

## 2005-2006 Storage Cabbage Variety Evaluation

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Table 1. Storage cabbage varieties in order of maturity

Entry	Market Class	YR <sup>1</sup>	Seed Source	Days to Maturity	Years in Trial	Notes
Topgun	Green	No	Bejo	105	2001, 2005	14" spacing, planted 2 weeks later
2697	Green	Yes	Bejo	100-105	2005	
Budena	Green	No	Bejo	105-110	2005	
Candella	Green	Yes	Bejo	110	2005	14" spacing, planted 3 weeks later <sup>2</sup>
WC 287 (SuperStor 112)	Green	Yes	Reed's Seeds	112	2005	planted 2 weeks later
Amtrak	Green	Yes	Bejo	115 (std)	2001, 2005	
Huron	Green	Yes	Seminis	115 (std)	2001, 2005	
2672	Green	Yes	Bejo	115	2005	
CLX 3966	Green	??	Harris Moran	?	2005	
CLX 3973	Green	??	Harris Moran	?	2005	
Shelton	Green	No	Bejo	115	2001, 2005	
3321	Green	Yes	Seminis	115	2005	
NIZ17-725	Green	Yes	Vilmorin	115	2005	
NIZ17-764	Green	Yes	Vilmorin	115	2005	
Counter	Green	Yes	Bejo	118	2005	
3307	Green	Yes	Seminis	118	2005	
Princeton	Green	Yes	Vilomorin	118	2005	
Rona	Red	No	Seminis	115 (std)	2005	
Super Red 115	Red	Yes	Reed's Seeds	115	2005	
Lectro	Red	No	Bejo	117 (std)	2001, 2005	

<sup>1</sup>YR: Fusarium Yellows Resistant. <sup>2</sup>first planting had poor emergence, re-planted.

### Procedures:

The trial was conducted in a commercial cabbage field located near Hamlin, NY (Monroe Co.) and was maintained by Martin Farms. Seventeen green and three red storage cabbage varieties including industry standards Amtrak, Huron and Rona, were evaluated. The trial was arranged as a randomized complete block design with three replicates. Plug transplants were produced by at the NYSEAS greenhouses in Geneva, NY. On June 24, 2005, the trial was planted by hand. The shorter season variety, Topgun and WCA 287 were planted 2 weeks later on July 8, 2005. Candella was planted 3 weeks later on July 15, 2005, because the first emergence failed and it had to be reseeded. Each replicate consisted of a single row of 40 plants with 18" plant spacing and 30" row spacing. Plant spacing for Candella and Topgun was tighter at 14". The best 35 heads of two replicates were harvested on November 8, 2005. Of these, 5 were cut, peeled and evaluated for thrips damage severity and depth. The remaining 30 heads were divided into two groups of 15 and weighed. Each field replicate transferred into a replicate in storage. One group

went into cold (refrigerated) storage and the other into common storage. After 15 weeks in common storage and 24 weeks in cold (refrigerated) storage, the cabbage was removed on February 22, 2006 and April 28, 2006, respectively. The 2005 growing season was hot and humid with average precipitation. Conditions during the 2005-2006 storage period were about 2-3 °F above normal.

### **Results:**

Compare everything to the “trial average”. Results are presented in Table 2 and 3. For most variables (i.e. marketable yield, head size, shrink loss, etc.), all heads in the entire trial are averaged to give a “trial average”. Individual varieties are compared to the trial average to see if they perform at, below or above average. Values that are underlined indicate the best result per variable. Values in bold and italics performed better and worse than the trial average, respectively.

Field Characteristics (Table 2). *Plant size:* Counter and 3321 had the largest plants in the trial, followed by Huron, 3307, Rona and Lectro. Budena had relatively small plants. CLX 3966 and Topgun had medium to large plants. *Uniformity:* Rona and Counter had the most uniform growth habit of all entries in the trial, followed by Topgun, NIZ17-725, NIZ17-764 and Super Red 155. CLX 3973 had the poorest uniformity of the trial. Plant uniformity was inconsistent among replicates for Candella, Amtrak, 2697, Budena, CLX 3966, 3307 and Lectro.

*Uprightness:* Topgun had the most upright growth habit of all entries in the trial, followed by Budena, CLX 3966, CLX 3973, Counter, Princeton and Rona. 3321, NIZ17-725 and 3307 were slightly tipped to tipped. Lectro was inconsistent among replicates with respect to uprightiness.

