Independent assessment of field and storage potential of onion varieties 2017/18

Figure 1. Onion varieties in the evaluation trial 2017

Action points

Best performing drilled varieties 2017/18

- Santero is resistant to mildew
- Drytan, Hybound, Fasto and Hybing were the earliest-maturing brown varieties. Red Light and Karminka were the earliest of the reds
- The highest-yielding brown varieties were Hyway (100.1 t/ha), Hytech and Hypark. Of the new varieties, SVND7772 and SVND7599 performed well (grown in Essex only). Motion, Hylander, Hybing and Hyfive all had high yields (Essex). Red Light (as last year) and Red Baron were the highest-yielding red varieties
- For single centres in the brown varieties, SV3557ND, Hypark and Drytan were the best. Karminka, 37-222 and Red Tide for the reds. Hybound, Hyway, SV8528ND and Chico has had high percentages of single centres in two of the last three years
- In storage, Drytan, Hyway, SVND7772 and Medaillon all performed significantly above average in 2017/18. Drytan, Medaillon, Hyway, and Vision have consistently had above average percentages of sound bulbs at the late-May assessment. Red Tide and 37-111 performed well in the reds. Redspark has performed above average in previous years
- In cold storage, the varieties Drytan, Vision, Hyway and Hyfive were the best brown varieties. Red Tide and Retano were the best performing of the red varieties

Varieties should be selected for:

- 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)

So:

- Select a range of varieties according to soil type, desired harvest period, habit, vigour and disease tolerance
- Varieties should match the market and your storage facilities – longer storing varieties give more options
- In high disease pressure years, grow 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

Introduction

This factsheet provides 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 had the opportunity to inspect the trials at key stages of development.

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

There are several companies that supply the UK market with commercial onion seed. This project provides 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. Open days have given growers the opportunity to view both the green crop, and harvested material side by side.

Seed breeding companies have central breeding programmes and will trial their varieties in a number of countries to find the ones that are most suitable to the local conditions and growing practices. Varieties can perform very differently in the United Kingdom to Holland and other parts of mainland Europe, thus UK trial field and storage data is essential for growers to make informed decisions when selecting varieties.

Figure 2. Brown onion varieties on display at the Field Open Day 2017

Optimising yield is the most obvious reason for careful varietal selection. The yield potential of varieties can vary greatly. In the drilled trials, this was approximately 29 t/ha and 21 t/ha between the highest- and lowest-yielding browns and reds, respectively (mean of both trials). Yield out of store is also important. Drilled material showed a difference of over 55% and 60% between the best and worst storage potential from ambient storage in the browns and reds, respectively. From cold storage, the differences were approximately 70% for browns and reds.

Mildew-resistant varieties require fewer and/or cheaper fungicide programmes and are a good option for organic growers.

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 maincrop varieties hold the majority of the acreage but mid-range and late-maturing varieties still hold a proportion. However, in cool seasons, late maturing varieties are only likely to mature properly on fertile soils. A range of maturities can play an important part in spreading the harvest period. 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% of the area grown. Set crops provide earliness, extend the establishment period and are options on land with high risk of wind erosion 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 set variety evaluations, the most recent trials were in 2016. Overwintered onions are still grown but there are too few varieties to warrant evaluation trials.

Trial 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 a commercial cold store.

The trials were drilled on 11 March (Norfolk) and 21 March (Essex) and were harvested on 6 September (Norfolk) and 13 September (Essex).

The trial designs were randomised complete block. The main trials had three replicates and the preliminary varieties only two replicates, which were randomised with the first two replicates of the main trial.

The 2017 season average maturity of brown onions was approximately two weeks earlier than the 10-year average and approximately three weeks earlier for the red onions. Establishment was good but the season started with a cool spring followed by a mini heatwave and then a warm but wet summer. Spring and summer night-time temperatures were higher than average. Mildew was a present in both trials but does not appear to have had a major impact on yield.

Both trials followed local commercial agronomy. Maleic hydrazide should not have been applied to either trial but the Norfolk trial storage data suggests it may have received some or, alternatively, something else may have affected the sprouting ability of the bulbs. Key varieties are discussed below and summarised in Table 1.

