and storage data is essential for growers to make informed decisions when selecting varieties.

Drilled onions account for approximately 70% of the area grown in the UK. Early maturing varieties such as Hybing, Hybound, Centro and Vision are popular. New material is competing to take a share of the early maturing variety market. Early main crop varieties hold the majority of the acreage but mid-range and late maturing varieties still hold a proportion but in cool seasons are only likely to mature properly on fertile soils. A range of maturities can still play an important part in spreading the harvest window. Red Baron still commands a large but diminishing percentage of the red area with Red Tide and Retano gaining popularity.

Understanding the relationship between soil type and drilling densities and plant establishment are important in not just yield but in the distribution of size grades within

the harvested crop. Effects on quality and gross yields are also likely to seen if populations drop too far below the ‘standard’ populations.

Results of the Onion Trials

Results – Onion varieties

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.

Table A. NIAB Spring Sown Onion Trials drilled from seed 2019 – 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 >40mm (t/ha)	Ambient Storage % sound bulbs at end May	Cold Storage % sound bulbs at end July
BROWNS					
Medusa	Takii	15-Aug	*99.6*		
Numbito	Agility/Seminis	19-Aug	*73.9*		
SVDN0110	*Agility/Seminis*	*19-Aug*	*72.0*		
Hybing	Bejo/DGS	19-Aug	*70.0*		
Hybound	Bejo/DGS	20-Aug	*69.4*		
Hypark	Bejo/DGS	21-Aug	*67.4*		
SVDN0233	*Agility/Seminis*	*21-Aug*	*66.0*		
SG 8360	*Syngenta*	*21-Aug*	*67.7*		
Vision	Syngenta	21-Aug	*68.3*		
Shakito	Agility/Seminis	22-Aug	*70.1*		
Medaillon	Syngenta	23-Aug	*67.1*		
Centro	Hazera	24-Aug	*69.0*		
Packito	Agility/Seminis	24-Aug	*70.3*		
Hyway	Bejo/DGS	24-Aug	*74.1*		
Bruce	Takii	24-Aug	*64.4*		
Bennito	Agility/Seminis	25-Aug	*68.6*		
Hybound (n-p)	Bejo/DGS	26-Aug	*67.4*		
Hytech	Bejo/DGS	28-Aug	*68.0*		
Hyroad	Bejo/DGS	29-Aug	*68.5*		
Fasto	Hazera	29-Aug	*68.3*		
Hysky	Bejo/DGS	29-Aug	*70.3*		
Motion	Syngenta	30-Aug	*69.6*		
Hyfive	Bejo/DGS	31-Aug	*68.8*		
Hylander	Bejo/DGS	31-Aug	*70.4*		
SG 8359	*Syngenta*	*31-Aug*	*69.1*		
Santero	Hazera	06-Sep	*68.9*		
Elista	ProVeg	12-Sep	*42.8*		
Means		**25-Aug**	**69.3**		
REDS					
Red Light	Bejo/DGS	18-Aug	*69.3*		
Ruby Star	Takii	21-Aug	*59.0*		
Red Tide	Bejo/DGS	22-Aug	*64.1*		
37-111	Hazera	24-Aug	*50.9*		
37-222	Hazera	28-Aug	*60.3*		
Red Herald	Allium Seeds	30-Aug	*53.4*		
Red Baron	Bejo/DGS	31-Aug	*58.3*		
37-123	*Hazera*	*01-Sep*	*59.1*		
Retano	Hazera	02-Sep	*53.8*		
Karminka	ProVeg	05-Sep	*40.3*		
Means		**28-Aug**	**56.8**		

Trial site details
Sites were agreed with AHDB Horticulture/BOPA through a steering group, storage was at NIAB in an ambient store and at P G Rix in commercial cold store.

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

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

Production details
The trials were drilled on 8th March (Norfolk) and 26th March (Essex) and were harvested on 5th September (Norfolk) and 12th September (Essex).

Trial design
The trial designs were randomised complete block.
The main trials had 3 replicates and the preliminary varieties only 2 replicates which were randomised with the first two replicates of the main trial.

Trial records and data collected
The 2019 season average maturities of brown onions were in line with the 10 year averages – 2018 had been a week earlier for the browns and approximately two weeks earlier for the red onions.
A wet early spring meant that the Norfolk trial went in during a dry couple of days but the Essex trial had to wait for conditions to improve. Both trials established well. April and May saw no extremes of temperature to cause complications. A hot June saw the trials catch up a bit by the summer equinox – Norfolk was at 5TL (true leaves) and Essex at 4-5TL.
Fusarium was less of an issue than in 2018 but mildew came into the Norfolk trial in early August and was difficult to control from that point onwards.
Both trials followed local commercial agronomy. Maleic hydrazide was not applied to either trial.

Key varieties are discussed below.

Discussion
There is a good range of maturities allowing growers to spread their harvest period. A series of warmer years has seen the average maturity date shifting to earlier in the

year. This will also have been affected by an increased number of earlier maturing varieties coming through into trials and thus shifting the split of early to main crop varieties.
The majority of varieties reached maturity as expected at the end of the summer and while August and September had wet periods the trials were able to be harvested in a timely fashion.
However, in cooler years, such as 2013, we see the maturity dates shifting later in the year and the opportunities to harvest later maturing varieties can run over into October which can result in bulbs having poorer initiation, being harder to dry and consequently inferior storage.

For organic growers and for high disease pressure years the mildew resistant varieties offer potential – Santero was the highest yielding variety on the mildew affected Norfolk site in 2014 – significant levels of mildew were late in developing so the mildew resistant varieties or those with a degree of tolerance did not have a chance to outperform the others.
Plant breeders continue to attempt to breed mildew resistance into commercially viable new varieties. Getting the resistance genes into varieties that have high yields, good quality and good storage potential has proved a challenge with some success seen in brown varieties but very limited success in the reds.