*Off-Types:* Candella, Amtrak, Huron, Shelton and Counter had no off-types. Budena, CLX 3966 and CLX 3973 had 30%, 23% and 15% off-types, respectively. *Rots:* None of the varieties had more than 3.6% rots (white rot) at harvest. Candella, Huron, 2697, 2672, 3321 and 3307 notable had no rots.

Split Cores at Harvest (Table 2). WC 287 was the only variety that did not have any split cores at harvest. 3307, Amtrak and Rona notably had 2.3, 3.3 and 3.3 % split cores at harvest. Alternatively, Princeton and Super Red 115 had 85.2 and 40.0 % split cores at harvest, respectively.

Head Size and Yield (Table 2). *Average Head size:* 3321 had the largest average head size (8.92 lb) of all the varieties in the trial, which was not significantly different from Counter (8.18 lb), Amtrak (8.10 lb), NIZ17-764 (7.75 lb) and 2672 (7.38 lb). Candella had the smallest head size (3.13 lb) in the trial, which was not significantly different than Budena (4.47 lb) and Topgun (4.50 lb). *Estimated Yield:* The estimated yield based on these head weights, of 3321 is 1036 cwt, and 951, 941, 900 and 857 cwt for Counter, Amtrak, NIZ17-764 and 2672, respectively. Similarly, the estimated yield for the smallest variety Candella, was 363 cwt, and 519 and 522 cwt for Budena and Topgun, respectively. *Marketable Yield:* 3321 also had the highest marketable yield at 1024 cwt, followed by Counter (935 cwt), Amtrak (932 cwt), NIZ17-764 (860 cwt) and 2672 (849 cwt). Due mostly to off-types, Budena had the lowest marketable yield at 348 cwt, followed by Candella (363 cwt) with no off-types or rots. On average, marketable yield was 5.8% less than the estimated yield.

Onion Thrips Damage (Table 2). Candella, Topgun, Shelton, Princeton and Rona had no thrips injury. 2672 had the deepest thrips injury in the trial with 3.9 layers affected, which was not significantly different than 2697 (2.5 layers). 2672 and 2697 also had the highest thrips severity ratings in the trial at 1.5 and 1.0, respectively, which were well below the maximum commercial acceptability of 3.0.

Storage Evaluations (Table 3). On average, shrink, trim and total losses were 2.8, 0.7 and 3.6% higher in common storage than in cold (refrigerated) storage. This was likely due to the above normal temperatures during the winter months (Dec. to Feb.) which made it more challenging to keep common storage conditions consistently cold. *Shrink Loss:* Out of common storage, Princeton had the least shrink loss (7.7%) followed by NIZ17-764 (8.3%), Counter (9.3%), 3307 (9.3%) and Lectro (9.3%), while Topgun (16.0%), Budena (14.1%) and Candella (14.1%) had the most. Out of cold storage, CLX 3966 had the least shrink loss (6.3%), followed by WC 287 (6.6%) and 3307 (6.9%), while Candella (14.6%) had the most. When comparing whether each variety performed above or below the trial average, 2697, 2672, CLX 3966 and Super Red 115 stored better (i.e. performed above trial average) in cold storage than they did in common storage (i.e. performed below trial average).

*Trim Loss:* Generally, red varieties had less trim loss than green varieties. Of the red varieties, Super Red 115 had the highest trim loss out of both storage types (common: 8.1%; cold: 10.8%). Lectro had the least trim loss out of common storage (6.8%) and Rona had the least trim out of cold storage (7.0%). Of the green varieties, 3307 (10.2%), 3321 (10.3%) and Counter (10.5%) had the least trim loss out of common storage, while Candella (19.8%) and 2697 (19.5%) had the most. Out of cold storage, 3321 (10.1%) and 2672 (10.2%) had the least trim loss, while Shelton (16.4%) had the most. When comparing whether each variety performed above or below the trial average, Budena, Amtrak and NIZ17-764 stored better in cold storage than they did in common storage. Alternatively, NIZ17-725, 3307 and Princeton did better in common storage than cold.

