

Project title: Onions - Independent assessment of field and storage potential of varieties

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Previous report:

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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 growing habits, 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 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 Redspark, Red Tide and Retano gaining popularity.

Onion set crops account for the majority of the remaining 30%. Overwintered onions are still grown but there are not enough varieties to warrant evaluation trials.

Results of the Variety Trials

Results – Drilled Onions

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 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:

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

The trials were harvested on 31st August (Norfolk) and 6th September (Essex). The 2018 season maturities were over a week earlier than the 10 year average while 2017 season was over two weeks earlier than the average.

Fusarium was a major problem in the Essex trial and bacterial rots in the Norfolk trial. The Fusarium had a significant impact on yield and storage results.

Table A. NIAB Spring Sown Onion Trials drilled from seed 2018 – 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					
<i>Goblin</i>	<i>Enza</i>	<i>03-Aug</i>	<i>35.8</i>	<i>43</i>	<i>56</i>
Hybing	Bejo/DGS	11-Aug	58.0	61	33
Hypark	Bejo/DGS	15-Aug	59.8	64	30
Fasto (37-104)	Hazera	16-Aug	59.1	77	45
Hybound (BGS 266)	Bejo/DGS	17-Aug	62.6	72	46
Numbito (SV3557ND)	Agility/Seminis	17-Aug	53.7	67	49
Vision	Syngenta	18-Aug	51.8	64	68
Bruce (TEON813)	Takii	18-Aug	55.2	72	79
Novista	Takii	19-Aug	45.5	61	47
Medaillon	Syngenta	19-Aug	45.7	54	38
Bennito	Agility/Seminis	20-Aug	53.7	51	38
Centro	Hazera	20-Aug	56.4	62	40
Packito (SV8528ND)	Agility/Seminis	22-Aug	51.5	51	35
Hytech	Bejo/DGS	23-Aug	56.1	63	51
<i>Hyroad (BGS 337)</i>	<i>Bejo/DGS</i>	<i>24-Aug</i>	<i>56.0</i>	<i>74</i>	<i>43</i>
Santero	Hazera	24-Aug	47.2	52	35
Hysky (BGS 289)	Bejo/DGS	25-Aug	55.6	74	49
Chico (37-89)	Hazera	25-Aug	48.1	69	38
Hyfive	Bejo/DGS	26-Aug	57.4	83	59

Motion	Syngenta	26-Aug	57.9	71	36
Hyway	Bejo/DGS	27-Aug	59.7	74	66
Bossito (SV1332ND)	Agility/Seminis	27-Aug	54.1	61	57
Elista	ProVeg	01-Sep	38.4	53	45
means		21-Aug	53.0	64	47
REDS					
Ruby Star (TEON502)	Takii	04-Aug	48.0	87	36
Red Light	Bejo/DGS	11-Aug	64.2	28	28
37-219	Hazera	15-Aug	37.3	51	37
37-111	Hazera	16-Aug	41.9	52	15
Monastrell	Enza	16-Aug	57.3	16	2
37-222	Hazera	16-Aug	44.3	67	30
Karminka	ProVeg	16-Aug	32.5	22	26
Retano	Hazera	17-Aug	45.1	54	46
Red Herald	Allium Seeds	19-Aug	43.0	64	21
Red Tide	Bejo/DGS	20-Aug	50.1	74	57
Redspark	Bejo/DGS	21-Aug	48.1	60	37
Red Baron	Bejo/DGS	25-Aug	46.3	58	33
Red Baron (AS)	Allium Seeds	27-Aug	46.0	54	27
means		17-Aug	46.5	54	30

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. However, in cooler years, such as 2013, the opportunities to harvest later maturing varieties can run over into October which can result in bulbs being harder to dry.

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.

Finding a drilling window was tricky and establishment was compromised by some capping on the Essex site. Seed beds at both sites had good tilth and the trial seed was drilled into moisture. The growing season started with a cold, dry spring followed by prolonged dry and hot weather. Crops matured earlier than usual.

Goblin, Hybing, Fasto and Hybing were the earliest maturing brown varieties of the drilled trials. Red Light and TEON502 were the earliest of the reds.

The mean of trial yields in Norfolk was 60t/ha browns and 53t/ha reds, the trial was affected by bacterial rots.

The Essex trial yield means were 46t/ha browns and 41t/ha reds. High levels of Fusarium had a significant impact on yields with many bulbs too rotten to harvest.

The highest yielding brown varieties were Fasto, Hyway, Hybound, Bossito and Hypark. Red Light was the highest yielding red variety.

Numbito, Hytech, Santero and Chico were the best of the brown varieties for having high percentages of single centres. Redspark, 37-111 and Red Tide 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.