Establishment was good in Norfolk but poorer in parts of the Essex trial. The seed beds in Norfolk had a good tilth but the Essex soil came up a bit cloddy and plant losses occurred where the seed bed did not consolidate well. The growing season started with cool conditions but then the summer was warm and dry. Crops matured in line with the 10 year averages. Commercial crops were affected by drilling dates – those that went in early tending to suffer more than those drilled in March. Late drilled material was also adversely affected – the trials were not as badly affected as some commercial material.

Numbito and SVDN0110 showed the most early vigour.

Medusa, Numbito, SVDN0110, Hybing and Hybound were the earliest maturing brown varieties of the trials. Red Light and Ruby Star were the earliest of the reds. Hypark, Vision and Fasto are also consistently early maturing browns and Red Tide in the reds.

The mean of trial yields in Norfolk was 70t/ha browns and 57t/ha reds, the trial was not adversely affected by rots or other grading losses.

The Essex trial yield means were 68t/ha browns and 57t/ha reds. A slow start may have contributed to yields being lower than in previous ‘normal’ seasons.

Over the last 5 years the 10 year average of the mean marketable yield has been creeping up by approx. 1 t/ha as better varieties become available and agronomic practices change and improve.

The highest yielding brown varieties (>60mm bulbs) were Medusa, Numbito and Fasto. Red Light, Red Tide and 37-222 were the highest yielding red variety.

Numbito, Hybing, Hybound, Hypark, SVND0233, Hyway, Hytech, Hysky and Hyfive were the best of the brown varieties for having high percentages of single centres. Redspark, 37-111 and Red Baron were the best of the reds for single centres.

Storage assessments in an ambient store were recorded in late-April and late-May 2019. Cold storage assessments were recorded in July 2019.

Storage potential continues to be a key factor for drilled crops. Fusarium and bacterial rots in the field were expressed through loss of yield at grading and immediately going into storage. Bulb quality was also poorer than in previous seasons.

Fasto, Hyroad, Hyway, Hysky and Hyfive all performed significantly above average in 2018/19.The new variety Bruce also performed above average along with Hybound and Motion.
Medaillon, Hyway, and Vision have consistently had above average percentages of sound bulbs at the late-May assessment.
Red Tide, Red Herald, Ruby Star and 37-222 performed well in the reds.

In cold storage the varieties Vision, Bruce, Hyway, Bossito and Hyfive were the best brown varieties for storage.
Red Tide and Retano were the best performing of the red varieties.

Stored bulb quality from the 2018 trials was generally poor throughout most of the brown varieties and the reds showed more softening. This was due to poor quality and

high disease pressure going into store. The 2019 trials have held up better regarding quality and the assessments will be in April and May 2020.

Conclusions

The yield potential of varieties can vary greatly. In the drilled trials this was approx. 57t/ha (27t/ha and 29t/ha in 2018 and 2017 respectively) between the highest and lowest yield means for brown varieties – although there was an exceptionally high and a weak performer then other varieties had a 10t/ha spread.

The trials yield data 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.

Varieties

Varieties need to match the grower's requirements and ideally have two or more above average characteristics e.g. for early maturity and high green plot yields, Fasto, is a suitable choice; for green plot yield and post storage yields. Numbito performed well for early vigour and green plot yield. Medaillon and Vision performed well in previous years. Fasto, and Numbito remain varieties to keep an eye on over the next couple of seasons. Bruce is one of the newest varieties looking like a reliable choice but will need a couple more years of data to confirm this.

In the drilled trials there was approx. 23t/ha between the highest and lowest yields (reds and browns, mean of both trials and excluding 3 non-standard varieties).

Drilled material (2018 trials) showed a difference of over 65%, between the best and worst storage potential from ambient store and of approx. 75% from cold storage.

Hybound, Numbito, Fasto, Hypark and Hybing are consistently early maturing brown varieties. Medusa was the earliest of the new brown varieties and SVDN0110 is also looking early.
Red Light is commonly one of the earliest reds; Ruby Star also looks to be early maturing. Red Tide is also at the early end of the spectrum.

The highest yielding brown varieties (>60mm bulbs) were Medusa, Numbito and Fasto.
Red Light, Red Tide and 37-222 were the highest yielding red variety.
Motion, Hypark, Hytech and Hybound have consistently been amongst the higher yielders.

Numbito, Hybing, Hybound, Hypark, SVND0233, Hyway, Hytech, Hysky and Hyfive were the best of the brown varieties for having high percentages of single centres. Redspark, 37-111 and Red Baron were the best of the reds for single centres.

Fasto, Hyroad, Hyway, Hysky and Hyfive all performed significantly above average in 2018/19.The new variety Bruce also performed above average along with Hybound and Motion.
Medaillon, Hyway, and Vision have consistently had above average percentages of sound bulbs at the late-May assessment.
Red Tide, Red Herald, Ruby Star and 37-222 performed well in the reds.

In cold storage the varieties Vision, Bruce, Hyway, Bossito and Hyfive were the best brown varieties for storage.
Red Tide and Retano were the best performing of the red varieties. Red Light has performed well previously.

Financial Benefits

The yield potential of varieties can vary greatly. In the drilled trials this was approx. 57t/ha and 29t/ha between the highest and lowest yielding browns and reds respectively (mean of both trials).

Yield out of store is also important. Drilled material show a difference of over 40% and 70% between the best and worst storage potential from ambient storage in the browns

and reds respectively. From cold storage the differences were approx. 75% for browns and reds.
Mildew resistant varieties require fewer and or cheaper fungicide programmes.

Action Points

- Select a range of varieties according to soil type, desired harvest period, habit vigour and disease tolerance.
- Select varieties best suited to your storage facilities.
- Varieties should match the market and available storage facilities – longer storing varieties give more options.
- In high disease pressure years growers material with good disease resistance e.g. mildew resistance – grow a range of varieties and use local knowledge of fields that could be disease hot spots.
- Seed cost is a factor in the selection of varieties

Technology transfer

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

Open days and events were also hosted on these occasions:

1. Drilled crop field open day in Norfolk – August 2019
2. Drilled crops harvested produce open day and technical presentations at NIAB, Cambridge – November 2019
3. Trials data and summary sheets available at Onion and Carrot Conference – November 2019

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.