*Total Loss (shrink + trim):* Again, red varieties had less total loss than green varieties with Super Red 115 having the highest total loss out of both storage types (common: 21.4%; cold: 18.9%) and Rona having the least total loss out of cold storage (15.6%) while Lectro had the least total loss out of common storage (16.1%). Of the green varieties, 3307 (19.5%) and Princeton (19.5%) had the lowest total loss followed by Counter (20.0%) coming out of common storage, while Candella (33.9%) and 2697 (32.9%) had the most. Out of cold storage, 3321 (17.1%) had the least total loss followed by CLX 3966 (17.4%), while Candella (29.4%) had the most. When comparing whether each variety performed above or below the trial average, 2672, NIZ17-764 and Rona stored better in cold storage than in common storage, while Huron and Lectro stored better in common storage.

*Final head size (lb):* By far, 3321 had the largest average final head size in both common (8.38 lb) and cold (8.67 lb) storages. Counter (7.25 lb) notably had the second largest head size out of common storage. Candella, Topgun and Budena had the smallest final head sizes out of both common and cold storages. When comparing whether each variety performed above or below the trial average, WC 287, CLX 3966 and CLX 3973 did better in cold storage than common, while Shelton and Princeton did better in common storage.

*Greenness:* Topgun had the most green left in the outer leaves after trimming out of both common (7.8 mm) and cold (5.2 mm) storages. In common storage, NIZ17-764 (6.1 mm) was the second most green variety, while 2697 (1.7 mm) had the least amount of green. In cold

storage, Princeton (4.4 mm) notably had the second most amount of green, while 2697 and Shelton did not have any.

Relative Storability (Figure 1.). Figure 1 is a schematic diagram that illustrates the relative head size of varieties coming out of the field (light green) compared to coming out of 15 weeks of common storage (yellow) and 24 weeks of cold storage (dark green). The head diameter is scaled according to average head size in pounds. Fourteen out of 20 varieties stored better in cold storage than in common, which is indicated by a larger size head out of cold storage. Above average temperatures throughout the storage period likely made it difficult to maintain 32 °F consistently in common storage. WC 287, Huron, CLX 3966, CLX 3973 and Candella had noticeably larger heads after trim out of cold (dark green) storage compared to common (yellow) storage, which may be an indication that such varieties do not store as well when temperatures fluctuate in common storage. Alternatively, Counter noticeably had a larger head size after trim out of common storage compared to cold storage, an indication that it does not store as long as the others. Very little difference in head size after trim out of common (yellow) and cold (dark green) occurred in Topgun, 2697, Budena, Amtrak, 2672, Shelton, 3321, NIZ17-725, NIZ17-764, 3307, Princeton, Rona, Super Red 115 and Lectro. Varieties that had the least difference in head size between coming out of the field and after trimming coming out of storage store the best. 3321 stored the best out of all varieties in the trial, followed by CLX 3966 (cold storage only), CLX 3973 (cold storage only), WC 287 (cold storage only) and Princeton. Amtrak and Shelton noticeably had very high storage loss.

### **Variety Summaries:**

Topgun. Green, 105 days to maturity, not YR. Medium to large plant size, one of most uniform varieties in trial and most upright plant growth of all varieties in trial. Topgun had the third smallest head size (4.50 lb) and marketable yield (500 cwt) in the trial. No thrips damage, some wormy heads and thick leaves. Very little difference in head size after trim from cold and common storage. Highest shrink loss out of common storage in trial (16.0%), more trim and total loss than trial average out of both common and cold storage, and one of the smallest final head sizes in the trial out of both storage types. Had the most green after trimming in the trial out of common (7.8 mm) and cold (5.2 mm) storage. Nice small head, easy to cut.

2697. Green, 100-105 days to maturity, YR. Large to medium plant size with inconsistent uniformity among plots ranging from good to excellent, slightly tipped to upright growth habit. Average head size (6.18 lb) and slightly above trial average marketable yield (706 cwt) with no rotted heads at harvest. Second highest thrips damage in trial, but still commercially acceptable. Thick leaves, easy trim. Very little difference in head size after trim from cold and common storage. One of highest total loss (32.9%) and trim losses out of common storage, trim due to thrips. Shrink loss was above average in common storage, but below average in cold storage. Below average final head size, had the least amount of green (1.7 mm) after trimming out of common storage and no green out of cold storage, white color.

Budena. Green, 105-110 days to maturity, not YR. Smallest plant size in the trial, plant uniformity inconsistent among replicates ranging from fair to very good, tied for second most uniform growth habit in trial. Second smallest head size (4.47 lb) in the trial and lowest marketable yield (348 cwt) due to highest number of off-types (29.6%) and 3.2% rots at harvest.