Fasto, Hyroad, Hyway, Hysky and Hyfive all performed significantly above average in 2018/19.

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 and Hyfive were the best brown varieties for storage.

Red Tide and Retano were the best performing of the red varieties.

Stored bulb quality 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.

Main Conclusions

Drilled Trials

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, Hybound and Hypark are suitable choices; for green plot yield and post storage yields Hyway performed well – Medaillon and Vision performed well in previous years. Fasto, and Numbito are newer varieties to keep an eye on over the next couple of seasons.

In the drilled trials there was approx. 32t/ha between the highest and lowest yields (mean of both trials).

Drilled material showed a difference of over 70%, between the best and worst storage potential from ambient store and of approx. 75% from cold storage.

Mildew resistant varieties should 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

SCIENCE SECTION

Introduction

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. Established varieties are included to give comparison with newer varieties and to evaluate performance stability.

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.

Onion set crops account for the majority of the remaining 30%. Set crops provide earliness, broaden the establishment period and options on land with high blow risk and/or weed burden. Early crops avoid potentially challenging autumn harvest conditions and the earliest of these can attract a premium. Newer varieties 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. For variety results the last trials were in 2016.

Overwintered onions are still grown but there are not enough varieties to warrant evaluation trials.

Varieties and numbered selections included

Table B. NIAB Spring Sown Onion Trials drilled from seed 2018 – 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
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Medaillon	Syngenta	19-Aug	45.7	54	38
Bennito	Agility/Seminis	20-Aug	53.7	51	38
Centro	Hazera	20-Aug	56.4	62	40
Packito (SV8528ND)	Agility/Seminis	22-Aug	51.5	51	35
Hytech	Bejo/DGS	23-Aug	56.1	63	51
<i>Hyroad (BGS 337)</i>	<i>Bejo/DGS</i>	<i>24-Aug</i>	<i>56.0</i>	<i>74</i>	<i>43</i>
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37-219	<i>Hazera</i>	<i>15-Aug</i>	<i>37.3</i>	<i>51</i>	<i>37</i>
37-111	Hazera	16-Aug	41.9	52	15
<i>Monastrell</i>	<i>Enza</i>	<i>16-Aug</i>	<i>57.3</i>	<i>16</i>	<i>2</i>
37-222	Hazera	16-Aug	44.3	67	30
Karminka	ProVeg	16-Aug	32.5	22	26
Retano	Hazera	17-Aug	45.1	54	46
Red Herald	Allium Seeds	19-Aug	43.0	64	21
Red Tide	Bejo/DGS	20-Aug	50.1	74	57
Redspark	Bejo/DGS	21-Aug	48.1	60	37
Red Baron	Bejo/DGS	25-Aug	46.3	58	33
Red Baron (AS)	Allium Seeds	27-Aug	46.0	54	27
means		17-Aug	46.5	54	30

Trial site details

Sites were agreed with AHDB/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 20th March (Norfolk) and 26th March (Essex) and were harvested on 31st August (Norfolk) and 6th 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 2018 season average maturities of brown onions was approximately one week earlier than the 10 year average and approximately two weeks earlier for the red onions. The Norfolk trial was much earlier than normal. Establishment was affected by the cold temperatures in the spring and capping at the Essex trial. The summer temperatures were higher than average which contributed to the early maturities but also resulted in high levels of Fusarium in the Essex trial. Mildew was not an issue this year.

Both trials followed local commercial agronomy. Maleic hydrazide was not applied to either trial.

Key varieties are discussed below and summarised in Table B. Full data summaries are appended.

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 may 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 hot dry summer and dry autumn allowed most crops 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 – neither of the 2018 trials had significant levels of mildew.

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 Essex. Seed beds at both sites had good tilth and the trial seed was drilled into moisture, however 19mm of rain the day after drilling the Essex trial resulted in capping as further forecast rain never materialised. The growing season started with cold conditions but then the summer was hot and dry. Crops matured earlier than usual. Commercial crops were affected by the hot summer especially by diseases such as Fusarium and bacterial rots.

Goblin, Hybing, Fasto and Hybing were the earliest maturing brown varieties of the drilled trials. Red Light and Ruby Star were the earliest of the reds.

The mean of trial yields in Norfolk was 60t/ha browns and 53t/ha reds, the trial was affected by bacterial rots.

The Essex trial yield means were 46t/ha browns and 41t/ha reds. High levels of Fusarium had a significant impact on yields with many bulbs too rotten to harvest.

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. 2018 saw a dip back down but this can be attributed to high disease pressure.

The highest yielding brown varieties were Fasto, Hyway, Hybound, Bossito and Hypark.