Trials and onion related updates are regularly featured on social media through twitter @AHDB_Hort @basnapier @NIABTAG @BritishGrowers with a combined following of over 15,000 users.

BOPA monthly grower newsletters are also used to circulate key dates and information.

Appendices

Table 1. NIAB Spring Sown Onion Trials from seed 2019 – varieties

Sites: Rix (Essex) and Raker (Norfolk)

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

				Maturity		
				Date of 80% foliage fallover		
Variety	Status	Source	Primed or Force Treated	Essex	Norfolk	Mean
BROWNS						
Medusa	1	Takii	Y	20-Aug	10-Aug	15-Aug
Numbito	R	Agility/Seminis	Y	27-Aug	11-Aug	19-Aug
SVDN0110	*P*	*Agility/Seminis*	*Y*	*28-Aug*	*11-Aug*	*19-Aug*
Hybing	C	Bejo/DGS	Y	27-Aug	12-Aug	19-Aug
Hybound	R	Bejo/DGS	Y	28-Aug	13-Aug	20-Aug
Hypark	R	Bejo/DGS	Y	26-Aug	15-Aug	21-Aug
SVDN0233	*P*	*Agility/Seminis*	*Y*	*31-Aug*	*11-Aug*	*21-Aug*
SG 8360	*P*	*Syngenta*	*Y*	*29-Aug*	*14-Aug*	*21-Aug*
Vision	C	Syngenta	Y	25-Aug	18-Aug	21-Aug
Shakito	3	Agility/Seminis	Y	28-Aug	16-Aug	22-Aug
Medaillon	R	Syngenta	Y	03-Sep	13-Aug	23-Aug
Centro	C	Hazera	Y	01-Sep	15-Aug	24-Aug
Packito	4	Agility/Seminis	Y	27-Aug	21-Aug	24-Aug
Hyway	4	Bejo/DGS	Y	25-Aug	23-Aug	24-Aug
Bruce	2	Takii	Y	27-Aug	21-Aug	24-Aug
Bennito	R	Agility/Seminis	Y	30-Aug	20-Aug	25-Aug
Hybound (n-	R	Bejo/DGS	N	31-Aug	20-Aug	26-Aug
Hytech	C	Bejo/DGS	Y	30-Aug	27-Aug	28-Aug
Hyroad	1	Bejo/DGS	Y	02-Sep	25-Aug	29-Aug
Fasto	3	Hazera	Y	04-Sep	24-Aug	29-Aug
Hysky	R	Bejo/DGS	Y	05-Sep	23-Aug	29-Aug
Motion	R	Syngenta	Y	03-Sep	27-Aug	30-Aug
Hyfive	4	Bejo/DGS	Y	03-Sep	28-Aug	31-Aug
Hylander	4	Bejo/DGS	Y	06-Sep	25-Aug	31-Aug
SG 8359	*P*	*Syngenta*	*Y*	*03-Sep*	*29-Aug*	*31-Aug*
Santero	R	Hazera	Y	15-Sep	29-Aug	06-Sep
Elista	2	ProVeg	Y	17-Sep	08-Sep	12-Sep
Means				**31-Aug**	**20-Aug**	**25-Aug**
REDS						
Red Light	R	Bejo/DGS	Y	27-Aug	10-Aug	18-Aug
Ruby Star	2	Takii	Y	28-Aug	14-Aug	21-Aug
Red Tide	R	Bejo/DGS	Y	28-Aug	17-Aug	22-Aug
37-111	3	Hazera	Y	31-Aug	18-Aug	24-Aug
37-222	3	Hazera	Y	01-Sep	24-Aug	28-Aug
Red Herald	4	Allium Seeds	Y	03-Sep	27-Aug	30-Aug
Red Baron	C	Bejo/DGS	Y	01-Sep	30-Aug	31-Aug
37-123	*P*	*Hazera*	*?*	*01-Sep*	*n/a*	*01-Sep*
Retano	R	Hazera	Y	07-Sep	29-Aug	02-Sep
Karminka	2	ProVeg	Y	09-Sep	02-Sep	05-Sep
Means				**01-Sep**	**22-Aug**	**28-Aug**

Table 2. NIAB Spring Sown Onion Trials from seed 2019- Yield data

Sites: Rix (Essex) and Raker (Norfolk)