Thrips damage was slightly above average. Very little difference in head size after trim from cold and common storage. One of highest shrink losses out of common storage in the trial. Trim loss was above average in common storage, but below average in cold storage. One of smallest final head sizes out of both storages, solid, 1 in 15 heads had white mold.

Candella. Green, 110 days to maturity, YR. Large to medium plant size, uniformity was inconsistent among replicates ranging from fair to very good, slightly-tipped to upright growth habit. Smallest head size (3.13 lb) in trial and second lowest marketable yield (363 cwt) despite no off-types or rots at harvest. No thrips damage, some worms in head, mild pepper spot, big cores. Had noticeably larger heads after trim out of cold storage than common storage. Highest shrink loss (14.6%) out of cold storage and one of the highest shrink losses out of common storage. Highest trim loss out of common storage and highest total losses out of cold (29.4%) and common (33.9%) storages resulted in the smallest final head size in both storages. ***Note, this variety was planted 1 week late due to failed emergence of first planting.***

WC 287. Green, 110 days to maturity, YR. Very large to large plant size with very good uniformity and slightly tipped to upright growth habit. Below trial average head size (5.59 lb) and marketable yield (621 cwt). Almost no thrips injury, thin leaves. WC 287 was the only variety that did not have any split cores. Excellent storability in cold storage, but did not do nearly as well in common storage. One of lowest shrink losses out of cold storage, above average trim loss and slightly below average total loss. Final head size was above average out of cold storage, but below average out of common storage. ***Note, this variety was planted 2 weeks late and had a tough start, could have performed better under more ideal planting conditions.***

Amtrak (industry standard). Green, 115 days to maturity, YR. Large to very large plant size, uniformity was inconsistent among replicates ranging from good to excellent, slightly tipped growth habit. Third largest head size (8.10 lb) and marketable yield (932 cwt) in trial with no off-types and 0.9% rots at harvest. Thrips damage was above the trial average. At harvest, only 3.3 % of the heads had split cores. Had noticeably very high storage loss, very little difference in head size after trim between cold and common storages. Above average shrink, trim and total losses in both storages, except below average trim loss out of cold storage. Out of storage, above average final head size, 1 in 3 heads (33%) had white mold and black midrib was found in 1 head.

Huron (industry standard). Green, 115 days to maturity, YR. One of largest plant sizes in the trial, very good plant uniformity and slightly tipped growth habit. Above trial average head size (7.29 lb) and marketable yield (847 cwt) with no off-types or rots at harvest. Very little thrips damage, easy trim. Had noticeably larger head size after trim out of cold storage compared to common, which may be an indication that this variety does not store as well when storage temperatures fluctuate. Below average shrink and above average trim loss out of both storages. Total loss was average out of common storage and above average out of cold storage. Out of storage, above average head size, nice solid heads, 1 in 15 heads had white mold, black midrib found in 2 heads and pepper spot in 1 head.

2672. Green, 115 days to maturity, YR. Large plant size with good to very good uniformity, slightly tipped growth habit and basal buds. Fifth largest head size (7.38 lb) and marketable

yield (849 cwt) with 0.9% off-types and no rots at harvest. Highest thrips injury in the trial, tough trim. Very little difference in head size after trim between cold and common storages. Below average shrink, trim (one of lowest in trial) and total loss out of cold storage. Out of common storage, average trim and total loss, slightly higher than average shrink loss, above average final head size. Thin leaves, trimmed due to thrips, 1 in 28 heads had white mold.

CLX 3966. Green, Days to maturity unknown, YR unknown. Medium-large plant size - one of smaller plants in trial, uniformity was inconsistent among replicates ranging from fair to very good, tied for second most upright growth habit (upright to slightly tipped). Below trial average head size (5.93 lb) and fourth lowest marketable yield (505 cwt) due to 23% off-types (multiple heads) and 3.6% white mold at harvest. Thrips damage was slightly higher than trial average. Had noticeably larger head size after trim out of cold storage compared to common, which may be an indication that this variety does not store as well when storage temperatures fluctuate. Had excellent storability in cold storage. Shrink loss (6.3%) was lowest in trial out of cold storage, but average out of common storage. Below average trim and total (second lowest in trial out of cold storage) losses in common and cold storage. Final head size was below average out of common storage and above average out of cold storage. Heads easy to cut, black midrib found in 1 head.

