LONG-TERM ONION STORAGE: 2008 REPORT

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Background

The Treasure Valley region of western Idaho and eastern Oregon supplies approximately 40 percent of the winter storage onions in the United States. Processing accounts for a significant portion of crop usage. Extending the current storage season beyond May would increase the amount of local onions that could be grown for processing. However, there is currently no information available on onion cultivars that have resistance to common onion decay pathogens during long-term storage, and thus potential for extended storage life. This study was designed to evaluate several new onion cultivars and breeding lines under cold storage conditions to see if they could be kept until mid-July.

Methods

Onion bulbs of 12 yellow onion cultivars and experimental lines were collected from research trials and grower fields. Where enough bulbs were available, the samples were split into 6 50-lb replicates. Because these samples were collected from different locations and may have been handled differently in terms of cultural practices, it is important to note that the results of these storage evaluations may have been influenced by factors other than resistance to storage decay. The onions were brought to the Parma R&E Center in Parma, Idaho after they were cured in commercial storage. The samples were placed in a small controlled temperature room and held at 37°F. Hobo recorders placed in the room indicated that temperatures fluctuated by no more than 0.5°F, while relative humidity fluctuated between 70 and 90 percent. Free moisture was never observed on the onion samples.

On March 4, June 3, and June 30 the samples were removed from storage, weighed, and evaluated for external defects and sprouting. If a bulb had both sprouting and decay, it was scored for decay. Bulbs that were sprouted but not decayed were considered usable. At the final sample date, all bulbs were sliced diagonally to evaluate

internal decay. External decay was scored as usable if it affected only the outer rings that would normally be removed during processing. Bulbs scored as unusable had external decay that was too extensive to be removed during processing.

Results

There were small yet significant differences in the level of usable decay, unusable decay, and good bulbs on the first evaluation date of March 4 (Table 1). This date was chosen as it is near the end of the conventional storage period for onions under ambient temperature conditions in this region. 'Crocket', 'Monarchos' and GG4012 had relatively high proportions of good bulbs on March 4.

By June 3, 'Vaquero', the current industry standard, was low to intermediate in terms of the proportion of good bulbs (Table 1). Crocket and GG4012 had significantly more good bulbs compared to Vaquero. Weight loss (percent shrink) and sprouting increased significantly between the March 4 and June 3 evaluation dates. There was a strong relationship between the incidence of external decay and weight loss.

By the final evaluation on June 30, most of the cultivars and noncommercial varieties had dropped below 50 percent unblemished bulbs (Table 2). Internal and external decay was present at high levels in most cultivars and precommercial varieties evaluated. However, Crocket and GG4012 continued to store very well and had over 90 percent good bulbs. Weight loss continued to increase between the second and third evaluation dates, as would be expected. However, the proportion of sprouted bulbs tended to decrease as many of these bulbs became decayed and were moved to that category.

Cultivars and experimental lines with a high incidence of external decay also tended to have considerable internal decay and translucent scale (Table 2). 'Generation X' had the highest incidence of bulbs with yellow coloration in the scales. This defect can cause problems during processing. All the other cultivars and lines had relatively low incidence of yellow scales.

Summary

The onion cultivars and experimental lines evaluated in this study showed a wide range of storability. In particular, Crocket and GG4012 had exceptional bulb quality out of long-term storage. While some of these differences may have been due to handling practices, it appears likely that cultivars with long-term storage potential are available. Cultivars with good disease resistance during long-term storage could significantly extend the current market season for processing onions in this region.

Table 1. Incidence of shrink, external decay, and sprouting of 12 yellow onion cultivars and precommercial varieties on March 4 and June 3, 2008 after long-term cold storage at 37°F. Values are means of six replications.

	March 4						June 3					
Cultivar	% shrink	% unusable decay	% usable decay	% good bulbs	% totals	% of total sprouted	% shrink	% unusable decay	% usable decay	% good bulbs	% totals	% of total sprouted
Vaquero	2.6	1	8	91	100	0	6.6	19	8	73	100	0
Granero	3.8	0	6	94	100	1	5.8	9	5	86	100	6
Monarchos	3.0	0	2	98	100	1	7.3	14	3	83	100	12
Arcero	2.6	0	7	93	100	1	6.0	16	7	77	100	8
Evolution	2.5	0	12	88	100	0	6.0	20	15	65	100	1
Joaquin	2.3	0	8	92	100	0	5.8	14	9	77	100	6
Gen X	2.1	0	5	95	100	0	5.7	13	5	82	100	6
Crocket	2.0	0	2	98	100	1	3.7	1	2	97	100	7
GG4012	2.3	0	1	99	100	1	4.5	3	1	96	100	2
OLYS 05N5	3.7	0	13	87	100	0	9.9	34	13	53	100	5
OLYS X00-23	2.6	0	4	96	100	0	6.2	11	4	85	100	2
OLYS 03-207	3.5	0	5	95	100	0	7.4	15	6	79	100	0
LSD (0.05)	NS	1	6	6			1.8	12	6	16		

Table 2. Incidence of shrink, external decay, sprouting, internal decay, translucent scale, and yellow scale in 12 yellow onion cultivars and precommercial varieties on June 30 after long-term cold storage at 37°F. Values are means of six replications.

Cultivar	% shrink	% unusable decay	% usable decay	% good bulbs	% totals	% of total sprouted	% internal decay	% translucent scale	% yellow scale
Vaquero	8.8	40	2	58	100	6	20	7	7
Granero	7.2	27	2	71	100	3	20	16	7
Monarchos	9.6	32	2	66	100	5	22	23	1
Arcero	7.6	29	2	69	100	2	21	31	2
Evolution	7.6	34	0	66	100	2	31	27	2
Joaquin	6.5	40	1	59	100	3	37	19	5
Gen X	7.0	21	3	76	100	0	13	0	42
Crocket	4.4	6	1	93	100	0	5	2	4
GG4012	5.6	5	1	94	100	0	4	0	1
OLYS 05N5	13.1	48	2	50	100	3	33	11	4
OLYS X00-23	8.8	34	5	61	100	5	21	11	2
OLYS 03-207	9.9	27	3	70	100	5	15	16	1
LSD (0.05)	2.5	15	3	15			11	9	6