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

	Population & Yield											
Variety	plant pop. (plants / sq. m)			marketable yield >40mm bulbs (t/ha)			marketable yield >60mm bulbs (t/ha)			% bulbs by weight >60mm		
	Rix	Raker	Mean	Rix	Raker	Mean	Rix	Raker	Mean	Rix	Raker	Mean
BROWNS												
Medusa	43.5	49.7	*46.6*	102.9	96.3	*99.6*	97.5	87.5	*92.5*	94.8	90.9	92.9
Numbito	43.3	45.1	*44.2*	73.2	74.5	*73.9*	63.0	63.8	*63.4*	86.0	85.6	85.8
SVDN0110	*48.1*	*52.1*	*50.1*	*74.0*	*70.0*	*72.0*	*58.5*	*47.3*	*52.9*	*79.1*	*67.4*	*73.3*
Hybing	46.1	45.7	*45.9*	69.0	71.0	*70.0*	53.8	56.7	*55.3*	78.1	79.6	78.9
Hybound	49.0	52.6	*50.8*	69.7	69.1	*69.4*	53.0	46.9	*50.0*	75.2	66.8	71.0
Hypark	44.4	47.1	*45.8*	65.1	69.7	*67.4*	51.2	53.4	*52.3*	77.5	75.8	76.6
SVDN0233	*42.2*	*42.9*	*42.5*	*66.1*	*65.9*	*66.0*	*53.5*	*51.5*	*52.5*	*81.4*	*78.3*	*79.8*
SG 8360	*44.9*	*53.5*	*49.2*	*64.8*	*70.6*	*67.7*	*53.2*	*48.7*	*50.9*	*81.0*	*68.5*	*74.8*
Vision	44.0	45.1	*44.5*	70.6	66.1	*68.3*	60.0	54.4	*57.2*	85.0	82.3	83.6
Shakito	43.1	44.6	*43.9*	67.5	72.6	*70.1*	56.4	61.3	*58.9*	83.3	84.4	83.9
Medaillon	40.9	41.7	*41.3*	63.9	70.3	*67.1*	50.6	59.8	*55.2*	78.9	85.0	81.9
Centro	43.1	45.9	*44.5*	67.4	70.6	*69.0*	57.3	57.8	*57.5*	85.0	81.8	83.4
Packito	45.7	46.9	*46.3*	73.3	67.4	*70.3*	60.1	51.1	*55.6*	82.0	75.1	78.5
Hyway	47.4	51.6	*49.5*	76.2	72.0	*74.1*	61.8	51.2	*56.5*	81.2	70.4	75.8
Bruce	36.3	41.8	*39.1*	63.6	65.3	*64.4*	56.8	56.7	*56.8*	89.1	86.9	88.0
Bennito	45.0	48.3	*46.7*	67.8	69.4	*68.6*	55.2	52.5	*53.8*	81.2	75.6	78.4
Hybound (n-p)	43.4	48.3	*45.8*	66.4	68.4	*67.4*	53.0	49.2	*51.1*	79.7	71.2	75.5
Hytech	44.5	46.5	*45.5*	64.4	71.7	*68.0*	50.9	60.6	*55.7*	79.0	84.5	81.7
Hyroad	44.4	44.3	*44.4*	70.3	66.7	*68.5*	58.4	54.7	*56.6*	83.1	82.0	82.6
Fasto	40.8	36.8	*38.8*	69.2	67.4	*68.3*	59.5	61.6	*60.5*	86.1	91.5	88.8
Hysky	42.4	47.0	*44.7*	62.5	78.0	*70.3*	49.2	66.7	*58.0*	78.6	85.2	81.9
Motion	45.0	47.0	*46.0*	66.8	72.4	*69.6*	51.1	56.8	*54.0*	76.2	78.4	77.3
Hyfive	49.0	47.7	*48.3*	69.8	67.9	*68.8*	53.3	49.9	*51.6*	76.2	73.0	74.6
Hylander	43.1	45.5	*45.4*	66.5	72.6	*70.4*	54.3	59.6	*56.9*	81.2	81.9	80.4
SG 8359	*48.3*	*47.0*	*45.4*	*70.3*	*73.7*	*69.1*	*53.0*	*59.8*	*55.4*	*75.3*	*81.1*	*79.8*
Santero	36.8	43.2	*40.0*	58.3	64.9	*68.9*	49.4	52.4	*50.9*	84.7	80.8	82.8
Elista	31.3	32.7	*32.0*	37.9	47.6	*42.8*	22.9	25.4	*24.1*	60.0	53.6	56.8
Means	**43.6**	**45.9**	**44.7**	**68.1**	**70.1**	**69.3**	**55.4**	**55.5**	**55.4**	**80.7**	**78.4**	**79.6**
REDS												
Red Light	37.8	38.8	*38.3*	66.1	72.5	*69.3*	57.9	67.2	*62.5*	87.2	92.6	89.9
Ruby Star	38.6	39.9	*39.2*	60.1	57.8	*59.0*	49.1	43.2	*46.2*	81.8	73.5	77.6
Red Tide	43.6	43.2	*43.4*	67.1	61.0	*64.1*	55.2	40.3	*47.7*	81.7	66.1	73.9
37-111	35.6	41.7	*38.6*	46.8	55.0	*50.9*	32.2	35.4	*33.8*	69.2	64.2	66.7
37-222	41.4	40.1	*40.7*	63.8	56.9	*60.3*	52.5	43.5	*48.0*	80.9	76.5	78.7
Red Herald	36.3	42.1	*39.2*	52.1	54.6	*53.4*	40.6	34.2	*37.4*	77.1	63.0	70.0
Red Baron	44.9	44.6	*44.8*	59.6	56.9	*58.3*	42.5	34.2	*38.4*	71.3	59.6	65.5
37-123	*42.6*	*n/a*	*42.6*	*59.1*	*n/a*	*59.1*	*46.2*	*n/a*	*46.2*	*77.9*	*n/a*	*77.9*
Retano	37.4	37.9	*37.6*	55.5	52.1	*53.8*	44.3	35.8	*40.1*	79.0	68.2	73.6
Karminka	40.8	27.7	*34.3*	43.5	37.1	*40.3*	19.7	21.3	*20.5*	40.1	57.7	48.9
Means	**39.9**	**39.5**	**39.9**	**57.4**	**56.0**	**56.8**	**44.0**	**39.5**	**42.1**	**74.6**	**69.0**	**72.3**

Table 3. NIAB Spring Sown Onion Trials from seed 2019 - rots by category

Sites: Rix (Essex) and Raker (Norfolk)