Red Light was the highest yielding red variety.

Of the new brown varieties Hyroad yielded well but mainly in the Norfolk trial. Monastrell had high yields in the reds. 37-219 was only on the Essex site and was higher yielding than the average.

Fusarium severely compromised the yields in the Essex trial and due to its patchy nature means that varieties should be looked at over several years.

Numbito, Hytech, Santero and Chico were the best of the brown varieties for having high percentages of single centres. Redspark, 37-111 and Red Tide were the best of the reds for single centres.

Chico has consistently had high percentages of single centre over several years.

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 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.

Conclusions

The yield potential of varieties can vary greatly. In the drilled trials this was approx. 27t/ha (29t/ha in 2017) between the highest and lowest yield means for brown varieties.

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.

Drilled 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, Hybound and Hypark are suitable choices; for green plot yield and post storage yields Hyway performed well – Medaillon and Vision performed well in previous years. Fasto, and Numbito are newer varieties to keep an eye on over the next couple of seasons.

In the drilled trials there was approx. 32t/ha between the highest and lowest yields (reds and browns, mean of both trials).

Drilled material showed a difference of over 70%, between the best and worst storage potential from ambient store and of approx. 75% from cold storage.

Hybound, Fasto and Hybing are consistently early maturing brown varieties. Goblin was the earliest of the new brown varieties.

Red Light is commonly one of the earliest reds; Ruby Star also looks to be early maturing.

The highest yielding (bulbs >60mm) brown varieties were Motion, Hypark, Fasto, Bossito and Hytbound. Red Light and Monestrell were the highest yielding (bulbs >60mm) reds.

Hytech and Red Light have consistently been amongst the higher yielders.

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.

Fasto, Hyroad, Hyway, Hysky and Hyfive all performed significantly above average in 2018/19.

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 and Hyfive were the best brown varieties for storage.

Red Tide and Retano were the best performing of the red varieties.

Stored bulb quality 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. Some of the weaker material had already rotted by Christmas and so disease incidence was a larger factor than genetic storage potential to resist sprouting.

Financial Benefits

The yield potential of varieties can vary greatly. In the drilled trials this was approx. 27t/ha and 32t/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. 50% 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
- Long rotations should help reduce the impact of diseases such as Fusarium

Technology transfer

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

Open days and events were also hosted on these occasions:

1. Drilled crop field open day in Essex – August 2018
 - a. Varieties trials
 - b. SCEPTREplus herbicide trials
2. Drilled crops harvested produce open day and technical presentations at NIAB, Cambridge – November 2018

These events were well attended by a number of growers, seed trade, agronomists, research providers, etc. Co-demonstration with the SCEPTREplus trial boosted numbers attending to approx. 50.

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 2018 – varieties

Sites: Rix (Essex) and Raker (Norfolk)

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

Variety	Status	Source	Primed	Maturity		
				Date of 80% foliage fallover		
				Essex	Norfolk	Mean
BROWNS						
<i>Goblin</i>	<i>P</i>	<i>Enza</i>		01-Aug	04-Aug	03-Aug
Hybing	C	Bejo/DGS	Primed	20-Aug	03-Aug	11-Aug
Hypark	R	Bejo/DGS	Primed	23-Aug	07-Aug	15-Aug
Fasto (37-104)	2	Hazera		23-Aug	09-Aug	16-Aug
Hybound (BGS 266)	R	Bejo/DGS	Primed	30-Aug	03-Aug	17-Aug
Numbito (SV3557ND)	R	Agility/Seminis		23-Aug	12-Aug	17-Aug
Vision	C	Syngenta		27-Aug	10-Aug	18-Aug
TEON813	1	Takii		02-Sep	04-Aug	18-Aug
Novista	1	Takii		26-Aug	13-Aug	19-Aug
Medaillon	R	Syngenta		01-Sep	07-Aug	19-Aug
Bennito	R	Agility/Seminis		28-Aug	12-Aug	20-Aug
Centro	C	Hazera		26-Aug	14-Aug	20-Aug
Packito (SV8528ND)	3	Agility/Seminis		31-Aug	13-Aug	22-Aug
Hytech	C	Bejo/DGS	Primed	04-Sep	11-Aug	23-Aug
<i>Hyroad (BGS 337)</i>	<i>P</i>	<i>Bejo/DGS</i>		06-Sep	11-Aug	24-Aug
Santero	R	Hazera		29-Aug	19-Aug	24-Aug
Hysky (BGS 289)	R	Bejo/DGS	Primed	04-Sep	14-Aug	25-Aug
Chico (37-89)	R	Hazera		02-Sep	18-Aug	25-Aug
Hyfive	3	Bejo/DGS		08-Sep	13-Aug	26-Aug
Motion	R	Syngenta		31-Aug	21-Aug	26-Aug
Hyway	4	Bejo/DGS	Primed	08-Sep	15-Aug	27-Aug
Bossito (SV1332ND)	3	Agility/Seminis		04-Sep	19-Aug	27-Aug
Elista	1	ProVeg		07-Sep	26-Aug	01-Sep
means				29-Aug	12-Aug	21-Aug
REDS						
TEON502	1	Takii		05-Aug	03-Aug	04-Aug
Red Light	R	Bejo/DGS	Primed	19-Aug	02-Aug	11-Aug
37-219	<i>P</i>	<i>Hazera</i>		15-Aug	-	15-Aug
37-111	2	Hazera		26-Aug	07-Aug	16-Aug
<i>Monastrell</i>	<i>P</i>	<i>Enza</i>		22-Aug	10-Aug	16-Aug
37-222	2	Hazera		22-Aug	10-Aug	16-Aug
Karminka	1	ProVeg		22-Aug	11-Aug	16-Aug
Retano	R	Hazera		23-Aug	10-Aug	17-Aug
Red Herald	3	Allium Seeds	Primed	24-Aug	14-Aug	19-Aug
Red Tide	R	Bejo/DGS	Primed	27-Aug	13-Aug	20-Aug
Redspark	C	Bejo/DGS	Primed	31-Aug	11-Aug	21-Aug
Red Baron	C	Bejo/DGS		02-Sep	18-Aug	25-Aug
Red Baron (AS)	3	Allium Seeds	Primed	04-Sep	19-Aug	27-Aug
means				23-Aug	10-Aug	17-Aug