Establishment was good. Seed beds at both sites had good tilth and the trial seed was drilled into moisture. The growing season started with a cool, dry spring followed by a mini heatwave in May and then a warm but wet summer. Crops matured earlier than usual. Commercial crops were affected by the early dry conditions and suffered with poor establishment where irrigation was not available. There were also weed issues where the dry conditions affected the efficacy of residual herbicides.

Trial results

Table 1. NIAB Spring Sown Onion Trials drilled from seed 2017 – Varieties, Maturities, Yield & Storage

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
BROWNS					
Drytan	Bejo/DGS	03-Aug	*94.0*	80	68
Hybound	Bejo/DGS	04-Aug	*90.0*	47	43
Fasto	Hazera	05-Aug	*88.5*	66	28
Hybing	Bejo/DGS	07-Aug	*96.5*	37	22
Hysky	Bejo/DGS	09-Aug	*96.4*	60	42
Hypark	Bejo/DGS	10-Aug	*98.2*	48	24
SV3557ND	Agility/Seminis	10-Aug	*89.4*	45	30
SVND 0363	Agility/Seminis	10-Aug	*88.1*	36	25
Centro	Hazera	11-Aug	*88.3*	43	26
Hytech	Bejo/DGS	11-Aug	*98.8*	41	45
Packito	Agility/Seminis	11-Aug	*88.8*	50	19
Medaillon	Syngenta	12-Aug	*85.2*	70	50
Vision	Syngenta	14-Aug	*87.0*	62	73
Bennito	Agility/Seminis	14-Aug	*85.4*	25	18
Hyway	Bejo/DGS	14-Aug	*100.1*	74	72
SVND0367	Agility/Seminis	14-Aug	*88.7*	67	50
Hyfive	Bejo/DGS	15-Aug	*97.1*	52	63
Hylander	Bejo/DGS	15-Aug	*97.4*	52	48
SVND7772	*Agility/Seminis*	*15-Aug*	*98.3*	*72*	*47*
SVND7599	*Agility/Seminis*	*16-Aug*	*98.4*	*38*	*19*
Chico	Hazera	17-Aug	*86.0*	59	51
Bossito	Agility/Seminis	18-Aug	*85.0*	51	39
Santero	Hazera	18-Aug	*83.2*	31	21
Elista	*ProVeg*	*19-Aug*	*71.6*	*47*	*36*
Motion	Syngenta	20-Aug	*92.2*	66	47
means		**12-Aug**	***90.1***	**53**	**40**
REDS					
Karminka	*ProVeg*	*30-Jul*	*64.0*	*12*	*19*
Red Light	Bejo/DGS	05-Aug	*92.6*	7	28
37-222	Hazera	07-Aug	*73.6*	40	12
Red Tide	Bejo/DGS	08-Aug	*83.0*	75	48
Retano	Hazera	09-Aug	*72.2*	56	50
37-111	Hazera	10-Aug	*73.4*	59	33
Red Herald (ABS212)	Allium Seeds	13-Aug	*77.3*	56	44
Red Baron (AS)	Allium Seeds	13-Aug	*81.5*	48	41
Red Baron	Bejo/DGS	15-Aug	*84.6*	50	31
Redspark	Bejo/DGS	15-Aug	*80.8*	46	28
means		**09-Aug**	***78.3***	**45**	**34**

Varieties in maturity order (mean of both sites); Main 3 replicates; *Preliminary 2 replicates of data. Storage Essex site only*

Figure 3. Field Open Day 2017 with red onion varieties on display

Discussion

There is a good range of maturities available, allowing growers to spread their harvest period. A series of warmer years has 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 maincrop varieties. Many areas had a wet August, which prevented harvesting of already mature crops until September and into October – this would have given over-mature varieties a yield advantage.

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 with consequent inferior storage qualities.

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 – both of the 2017 trials had significant levels of mildew but this came in later in the season and does not seem to have impacted significantly on the trial green plot yields. Plant breeders continue to attempt to breed mildew resistance into commercially viable new varieties. Transferring 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.