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

	Population & Yield														
Variety	% Base Rots			% Neck Rots			% bacterial rots			% Penicllium			total % defects (excl. rots)		
	Rix	Raker	Mean	Rix	Rak.	Mean	Rix	Rak.	Mean	Rix	Rak.	Mean	Rix	Rak.	Mean
BROWNS															
Medusa	0.2	0.0	*0.1*	0.0	0.0	*0.0*	0.2	0.0	*0.1*	0.0	0.0	*0.0*	0.5	1.1	0.8
Numbito	1.7	0.2	*0.9*	0.0	0.0	*0.0*	0.3	0.0	*0.2*	0.0	0.0	*0.0*	0.8	0.6	0.7
SVDN0110	*1.0*	*0.0*	*0.5*	*0.4*	*0.0*	*0.2*	*1.4*	*0.0*	*0.7*	*0.0*	*0.0*	*0.0*	*0.8*	*0.4*	*0.6*
Hybing	1.4	0.3	*0.9*	0.0	0.0	*0.0*	0.6	0.0	*0.3*	0.0	0.0	*0.0*	0.3	0.2	0.2
Hybound	0.5	0.3	*0.4*	0.3	0.0	*0.1*	0.1	0.0	*0.1*	0.0	0.0	*0.0*	0.8	0.0	0.4
Hypark	2.4	0.3	*1.3*	0.0	0.0	*0.0*	1.3	0.4	*0.9*	0.0	0.0	*0.0*	0.3	0.1	0.2
SVDN0233	*0.8*	*0.5*	*0.6*	*0.0*	*0.0*	*0.0*	*1.0*	*0.0*	*0.5*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
SG 8360	*1.3*	*0.6*	*1.0*	*0.0*	*0.0*	*0.0*	*2.0*	*0.2*	*1.1*	*0.0*	*0.0*	*0.0*	*2.2*	*0.8*	*1.5*
Vision	2.0	0.2	*1.1*	0.2	0.0	*0.1*	1.5	0.2	*0.8*	0.0	0.0	*0.0*	0.9	1.3	1.1
Shakito	1.5	0.0	*0.8*	0.0	0.0	*0.0*	1.5	0.0	*0.8*	0.0	0.0	*0.0*	1.9	0.3	1.1
Medaillon	1.7	0.9	*1.3*	0.0	0.0	*0.0*	0.3	0.3	*0.3*	0.0	0.0	*0.0*	1.4	0.5	1.0
Centro	0.8	0.0	*0.4*	0.0	0.0	*0.0*	0.9	0.0	*0.5*	0.0	0.0	*0.0*	0.9	0.0	0.5
Packito	1.5	0.0	*0.7*	0.2	0.0	*0.1*	0.7	0.0	*0.4*	0.0	0.0	*0.0*	0.3	0.2	0.2
Hyway	1.1	0.0	*0.6*	0.0	0.0	*0.0*	0.4	0.0	*0.2*	0.0	0.0	*0.0*	0.1	0.0	0.1
Bruce	2.6	0.0	*1.3*	0.0	0.0	*0.0*	1.1	0.0	*0.6*	0.0	0.0	*0.0*	1.3	0.3	0.8
Bennito	1.1	0.0	*0.6*	0.0	0.0	*0.0*	0.2	0.0	*0.1*	0.0	0.0	*0.0*	1.9	0.0	1.0
Hybound (n-p)	3.0	0.3	*1.7*	0.0	0.0	*0.0*	0.3	0.0	*0.1*	0.0	0.0	*0.0*	1.0	0.3	0.7
Hytech	2.9	0.6	*1.8*	0.0	0.0	*0.0*	1.2	0.0	*0.6*	0.0	0.0	*0.0*	1.0	0.2	0.6
Hyroad	1.7	0.2	*0.9*	0.5	0.0	*0.2*	0.9	0.0	*0.4*	0.0	0.0	*0.0*	0.8	0.5	0.6
Fasto	1.2	0.0	*0.6*	0.0	0.0	*0.0*	0.4	0.0	*0.2*	0.0	0.0	*0.0*	0.8	0.0	0.4
Hysky	1.0	0.2	*0.6*	0.2	0.0	*0.1*	1.3	0.0	*0.6*	0.0	0.0	*0.0*	0.5	0.3	0.4
Motion	1.2	0.0	*0.6*	0.3	0.0	*0.1*	0.7	0.0	*0.4*	0.0	0.0	*0.0*	0.9	0.2	0.5
Hyfive	1.2	0.2	*0.7*	0.1	0.0	*0.1*	0.9	0.0	*0.5*	0.0	0.0	*0.0*	0.4	0.0	0.2
Hylander	0.9	0.0	*0.8*	0.0	0.0	*0.0*	0.5	0.0	*0.4*	0.0	0.0	*0.0*	2.2	0.2	0.6
SG 8359	*0.4*	*0.2*	*0.9*	*0.0*	*0.0*	*0.0*	*1.2*	*0.0*	*0.5*	*0.0*	*0.0*	*0.0*	*1.2*	*0.2*	*0.6*
Santero	1.5	0.5	*1.0*	0.0	0.0	*0.0*	0.3	0.0	*0.2*	0.0	0.0	*0.0*	1.6	0.0	0.6
Elista	2.5	0.0	*1.2*	0.3	0.2	*0.2*	1.4	0.5	*0.9*	0.0	0.0	*0.0*	3.2	1.1	2.2
Means	**1.4**	**0.2**	**0.9**	**0.1**	**0.0**	**0.0**	**0.8**	**0.1**	**0.5**	**0.0**	**0.0**	**0.0**	**1.0**	**0.3**	**0.6**
REDS															
Red Light	0.0	0.0	*0.0*	0.0	0.0	*0.0*	0.7	0.0	*0.3*	0.0	0.0	*0.0*	0.9	1.5	1.2
Ruby Star	0.8	0.2	*0.5*	0.0	0.0	*0.0*	1.4	0.0	*0.7*	0.0	0.0	*0.0*	0.2	0.2	0.2
Red Tide	0.6	0.0	*0.3*	0.2	0.0	*0.1*	1.3	0.0	*0.6*	0.0	0.0	*0.0*	0.1	0.2	0.1
37-111	1.9	0.3	*1.1*	0.2	0.0	*0.1*	1.7	0.0	*0.8*	0.0	0.0	*0.0*	2.0	0.7	1.4
37-222	0.8	0.0	*0.4*	0.2	0.0	*0.1*	0.5	0.0	*0.2*	0.0	0.0	*0.0*	0.6	0.7	0.7
Red Herald	1.7	0.3	*1.0*	0.0	0.0	*0.0*	1.1	0.0	*0.5*	0.0	0.0	*0.0*	1.7	0.7	1.2
Red Baron	2.0	0.3	*1.2*	0.0	0.0	*0.0*	0.3	0.0	*0.1*	0.0	0.0	*0.0*	1.3	0.3	0.8
37-123	*1.0*	*n/a*	*1.0*	*0.5*	*n/a*	*0.5*	*3.3*	*n/a*	*3.3*	*0.0*	*n/a*	*0.0*	*0.3*	*n/a*	*0.3*
Retano	1.2	0.0	*0.6*	0.3	0.0	*0.2*	0.8	0.0	*0.4*	0.0	0.0	*0.0*	0.9	0.4	0.6
Karminka	1.3	0.6	*0.9*	0.5	0.0	*0.2*	2.4	0.3	*1.4*	0.0	0.0	*0.0*	1.6	1.4	1.5
Means	**1.1**	**0.2**	**0.7**	**0.2**	**0.0**	**0.1**	**1.3**	**0.0**	**0.8**	**0.0**	**0.0**	**0.0**	**1.0**	**0.7**	**0.8**