Table 2. NIAB Spring Sown Onion Trials from seed 2018- Yield data

Sites: Rix (Essex) and Raker (Norfolk)

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

Variety	Population & Yield									marketable yield >60mm bulbs (t/ha)		
	plant pop. (plants / sq. m)			marketable yield >40mm bulbs (t/ha)			% bulbs by weight >60mm					
	Rix	Raker	Mean	Rix	Raker	Mean	Rix	Raker	Mean	Rix	Raker	Mean
BROWNS												
<i>Goblin</i>	36.7	36.7	36.7	32.7	38.8	35.8	48.9	52.8	50.9	16.0	20.7	18.3
Hybing	44.9	45.5	45.2	54.7	61.4	58.0	71.8	71.2	71.5	39.3	43.6	41.4
Hypark	38.3	48.2	43.2	52.1	67.4	59.8	76.5	73.8	75.2	40.1	50.5	45.3
Fasto	39.5	46.5	43.0	52.5	65.8	59.1	72.7	75.9	74.3	38.3	50.1	44.2
Hybound	46.3	50.0	48.2	55.8	69.4	62.6	71.0	74.4	72.7	39.8	51.9	45.9
Numbito	43.2	45.8	44.5	48.6	58.7	53.7	66.2	68.0	67.1	32.3	40.3	36.3
Vision	39.1	39.3	39.2	47.6	55.9	51.8	75.2	79.7	77.4	35.9	44.7	40.3
TEON813	39.5	47.9	43.7	47.4	63.1	55.2	69.7	72.0	70.9	33.1	46.0	39.6
Novista	32.2	39.4	35.8	42.2	48.8	45.5	77.2	64.4	70.8	32.6	31.7	32.2
Medaillon	41.1	47.2	44.2	37.9	53.5	45.7	61.5	57.5	59.5	23.5	30.8	27.2
Bennito	37.8	54.7	46.3	46.0	61.4	53.7	78.8	62.9	70.9	36.3	38.8	37.6
Centro	40.6	51.1	45.9	49.1	63.8	56.4	72.2	65.0	68.6	35.5	42.6	39.0
Packito	37.4	44.2	40.8	41.9	61.2	51.5	69.9	74.1	72.0	29.3	45.6	37.4
Hytech	43.1	50.6	46.9	50.8	61.5	56.1	71.1	61.6	66.3	35.9	38.3	37.1
<i>Hyroad</i>	37.7	47.8	42.7	48.0	63.9	56.0	71.4	75.4	73.4	34.3	49.2	41.8
Santero	33.4	47.2	40.3	34.6	59.8	47.2	62.3	67.2	64.7	21.8	40.4	31.1
Hysky	38.1	52.9	45.5	47.8	63.3	55.6	78.5	63.0	70.7	37.5	40.0	38.7
Chico	35.4	50.1	42.7	36.1	60.1	48.1	66.0	60.7	63.3	24.0	37.1	30.5
Hyfive	40.1	53.1	46.6	48.1	66.7	57.4	70.1	63.3	66.7	33.6	42.6	38.1
Motion	34.2	43.0	38.6	51.3	64.4	57.9	77.8	79.7	78.8	40.4	51.4	45.9
Hyway	42.1	53.4	47.8	53.3	66.0	59.7	72.3	65.1	68.7	38.6	44.1	41.3
Bossito	31.0	47.4	39.2	43.1	65.2	54.1	76.6	77.5	77.0	33.2	50.7	42.0
Elista	32.0	34.6	33.3	33.9	42.8	38.4	50.1	53.2	51.7	16.9	22.8	19.8
means	38.4	46.8	42.6	45.9	60.1	53.0	69.9	67.7	68.8	32.5	41.5	37.0
REDS												
TEON502	34.7	42.7	38.7	38.6	57.3	48.0	65.2	66.0	65.6	25.6	38.2	31.9
Red Light	46.7	50.2	48.5	61.1	67.3	64.2	73.2	72.5	72.9	44.8	48.9	46.8
37-219	32.0	-	32.0	37.3	-	37.3	74.3	-	74.3	27.8	-	27.8
37-111	26.4	43.4	34.9	33.2	50.7	41.9	81.2	57.2	69.2	26.8	29.5	28.2
<i>Monastrell</i>	38.9	48.1	43.5	50.5	64.1	57.3	74.8	76.1	75.5	38.1	48.7	43.4
37-222	30.5	39.8	35.2	35.2	53.4	44.3	75.0	68.3	71.6	26.4	37.2	31.8
Karminka	28.9	34.2	31.5	28.6	36.4	32.5	45.3	32.5	38.9	13.1	11.9	12.5
Retano	38.2	46.6	42.4	43.7	46.4	45.1	68.3	46.5	57.4	29.9	21.7	25.8
Red Herald	33.4	47.4	40.4	32.3	53.7	43.0	71.2	58.1	64.7	23.0	31.7	27.4
Red Tide	41.7	46.8	44.3	48.1	52.1	50.1	70.5	57.8	64.1	34.2	30.5	32.4
Redspark	38.6	41.6	40.1	43.4	52.8	48.1	69.8	62.2	66.0	30.4	33.2	31.8
Red Baron	36.1	46.0	41.1	41.7	50.9	46.3	70.9	55.3	63.1	29.6	28.3	29.0
Red Baron (AS)	37.4	40.8	39.1	38.3	53.6	46.0	65.2	70.9	68.0	25.0	38.4	31.7
means	35.7	44.0	39.4	40.9	53.2	46.5	69.6	60.3	65.5	28.8	33.2	30.8