CLX 3973. Green, Days to maturity unknown, YR unknown. Large plant size, uniformity was inconsistent among replicates ranging from fair to good, slightly tipped growth habit and basal buds. Below trial average head size (6.29 lb) and marketable yield (597 cwt) which was reduced by 14.7% off-types and 3.6% rots. Very slight thrips injury. Had noticeably larger head size after trim out of cold storage compared to common, which may be an indication that this variety does not store as well when storage temperatures fluctuate. Had excellent storability in cold storage. Higher than average shrink, trim and total losses out of both storage types. Out of storage, final head size below average out of common storage and average out of cold storage, solid heads, tough to trim and pepper spot found in 1 head.

Shelton. Green, 115 days to maturity, not YR. large plant size, very good to good uniformity and slightly tipped to upright growth habit. Wrapper leaves had notably more worm holes than other varieties. Above average head size (6.89 lb) and marketable yield (778 cwt) with no off-types and 2.6% rots (white mold) at harvest. Very little difference in head size after trim between cold and common storages. Average shrink loss out of common storage and above average shrink loss out of cold storage. Above average trim (highest in trial out of cold storage - 16.4%) and total losses out of both storage types. Out of storage, average head size, no green color out of cold storage, yellow color, solid, tough to cut in half, pepper spot found in 1 head.

3321. Green, 115 days to maturity, not YR. Largest plant size in the trial with very good uniformity, but slightly tipped to tipped growth habit. Largest head size (8.92 lb) and marketable yield (1024 cwt) in trial with 1.1% off-types and no rots at harvest. Thrips damage was average, very clean, easy trim. Very little difference in head size after trim between cold and common storages. Had the best storability of all varieties in the trial in both storage types. Lowest trim loss out of cold storage, second lowest trim loss out of common storage, least total loss (17.1%) out of cold storage. Largest final head size by far in common (8.38 lb) and cold (8.67 lb). Easy to cut, some bruises, decent amount of green after trimming.

NIZ17-725. Green, 115 days to maturity, YR unknown. Large plant size, one of most uniform varieties in trial which was very good to excellent, slightly tipped to tipped growth habit. Sixth largest head size (7.30 lb) and seventh highest marketable yield (818 cwt) in trial with below trial average rots and off-types at harvest. Thrips damage was below trial average. Very little difference in head size after trim between cold and common storages. Average and below average shrink loss out of common and cold storage, respectively. Below average and average trim and total losses out of common and cold storage, respectively. Out of storage, above average final head size, solid heads, but with core rot and 1 in 30 heads had white mold, trim for thrips.

NIZ17-764. Green, 115 days to maturity, YR unknown. Large plant size, one of most uniform varieties in trial, which was very good to excellent, slightly tipped to upright growth habit. Fourth largest head size (7.75 lb) and marketable yield (860 cwt) with 2.6% white mold at harvest. Thrips damage was above the trial average. Very little difference in head size after trim between cold and common storages. Second lowest shrink loss out of common storage and below average shrink, trim and total losses out of cold storage. Above average trim and total losses out of common storage. Out of storage, above average final head size, second most green heads out of common storage, solid heads, but cores were starting to rot, 3 in 28 heads had white mold and some heads had thrips in deep.

Counter. Green, 118 days to maturity, YR. One of largest plant sizes, best uniformity and upright growth habit (upright to slightly tipped) of all entries in the trial. Outside wrapper leaves notably had a few more worm holes than other varieties. Second largest head size (8.18 lb) and marketable yield (935 cwt) in the trial with no off-types. Slight thrips damage, worm holes in head, thin leaves. Did not store as good for the long term. Out of common storage, one of the lowest shrink, trim and total losses in trial and second largest final head size in trial. Out of cold storage, average shrink and total losses and below average trim loss, above average final head size. Out of storage, heads had bruises and found 2 heads with black midrib.

3307. Green, 118 days to maturity, YR. One of largest plant sizes in the trial, uniformity was inconsistent among replicates and ranged from fair to very good, the least upright plant growth (slightly tipped to tipped) in the trial. Above average head size (6.64 lb) and marketable yield (713 cwt) with 7.5% off-types, no rots and 2.3% split cores at harvest. Slight thrips damage. Very little difference in head size after trim between cold and common storages. One of lowest shrink losses out of common and cold storage. Lowest trim and total loss of green varieties out of common storage, average trim and total losses out of cold storage. Above average and average final head size out of common and cold storage, respectively. Some bruises.