Table 4. NIAB Spring Onion Trials from seed 2019 – Bulb Quality data

Sites: Rix (Essex) and Raker (Norfolk)

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

	Bulb Quality (1-9)														
Variety	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	Raker	Av	Rix	Raker	Av	Rix	Raker	Av	Rix	Raker	Av	Rix	Raker	Av
BROWNS															
Medusa	6.5	7.0	6.8	6.5	6.0	6.3	6.0	6.0	6.0	7.0	6.5	6.8	7.0	7.0	7.0
Numbito	5.5	6.0	5.8	7.0	6.0	6.5	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
SVDN0110	*5.0*	*5.0*	*5.0*	*7.0*	*7.5*	*7.3*	*5.0*	*5.0*	*5.0*	*7.0*	*7.0*	*7.0*	*7.0*	*7.0*	*7.0*
Hybing	4.5	5.0	4.8	7.0	7.0	7.0	5.0	4.0	4.5	6.0	6.0	6.0	7.0	7.0	7.0
Hybound	4.5	5.0	4.8	7.0	8.0	7.5	5.0	5.0	5.0	7.0	8.0	7.5	7.0	7.0	7.0
Hypark	4.0	4.0	4.0	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
SVDN0233	*5.0*	*5.0*	*5.0*	*7.0*	*7.5*	*7.3*	*6.0*	*5.0*	*5.5*	*6.0*	*6.0*	*6.0*	*7.0*	*7.0*	*7.0*
SG 8360	*4.5*	*4.5*	*4.5*	*7.0*	*7.0*	*7.0*	*5.0*	*5.0*	*5.0*	*7.0*	*7.0*	*7.0*	*7.0*	*7.0*	*7.0*
Vision	5.0	6.0	5.5	8.0	8.0	8.0	5.0	5.5	5.3	7.0	7.0	7.0	7.0	7.0	7.0
Shakito	5.0	5.0	5.0	7.0	7.0	7.0	5.0	5.0	5.0	8.0	8.0	8.0	7.0	7.0	7.0
Medaillon	5.0	5.5	5.3	7.0	7.0	7.0	5.0	5.0	5.0	6.0	6.0	6.0	8.0	8.0	8.0
Centro	5.0	5.0	5.0	7.0	7.0	7.0	4.0	5.0	4.5	7.0	7.0	7.0	8.0	7.0	7.5
Packito	5.0	5.0	5.0	7.0	7.0	7.0	6.0	6.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0
Hyway	4.0	3.0	3.5	7.0	6.5	6.8	5.0	4.0	4.5	7.0	7.0	7.0	7.0	7.0	7.0
Bruce	5.0	5.5	5.3	7.0	7.0	7.0	6.0	6.0	6.0	7.0	6.0	6.5	7.0	6.0	6.5
Bennito	5.0	5.0	5.0	7.0	8.0	7.5	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
Hybound (n-p)	4.5	5.0	4.8	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
Hytech	4.0	5.0	4.5	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
Hyroad	5.0	4.0	4.5	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
Fasto	5.0	5.5	5.3	6.0	7.0	6.5	5.0	5.5	5.3	6.0	7.0	6.5	7.0	7.0	7.0
Hysky	4.5	5.0	4.8	6.5	7.5	7.0	5.0	5.5	5.3	8.0	8.0	8.0	7.0	7.0	7.0
Motion	5.0	5.0	5.0	7.0	6.0	6.5	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
Hyfive	4.0	5.0	4.5	7.0	6.0	6.5	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
Hylander	4.5	5.0	4.8	7.0	7.0	7.0	5.0	4.0	4.5	7.0	7.0	7.0	7.0	7.0	7.0
SG 8359	*5.0*	*5.0*	*5.0*	*7.0*	*7.0*	*7.0*	*5.0*	*5.0*	*5.0*	*7.0*	*7.0*	*7.0*	*7.0*	*7.0*	*7.0*
Santero	5.0	5.0	5.0	7.0	7.0	7.0	5.0	4.0	4.5	7.0	7.0	7.0	7.0	7.0	7.0
Elista	6.0	6.0	6.0	7.0	7.0	7.0	9.0	9.0	9.0	5.0	5.0	5.0	6.5	6.0	6.3
Means	**4.8**	**5.0**	**4.9**	**7.0**	**7.1**	**7.0**	**5.3**	**5.2**	**5.2**	**6.9**	**6.9**	**6.9**	**7.1**	**7.0**	**7.0**
REDS															
Red Light	5.0	5.5	5.3	7.0	5.0	6.0	5.0	4.0	4.5	7.0	6.0	6.5	7.0	6.0	6.5
Ruby Star	5.0	5.0	5.0	6.0	6.0	6.0	4.5	4.0	4.3	7.0	7.0	7.0	7.0	7.0	7.0
Red Tide	5.5	5.5	5.5	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
37-111	4.5	5.0	4.8	7.0	6.5	6.8	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
37-222	5.0	5.0	5.0	5.0	6.5	5.8	5.0	4.0	4.5	7.0	7.0	7.0	7.0	7.0	7.0
Red Herald	5.5	4.5	5.0	6.5	6.5	6.5	5.0	5.0	5.0	6.0	6.0	6.0	7.0	7.0	7.0
Red Baron	5.5	5.5	5.5	7.0	7.0	7.0	5.0	5.0	5.0	7.0	6.0	6.5	7.0	7.0	7.0
37-123	*5.0*	*N/A*	*5.0*	*6.0*	*N/A*	*6.0*	*6.0*	*N/A*	*6.0*	*6.0*	*N/A*	*6.0*	*7.0*	*N/A*	*7.0*
Retano	6.0	6.0	6.0	6.0	7.0	6.5	4.0	3.0	3.5	6.0	6.0	6.0	7.0	6.0	6.5
Karminka	4.0	4.0	4.0	7.0	6.5	6.8	9.0	9.0	9.0	6.0	5.5	5.8	6.0	5.0	5.5
Means	**5.1**	**5.1**	**5.1**	**6.5**	**6.4**	**6.4**	**5.4**	**4.9**	**5.2**	**6.6**	**6.4**	**6.5**	**6.9**	**6.6**	**6.8**