Table 3. NIAB Spring Sown Onion Trials from seed 2018 - rots by category

Sites: Rix (Essex) and Raker (Norfolk)

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

Variety	Population & Yield												total % defects (excl. rots)			
	% Base Rots			% Neck Rots			% bacterial rots			% Penicillium			Rix	Rak.	Mean	
	Rix	Raker	Mean	Rix	Rak.	Mean	Rix	Rak.	Mean	Rix	Rak.	Mean				
BROWNS																
<i>Goblin</i>	1.2	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Hybing	3.2	0.0	1.6	0.2	0.0	0.1	0.0	0.3	0.2	0.0	0.0	0.0	0.6	0.1	0.4	
Hypark	3.1	0.2	1.6	0.6	0.0	0.3	0.0	0.6	0.3	0.0	0.0	0.0	0.8	0.1	0.5	
Fasto	2.6	0.3	1.5	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	0.4	
Hybound	4.2	0.2	2.2	0.2	0.2	0.2	0.0	0.2	0.1	0.0	0.0	0.0	0.5	0.3	0.4	
Numbito	3.1	0.0	1.6	0.2	0.1	0.2	0.0	0.2	0.1	0.0	0.0	0.0	0.3	0.0	0.2	
Vision	8.6	0.0	4.3	0.3	0.0	0.1	0.0	1.2	0.6	0.0	0.0	0.0	0.3	0.7	0.5	
TEON813	2.0	0.2	1.1	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.5	0.6	
Novista	7.5	0.2	3.8	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.7	0.0	0.3	
Medaillon	16.9	0.0	8.4	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	1.1	
Bennito	8.3	0.0	4.1	0.2	0.1	0.2	0.0	1.5	0.8	0.0	0.0	0.0	1.3	0.3	0.8	
Centro	5.5	0.1	2.8	0.4	0.0	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.6	0.0	0.3	
Packito	5.1	0.0	2.6	0.2	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.5	0.9	
Hytech	2.2	0.0	1.1	0.3	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	1.3	0.0	0.7	
<i>Hyroad</i>	4.3	0.0	2.2	0.6	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Santero	7.6	0.0	3.8	0.6	0.0	0.3	0.0	0.5	0.2	0.0	0.0	0.0	0.4	0.1	0.3	
Hysky	5.0	0.0	2.5	0.8	0.0	0.4	0.0	0.1	0.1	0.0	0.0	0.0	0.2	0.1	0.2	
Chico	9.3	0.0	4.6	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.0	0.0	2.4	0.1	1.3	
Hyfive	3.3	0.0	1.7	0.6	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.3	
Motion	6.5	0.0	3.3	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.3	
Hyway	3.2	0.0	1.6	0.2	0.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.8	
Bossito	3.2	0.5	1.9	0.5	0.8	0.6	0.0	1.2	0.6	0.0	0.0	0.0	2.3	0.0	1.2	
Elista	8.0	0.0	4.0	0.3	1.1	0.7	0.0	1.3	0.6	0.0	0.0	0.0	2.6	1.1	1.8	
means	5.4	0.1	2.7	0.3	0.2	0.2	0.0	0.3	0.2	0.0	0.0	0.0	0.9	0.2	0.6	
REDS																
TEON502	12.8	0.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3	
Red Light	5.6	0.0	2.8	0.2	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.2	0.0	0.1	
37-219	16.4	-	16.4	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	
37-111	18.3	0.0	9.1	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	
<i>Monastrell</i>	3.8	0.2	2.0	0.0	0.0	0.0	0.0	2.0	1.0	0.0	0.0	0.0	2.9	0.9	1.9	
37-222	13.1	0.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Karminka	13.1	0.0	6.6	0.0	0.9	0.5	0.0	1.1	0.6	0.0	0.0	0.0	0.0	0.2	0.1	
Retano	6.4	0.0	3.2	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.4	0.0	0.2	
Red Herald	23.9	0.0	11.9	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.3	0.8	
Red Tide	10.2	0.0	5.1	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	
Redspark	9.1	0.2	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	
Red Baron	12.1	0.0	6.0	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.0	0.1	1.0	0.0	0.5	
R Baron (AS)	11.6	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.4	0.7	
means	12.0	0.0	6.7	0.1	0.1	0.1	0.0	0.3	0.1	0.0	0.0	0.0	0.6	0.2	0.4	

Table 4. NIAB Spring Onion Trials from seed 2017 – Bulb Quality data

Sites: Rix (Essex) and Raker (Norfolk)