Princeton. Green, 118 days to maturity, YR. Large plant size, uniformity was inconsistent among replicates and ranged from good to excellent, one of most upright growth habits (upright to slightly tipped) in the trial. Above trial average head size (6.50 lb) and marketable yield (728 cwt). No thrips damage, green interior, thick leaves. At harvest, 85.2% of the heads had split cores. Very little difference in head size after trim between cold and common storages. Very good long term storability. One of lowest shrink losses (7.7%), below average trim loss and lowest total loss of green varieties in trial out of common storage. Below average shrink loss and

average trim and total losses out of common storage. Average final head size with decent amount of green color, some core rot.

Rona (industry standard). Red, 115 days to maturity, not YR. One of largest plant sizes and upright (upright to slightly tipped) growth habits in the trial with the most uniform (excellent to very good) growth habit. Second largest head size (5.68 lb) and marketable yield (619 cwt) of red varieties with 5.2% off-types. No thrips damage. Very little difference in head size after trim between cold and common storages. At harvest, only 3.3% of the heads had split cores. Out of red varieties, lowest trim and total losses out of cold storage. Very solid.

Lectro (industry standard). Red, 117 days to maturity, not YR. One of largest plant sizes in the trial, uniformity inconsistent among replicates ranging from fair to very good, upright growth habit inconsistent among replicates ranging from tipped to upright, basal buds. Smallest head size (4.73 lb) and marketable yield (526 cwt) of red varieties. Very little difference in head size after trim between cold and common storages. Thrips damage was higher than trial average and the highest of the red varieties. Out of red varieties, lowest trim and total losses out of common storage. Some thrips deep.

Super Red 115. Red, 115 days to maturity, YR. Large to medium plant size, one of most uniform (very good to excellent) varieties in trial, slightly tipped growth habit, basal buds. Slightly larger head size (6.00 lb) and marketable yield (674 cwt) than Rona. Slight thrips damage, lower than trial average. At harvest, 40.0% of the heads had split cores. Very little difference in head size after trim between cold and common storages. Out of red varieties, highest trim and total losses in both storage types. Some thrips deep.

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**For more information:**

For color photos or a powerpoint presentation of this trial, contact Christy Hoepting, 12690 Rt 31, Albion, NY 14411, 585-798-4265 x 38; 585-721-6953 (cell), cah59@cornell.edu



Table 2. Plant characteristics, head size, yield and onion thrips damage of storage cabbage varieties, Hamlin, 2005.