Table 5. NIAB Spring Sown Trials from seed 2019 – vigour and plant characteristics

Sites: Rix (Essex) and Raker (Norfolk)

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

	Establishment %			Early vigour 1-9 9=vigorous			Mid-June vigour/density 1-9 9=vigorous/dense		
variety	Rix	Raker	Mean	Rix	Raker	Mean	Rix		
BROWNS									
Medusa	95.0	95.0	95.0	7.0	8.0	7.5	8.3	8.0	8.2
Numbito	95.0	95.0	95.0	7.7	8.0	7.8	7.3	8.0	7.7
SVDN0110	*95.0*	*95.0*	*95.0*	*7.5*	*8.0*	*7.8*	*8.0*	*8.0*	*8.0*
Hybing	95.0	95.0	95.0	7.3	8.0	7.7	8.0	8.0	8.0
Hybound	95.0	95.0	95.0	7.0	7.3	7.2	8.0	8.0	8.0
Hypark	93.3	95.0	94.2	7.0	7.3	7.2	8.3	7.8	8.1
SVDN0233	*95.0*	*95.0*	*95.0*	*7.5*	*7.5*	*7.5*	*7.5*	*7.3*	*7.4*
SG 8360	*95.0*	*95.0*	*95.0*	*7.0*	*7.0*	*7.0*	*7.5*	*7.5*	*7.5*
Vision	95.0	95.0	95.0	7.0	7.0	7.0	8.0	7.0	7.5
Shakito	95.0	95.0	95.0	7.7	7.3	7.5	8.0	7.8	7.9
Medaillon	95.0	95.0	95.0	7.0	7.3	7.2	7.3	7.7	7.5
Centro	95.0	95.0	95.0	7.3	7.3	7.3	7.7	7.5	7.6
Packito	93.3	95.0	94.2	7.3	7.3	7.3	8.7	7.7	8.2
Hyway	95.0	95.0	95.0	7.0	7.7	7.3	8.3	7.7	8.0
Bruce	93.3	95.0	94.2	7.3	7.7	7.5	8.0	7.8	7.9
Bennito	95.0	95.0	95.0	7.3	7.7	7.5	8.0	7.5	7.8
Hybound (n-p)	95.0	95.0	95.0	7.0	7.0	7.0	7.7	7.8	7.8
Hytech	95.0	95.0	95.0	7.0	7.0	7.0	7.7	7.0	7.3
Hyroad	95.0	95.0	95.0	7.0	7.0	7.0	7.7	7.5	7.6
Fasto	95.0	93.3	94.2	7.0	7.7	7.3	7.7	7.5	7.6
Hysky	95.0	95.0	95.0	7.3	7.0	7.2	7.7	7.7	7.7
Motion	95.0	93.3	94.2	7.0	7.0	7.0	8.0	7.7	7.8
Hyfive	95.0	95.0	95.0	7.3	7.3	7.3	8.0	7.8	7.9
Hylander	93.3	95.0	94.2	7.0	7.7	7.3	7.0	8.0	7.5
SG 8359	*95.0*	*95.0*	*95.0*	*7.5*	*7.5*	*7.5*	*8.0*	*7.5*	*7.8*
Santero	90.0	95.0	92.5	7.0	7.3	7.2	6.0	7.8	6.9
Elista	88.3	86.7	87.5	7.3	6.0	6.7	7.0	6.0	6.5
Means	**94.3**	**94.6**	**94.4**	**7.2**	**7.4**	**7.3**	**7.8**	**7.6**	**7.7**
REDS									
Red Light	95.0	95.0	95.0	8.0	8.0	8.0	8.3	8.0	8.2
Ruby Star	95.0	95.0	95.0	7.0	7.3	7.2	7.7	7.7	7.7
Red Tide	95.0	95.0	95.0	7.7	7.7	7.7	8.3	7.7	8.0
37-111	95.0	93.3	94.2	7.0	6.3	6.7	6.7	7.2	6.9
37-222	95.0	91.7	93.3	7.7	6.7	7.2	8.0	7.0	7.5
Red Herald	93.3	95.0	94.2	7.3	7.3	7.3	7.7	7.5	7.6
Red Baron	95.0	95.0	95.0	7.0	7.3	7.2	8.0	7.2	7.6
37-123	*95.0*	*n/a*	*95.0*	*7.3*	*n/a*	*7.3*	*7.3*	*n/a*	*7.3*
Retano	93.3	93.3	93.3	7.7	7.0	7.3	6.7	7.0	6.8
Karminka	95.0	85.0	90.0	7.0	6.3	6.7	6.7	6.3	6.5
Means	**94.7**	**93.1**	**94.0**	**7.4**	**7.1**	**7.3**	**7.5**	**7.3**	**7.4**