Drytan, Hybound, Fasto and Hybing were the earliest-maturing brown varieties of the drilled trials. Red Light and Karminka were the earliest of the reds.

The mean of trial yields in Norfolk was 82 t/ha browns and 74 t/ha reds. The mildew came in late enough in the growing season not to have adversely affected yields. The Essex trial yield means were 98 t/ha for browns and 83 t/ha for reds. Again, the mildew did not severely impact upon the yields. Over the last four years, the 10-year average of the mean marketable yield has been creeping up by approximately 1 t/ha as better varieties become available and agronomic practices change and improve.

The highest-yielding brown varieties were Hyway, Hytech and Hypark. Of the new varieties, SVND7772 and SVND7599 performed well but were only grown in the Essex trial. Motion, Hylander, Hybing and Hyfive all had high yields on the Essex site. Red Light and Red Baron were the highest-yielding red varieties.

There was a small percentage of bacterial rots and physical defects (splitting) in the harvested material from Essex and this was reflected in the storage results. Fusarium continues to be a major concern in commercial crops and the focus of breeding programmes is to introduce known resistances into commercially viable lines.

SV3557ND, Hypark and Drytan were the best of the brown varieties for having high percentages of single centres. Karminka, 37-222 and Red Tide were the best of the reds for single centres. Hybound, Hyway, SV8528ND and Chico have had high percentages of single centres in two of the last three years.

Storage assessments in an ambient store were recorded in late-April and late-May/early June 2018. The late cold spells in February and March 2018 delayed sprouting by a few days or maybe even by over a week and this was reflected by shifting the assessment dates to capture the biggest differences between varieties. Cold storage assessments were recorded in July 2018.

Storage potential continues to be a key factor for drilled crops. The long delay between crop maturity and harvest was a concern for growers as there was the potential for diseases to be expressed during storage.

Drytan, Hyway, SVND7772 and Medaillon all performed significantly above average in 2017/18. Drytan, Medaillon, Hyway, and Vision have consistently had above average percentages of sound bulbs at the late-May assessment. Red Tide and 37-111 performed well in the reds. Redspark has performed above average in previous years.

In cold storage, the varieties Drytan, Vision, 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 very good throughout most of the brown varieties but the reds showed more softening.

Figure 4. Open Day November 2017 with harvested onion varieties on display

Conclusion

The yield potential of varieties can vary greatly. In the drilled trials, this was approximately 29 t/ha between the highest and lowest yield means for brown 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, 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, Chico and SV3557ND are newer varieties to keep an eye on over the next couple of seasons.

Hybound, Hybing and Drytan are consistently early maturing brown varieties. Red Light is commonly one of the earliest reds.

The highest-yielding brown varieties were Hyway, Hypark and Hytech. Red Light and Red Baron were the highest yielding reds. Hytech and Red Light have consistently been among the higher yielders.

Drytan, Hyway, SVND7772 and Medaillon all had better than average storage potential in ambient store. Vision and Hyway are normally in this category, too. Red Tide and 37-111 performed well in the reds. Redspark has performed above average in previous years.

In cold storage, the varieties Drytan, Vision, Hyway and Hyfive were the best brown varieties for storage. Medaillon and Vision are also known for good storage in cold stores. Red Tide and Retano were the best performing of the red varieties – Red Light has performed well previously.

Figure 5. Open Day 2017, with harvested onion varieties on display, gave growers and agronomists the opportunity to discuss the merits of different varieties

Knowledge Exchange

Each year a factsheet is produced to update levy payers, sponsoring plant breeders and seed companies with variety trial results.

In 2017 Open days took place as follows:

- Drilled crop field open day (August 2017 in Norfolk)
- Drilled crops harvested produce open day and technical presentations at NIAB, Cambridge (November 2017)

These events were well attended by a number of growers, seed trade, agronomists, research providers, etc. The farming press attended the open days, resulting in 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.

For more details of methodology and results, see FV 348d annual report **horticulture.ahdb.org.uk/project/onions-independent-assessment-field-and-storage-potential-varieties-22**

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- Raker Farms, Croxton, Norfolk – drilled onions on a Breckland soil
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