Varieties in maturity order (mean of both sites); 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	Raker	Av	Rix	Raker	Av	Rix	Raker	Av	Rix	Raker	Av	Rix	Raker	Av
BROWNS															
<i>Goblin</i>	5.5	5.5	5.5	3.0	3.0	3.0	6.0	5.0	5.5	7.0	7.0	7.0	6.0	6.0	6.0
<i>Hybing</i>	5.0	4.5	4.8	6.0	5.0	5.5	5.0	5.0	5.0	6.0	6.0	6.0	7.0	7.0	7.0
<i>Hypark</i>	5.0	4.5	4.8	7.0	6.0	6.5	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
<i>Fasto</i>	5.5	6.0	5.8	7.0	7.0	7.0	5.0	5.0	5.0	7.0	8.0	7.5	8.0	8.0	8.0
<i>Hybound</i>	5.5	4.5	5.0	7.0	7.0	7.0	5.0	5.0	5.0	6.0	6.0	6.0	8.0	8.0	8.0
<i>Numbito</i>	7.0	5.0	6.0	7.0	7.0	7.0	5.0	5.0	5.0	6.0	6.0	6.0	7.0	7.0	7.0
<i>Vision</i>	5.0	5.0	5.0	7.0	7.0	7.0	4.0	5.0	4.5	6.0	6.0	6.0	8.0	7.0	7.5
<i>TEON813</i>	6.5	5.5	6.0	6.0	6.0	6.0	5.0	5.0	5.0	6.0	7.0	6.5	7.0	7.0	7.0
<i>Novista</i>	6.0	6.0	6.0	7.0	7.0	7.0	5.0	5.0	5.0	6.0	7.0	6.5	7.0	6.0	6.5
<i>Medaillon</i>	4.5	5.0	4.8	6.0	6.0	6.0	5.0	5.0	5.0	6.0	7.0	6.5	7.0	6.0	6.5
<i>Bennito</i>	4.0	5.5	4.8	7.0	7.0	7.0	5.0	5.0	5.0	6.0	7.0	6.5	7.0	7.0	7.0
<i>Centro</i>	6.0	6.0	6.0	7.0	6.0	6.5	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
<i>Packito</i>	6.0	5.5	5.8	5.0	6.0	5.5	5.0	5.0	5.0	7.0	6.0	6.5	7.0	7.0	7.0
<i>Hytech</i>	5.5	5.0	5.3	7.0	6.0	6.5	5.0	5.0	5.0	6.0	6.0	6.0	7.0	7.0	7.0
<i>Hyroad</i>	5.0	4.5	4.8	5.0	5.0	5.0	5.0	5.0	5.0	7.0	7.0	7.0	6.0	7.0	6.5
<i>Santero</i>	6.0	5.0	5.5	4.0	5.0	4.5	4.0	4.0	4.0	6.0	6.0	6.0	8.0	8.0	8.0
<i>Hysky</i>	6.0	5.0	5.5	5.0	6.0	5.5	5.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
<i>Chico</i>	6.0	6.0	6.0	5.0	6.0	5.5	5.0	5.0	5.0	7.0	7.0	7.0	8.0	8.0	8.0
<i>Hyfive</i>	4.0	4.5	4.3	6.0	6.0	6.0	5.0	5.0	5.0	6.0	6.0	6.0	7.0	7.0	7.0