Table 6. NIAB Spring Sown Onion Trials from seed 2019 - 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
BROWNS			
Medusa	28.9	35.6	32.2
Numbito	82.2	86.0	84.1
SVDN0110	*40.0*	*63.3*	*51.7*
Hybing	77.8	86.0	81.9
Hybound	66.7	91.1	78.9
Hypark	73.3	84.4	78.9
SVDN0233	*80.0*	*76.7*	*78.3*
SG 8360	*26.7*	*60.0*	*43.3*
Vision	28.9	51.1	40.0
Shakito	60.0	73.3	66.7
Medaillon	73.3	73.3	73.3
Centro	64.4	68.9	66.7
Packito	40.0	62.2	51.1
Hyway	73.3	82.2	77.8
Bruce	40.0	55.6	47.8
Bennito	44.4	57.8	51.1
Hybound (n-p)	53.3	88.9	71.1
Hytech	84.4	77.8	81.1
Hyroad	51.1	86.7	68.9
Fasto	37.8	80.0	58.9
Hysky	66.7	97.8	82.2
Motion	63.2	71.1	67.1
Hyfive	66.7	97.8	82.2
Hylander	68.9	82.2	65.9
SG 8359	*46.7*	*60.0*	*67.3*
Santero	53.3	73.3	63.3
Elista	76.4	24.4	50.4
Means	**58.1**	**72.1**	**65.3**
REDS			
Red Light	51.1	53.2	52.1
Ruby Star	17.8	46.7	32.2
Red Tide	55.6	77.3	66.4
37-111	89.3	93.3	91.3
37-222	44.4	77.0	60.7
Red Herald	44.4	42.1	43.2
Red Baron	54.6	86.7	70.6
37-123	*63.7*	*n/a*	*63.7*
Retano	44.4	80.0	62.2
Karminka	51.1	53.3	52.2
Means	**51.6**	**67.7**	**59.5**

Table 7. NIAB Spring Sown Onion Trials from seed 2018 – Storage data (Ambient) Assessments Apr/May 2019

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 cold storage July
	Rix	Raker	Mean	Rix	Raker	Mean	Rix
BROWNS							
Goblin	*58*	*74*	*66*	*21*	*66*	*43*	*56*
Hybing	73	89	81	41	80	61	33
Hypark	66	94	80	37	91	64	30
Fasto	86	95	91	64	90	77	45
Hybound	81	95	88	57	88	72	46
Numbito	78	87	83	52	83	67	49
Vision	71	84	77	50	78	64	68
TEON813	83	94	89	57	87	72	79
Novista	68	88	78	43	80	61	47
Medaillon	47	91	69	24	83	54	38
Bennito	55	80	68	28	75	51	38
Centro	69	89	79	38	86	62	40
Packito	59	76	68	33	70	51	35
Hytech	76	85	80	48	79	63	51
Hyroad	*77*	*92*	*85*	*58*	*89*	*74*	*43*
Santero	65	86	75	26	78	52	35
Hysky	85	94	89	58	91	74	49
Chico	73	86	80	58	80	69	38
Hyfive	87	95	91	72	93	83	59
Motion	83	92	87	53	89	71	36
Hyway	85	81	83	72	75	74	66
Bossito	71	78	75	48	73	61	57
Elista	70	67	69	55	51	53	45
means	**72**	**87**	**80**	**47**	**81**	**64**	**47**
REDS							
TEON502	81	97	89	80	94	87	36
Red Light	10	63	37	1	56	28	28
37-219	*67*		67	*51*		*51*	*37*
37-111	49	93	71	18	86	52	15
Monastrell	*0*	*38*	*19*	*0*	*31*	*16*	*2*
37-222	57	92	75	47	88	67	30
Karminka	18	54	36	4	40	22	26
Retano	57	78	67	38	71	54	46
Red Herald	56	88	72	43	85	64	21
Red Tide	77	89	83	62	85	74	57
Redspark	73	78	76	52	68	60	37
Red Baron	58	82	70	41	75	58	33
Red Baron (AS)	56	78	67	38	71	54	27
means	**51**	**78**	**64**	**37**	**71**	**54**	**30**

Table 8. NIAB Spring Sown Onion Trials from seed 2018 – Storage data (Ambient) Assessments May 2019 (cold storage late June 2019)

Sites: Rix (Essex) and Raker (Norfolk)

Varieties in maturity order (mean of both sites)

Preliminary varieties 2 replicates of data

Variety	firmness (1-9) 1=soft Late April			Total % rots Late May		
	Rix	Raker	Cold store	Rix	Raker	Cold store
BROWNS						
Goblin	*7.5*	*6.0*	*4.0*	*10*	*6*	*13*
Hybing	7.3	6.0	3.5	17	6	13
Hypark	7.3	7.0	6.0	25	5	19
Fasto	7.7	6.7	4.5	9	4	6
Hybound	7.7	7.0	4.5	17	3	28
Numbito	7.0	6.0	4.5	14	11	18
Vision	6.0	6.3	5.5	29	14	17
TEON813	7.0	6.7	3.0	22	3	10
Novista	7.7	6.3	3.5	31	11	38
Medaillon	7.3	7.0	5.0	43	7	49
Bennito	7.3	6.3	4.0	29	17	31
Centro	7.0	6.3	5.5	21	10	36
Packito	7.0	6.7	5.0	34	24	27
Hytech	8.0	6.3	4.5	19	13	20
Hyroad	*7.5*	*7.0*	*6.5*	*26*	*8*	*31*
Santero	8.0	6.7	6.0	25	10	35
Hysky	7.0	5.7	6.0	13	6	22
Chico	6.3	7.0	5.0	28	13	33
Hyfive	8.0	6.7	5.5	14	4	15
Motion	7.7	6.7	4.5	15	8	23
Hyway	7.0	6.3	6.0	21	18	26
Bossito	8.0	6.3	4.5	19	21	12
Elista	6.3	5.0	5.0	25	33	48
means	**7.3**	**6.4**	**4.9**	**22**	**11**	**25**
REDS						
TEON502	6.7	8.0	5.0	17	3	53
Red Light	6.7	5.3	3.5	30	30	26
37-219	*6.0*	-	*4.5*	*31*	-	*29*
37-111	7.3	7.0	4.5	37	4	55
Monastrell	*5.5*	*6.0*	*3.0*	*46*	*61*	*29*
37-222	7.0	7.0	3.5	40	8	41
Karminka	6.3	4.0	4.5	65	42	49
Retano	7.0	6.0	3.5	35	22	33
Red Herald	6.7	6.3	4.5	36	11	52
Red Tide	7.0	7.0	5.0	24	11	36
Redspark	7.3	6.3	4.5	21	19	40
Red Baron	7.0	6.3	3.0	37	16	41
Red Baron (AS)	7.0	6.0	4.0	37	19	42
means	**6.7**	**6.3**	**4.1**	**35**	**20**	**40**