<i>Motion</i>	5.0	5.0	5.0	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0	8.0	8.0	8.0
<i>Hyway</i>	4.5	4.0	4.3	6.0	6.0	6.0	5.0	5.0	5.0	6.0	6.0	6.0	7.0	7.0	7.0
<i>Bossito</i>	7.0	6.0	6.5	6.0	7.0	6.5	5.0	5.0	5.0	6.0	7.0	6.5	7.0	7.0	7.0
<i>Elista</i>	6.5	5.0	5.8	7.0	7.0	7.0	8.0	8.0	8.0	5.0	5.0	5.0	6.0	6.0	6.0
means	5.5	5.2	5.3	6.1	6.1	6.1	5.1	5.1	5.1	6.3	6.6	6.5	7.1	7.0	7.1
REDS															
<i>TEON502</i>	7.0	6.0	6.5	6.0	4.0	5.0	5.0	5.0	5.0	7.0	6.0	6.5	7.0	7.0	7.0
<i>Red Light</i>	7.5	7.0	7.3	5.0	4.0	4.5	5.0	5.0	5.0	6.0	5.0	5.5	7.0	5.0	6.0
<i>37-219</i>	5.0	-	5.0	5.0	-	5.0	4.0	-	4.0	7.0	-	7.0	6.0	-	6.0
<i>37-111</i>	6.0	6.0	6.0	6.0	7.0	6.5	4.0	5.0	4.5	6.0	7.0	6.5	6.0	7.0	6.5
<i>Monastrell</i>	7.5	7.0	7.3	3.0	3.0	3.0	5.0	5.0	5.0	4.0	6.0	5.0	5.0	6.0	5.5
<i>37-222</i>	6.0	6.0	6.0	6.0	6.0	6.0	4.0	4.0	4.0	7.0	6.0	6.5	7.0	7.0	7.0
<i>Karminka</i>	7.0	6.0	6.5	7.0	7.0	7.0	8.0	8.0	8.0	6.0	7.0	6.5	5.0	6.0	5.5
<i>Retano</i>	8.0	8.0	8.0	6.0	5.0	5.5	3.0	4.0	3.5	6.0	6.0	6.0	7.0	7.0	7.0
<i>Red Herald</i>	7.0	7.0	7.0	5.0	6.0	5.5	4.0	5.0	4.5	6.0	6.0	6.0	7.0	7.0	7.0
<i>Red Tide</i>	7.0	6.5	6.8	7.0	7.0	7.0	4.0	4.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0
<i>Redspark</i>	7.0	7.0	7.0	6.0	6.0	6.0	4.0	5.0	4.5	7.0	6.0	6.5	6.0	7.0	6.5
<i>Red Baron</i>	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0	6.0	6.0	6.0	7.0	7.0	7.0
<i>Red Baron (AS)</i>	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0	6.0	7.0	6.5	7.0	6.0	6.5
means	6.8	6.7	6.7	5.8	5.8	5.8	4.6	5.0	4.8	6.2	6.2	6.2	6.4	6.5	6.4

Table 5. NIAB Spring Sown Trials from seed 2018 – vigour and plant characteristics

Sites: Rix (Essex) and Raker (Norfolk)

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

Both trials had a full fungicide programme so mildew is only recorded as present or absent on a 0-3 scale of severity

variety	Establishment %			Early vigour 1-9 9=vigorous			Fusarium (27 Aug) 0-5 5= very severe		
	Rix	Raker	Mean	Rix	Raker	Mean	Rix		
BROWNS									
<i>Goblin</i>	83	>95	89	8.0	8.0	8.0	0.0		
Hybing	92	>95	93	8.0	7.7	7.8	1.7		
Hypark	90	90	90	8.0	7.7	7.8	1.0		
Fasto	90	>95	93	8.0	8.0	8.0	2.0		
Hybound	93	>95	94	8.0	8.0	8.0	1.7		
Numbito	93	>95	94	8.0	7.7	7.8	2.3		
Vision	80	>95	88	8.0	7.7	7.8	2.0		
TEON813	90	>95	93	7.7	7.3	7.5	1.3		
Novista	83	>95	89	7.7	7.7	7.7	3.0		
Medaillon	88	>95	92	7.0	7.0	7.0	2.0		
Bennito	92	>95	93	8.0	7.7	7.8	1.3		
Centro	87	>95	91	7.7	7.7	7.7	2.0		
Packito	82	90	86	7.3	7.0	7.2	1.7		
Hytech	83	90	87	8.0	7.0	7.5	1.7		
<i>Hyroad</i>	83	88	85	7.0	7.0	7.0	1.0		
Santero	87	>95	91	7.0	7.7	7.3	3.3		
Hysky	88	>95	92	8.0	7.7	7.8	1.7		
Chico	82	>95	88	7.0	7.3	7.2	1.7		
Hyfive	77	>95	86	7.0	7.7	7.3	0.7		
Motion	83	90	87	7.3	7.7	7.5	1.3		
Hyway	87	>95	91	7.0	7.3	7.2	1.7		
Bossito	82	>95	88	7.3	7.3	7.3	1.0		
Elista	78	>95	87	6.7	6.7	6.7	1.7		
means	86	94	90	7.6	7.5	7.5	1.6		
REDS									
TEON502	82	>95	88	7.7	7.7	7.7	2.7		
Red Light	92	>95	93	8.0	7.3	7.7	2.0		
37-219	88	-	88	7.5	-	7.5	3.5		
37-111	78	>95	87	7.0	7.0	7.0	3.0		
<i>Monastrell</i>	88	>95	91	7.5	7.5	7.5	2.0		
37-222	83	90	87	7.3	7.7	7.5	2.7		
Karminka	75	>95	85	7.0	7.0	7.0	2.3		
Retano	87	90	88	7.3	7.3	7.3	1.0		
Red Herald	83	>95	89	7.7	8.0	7.8	3.5		
Red Tide	95	>95	95	8.0	7.7	7.8	2.0		
Redspark	88	>95	92	7.7	7.3	7.5	2.0		
Red Baron	85	>95	90	7.7	7.3	7.5	1.7		
Red Baron (AS)	87	90	88	8.0	7.3	7.7	2.3		
means	85	94	89	7.6	7.4	7.5	2.4		

Table 6. NIAB Spring Sown Onion Trials from seed 2018 - 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			
<i>Goblin</i>	63.3	40.0	51.7
Hybing	55.6	88.9	72.2
Hypark	77.8	86.7	82.2
Fasto	73.3	73.3	73.3
Hybound	73.3	71.1	72.2
Numbito	95.6	82.2	88.9
Vision	66.7	66.7	66.7
TEON813	73.3	53.3	63.3
Novista	73.3	62.2	67.8
Medaillon	60.0	75.6	67.8
Bennito	73.3	51.1	62.2
Centro	77.8	75.6	76.7
Packito	80.0	66.7	73.3
Hytech	84.4	93.3	88.9
<i>Hyroad</i>	86.7	80.0	83.3
Santero	95.6	86.7	91.1
Hysky	86.7	60.0	73.3
Chico	95.6	86.7	91.1
Hyfive	82.2	77.8	80.0
Motion	91.1	64.4	77.8
Hyway	80.0	84.4	82.2
Bossito	84.4	62.2	73.3
Elista	64.4	71.1	67.8
means	78.0	72.2	75.1
REDS			
TEON502	71.1	44.4	57.8
Red Light	48.9	60.0	54.4
37-219	76.7	-	76.7
37-111	91.1	86.7	88.9
<i>Monastrell</i>	80.0	83.3	81.7
37-222	84.4	88.9	86.7
Karminka	80.0	73.3	76.7
Retano	66.7	71.1	68.9
Red Herald	73.3	66.7	70.0
Red Tide	82.2	84.4	83.3
Redspark	86.7	68.9	77.8
Red Baron	75.6	84.4	80.0
Red Baron (AS)	70.0	60.0	65.0
means	75.9	72.7	74.4

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							
<i>Goblin</i>	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
<i>Hyroad</i>	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
<i>Monastrell</i>	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						
<i>Goblin</i>	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
<i>Hyroad</i>	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
<i>Monastrell</i>	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