Variety	Plant Characteristics			% off-types	% rots	% split cores	Ave. head size (lb)	Estimated yield (cwt) <sup>4</sup>	Estimated marketable yield (cwt) <sup>5</sup>	Onion thrips damage	
	Size	Uniformity	Upright							Depth <sup>6</sup>	Severity <sup>7</sup>
Topgun	M-L	VG-E	<u>U-ST</u>	<b>2.6</b>	<i>1.7</i>	<b>9.1</b> c	<i>4.50</i> gh	<i>522</i>	<i>500</i>	<b>0.0</b> f	<b>0.0</b> e
2697	L-M	G-E	ST-U	<b>1.7</b>	<b>0.0</b>	<i>28.3</i> bc	<i>6.18</i> c-f	<i>717</i>	<i>705</i>	<i>2.5</i> ab	<i>1.0</i> b
Budena	S	F-VG	U-ST	<i>29.6</i>	<i>3.2</i>	<b>9.0</b> cd	<i>4.47</i> gh	<i>518</i>	<i>348</i>	<i>1.4</i> b-f	<i>0.3</i> c-e
Candella	L-M <sup>1</sup>	F-VG <sup>2</sup>	ST-U <sup>3</sup>	<b>0.0</b>	<b>0.0</b>	<b>7.0</b> cd	<i>3.13</i> h <sup>8</sup>	<i>363</i>	<i>363</i>	<b>0.0</b> f	<b>0.0</b> e
WC 287	VL-L	VG	ST-U	<b>2.1</b>	<i>2.1</i>	<b>0.0</b> d	<i>6.13</i> c-f	<i>716</i>	<i>686</i>	<b>0.01</b> f	<b>0.01</b> de
Amtrak	L-VL	G-E	ST	<b>0.0</b>	<b>0.9</b>	<b>3.3</b> cd	<b>8.10</b> ab	<b>954</b>	<b>946</b>	<i>2.2</i> bc	<i>0.5</i> cd
Huron	VL	VG	ST	<b>0.0</b>	<b>0.0</b>	<b>13.6</b> cd	<b>7.29</b> b-d	<b>847</b>	<b>847</b>	<b>0.3</b> ef	<b>0.2</b> de
2672	L	G-VG	ST	<b>0.9</b>	<b>0.0</b>	<b>12.3</b> cd	<b>7.38</b> a-d	<b>857</b>	<b>849</b>	<i>3.9</i> a	<i>1.5</i> a
CLX 3966	ML	F-VG	U-ST	<i>23.0</i>	<i>3.6</i>	<b>9.8</b> cd	<i>5.93</i> d-g	<i>692</i>	<i>508</i>	<i>1.4</i> b-f	<i>0.3</i> c-e
CLX 3973	L	F-G	ST	<i>14.7</i>	<i>3.6</i>	<b>12.2</b> cd	<i>6.29</i> c-f	<i>770</i>	<i>630</i>	<b>0.6</b> c-f	<b>0.1</b> de
Shelton	L	VG-G	ST-U	<b>0.0</b>	<i>2.6</i>	<b>12.0</b> cd	<b>6.89</b> b-e	<b>800</b>	<b>779</b>	<b>0.0</b> f	<b>0.0</b> e
3321	<u>VL</u> <sup>11</sup>	VG	ST-T	<b>1.1</b>	<b>0.0</b>	<b>12.7</b> cd	<b>8.92</b> a	<b>1186</b>	<b>1173</b>	<i>1.4</i> b-f	<b>0.2</b> de
NIZ17-725	L	VG-E	ST-T	<b>2.8</b>	<b>0.8</b>	<i>16.1</i> b-d	<b>7.30</b> b-d	<b>848</b>	<b>818</b>	<b>0.7</b> c-f	<b>0.1</b> de
NIZ17-764	L	VG-E	ST-U	<b>1.8</b>	<i>2.6</i>	<b>5.6</b> cd	<b>7.75</b> a-c	<b>917</b>	<b>877</b>	<i>2.1</i> b-d	<i>0.7</i> bc
Counter	<u>VL</u>	E-VG	U-ST	<b>0.0</b>	<i>1.7</i>	<i>18.8</i> b-d	<b>8.18</b> ab	<b>951</b>	<b>935</b>	<b>0.2</b> ef	<b>0.04</b> de
3307	VL	F-VG	ST-T	<i>7.5</i>	<b>0.0</b>	<b>2.3</b> d	<b>6.64</b> b-e	<b>771</b>	<b>716</b>	<b>0.6</b> c-f	<b>0.1</b> de
Princeton	L	G-E	U-ST	<b>2.8</b>	<b>0.9</b>	<i>85.2</i> a	<b>6.50</b> c-e	<i>751</i>	<b>724</b>	<b>0.0</b> f	<b>0.0</b> e
Rona	VL	<u>E-VG</u>	U-ST	<i>5.2</i>	<b>0.9</b>	<b>3.3</b> cd	<i>5.68</i> e-g	<i>660</i>	<i>620</i>	<b>0.0</b> f	<b>0.0</b> e
Lectro	VL	F-VG	T-U	<b>3.4</b>	<b>0.8</b>	<b>7.4</b> cd	<i>4.73</i> fg	<i>549</i>	<i>526</i>	<i>1.5</i> b-e	<i>0.3</i> c-e
Super Red 115	L-M	VG-E	ST	<b>2.5</b>	<b>0.8</b>	<i>40.0</i> b	<i>6.00</i> d-g	<i>697</i>	<i>673</i>	<b>0.6</b> d-f	<b>0.2</b> de
<b>Trial Average</b> <sup>9</sup>				<b>5.1</b>	<b>1.3</b>	<b>15.0</b>	<b>6.37</b>	<b>755</b>	<b>711</b>	<b>1.0</b>	<b>0.3</b>
<b>P Value</b> <sup>10</sup>						0.0007	0.0000			0.0000	0.0000

<sup>1</sup>Plant size: **S** – small; **M** – medium; **ML** – medium-large; **L** – large; **VL** – very large. <sup>2</sup>Uniformity: **F** – fair, **G** – good; **VG** – very good; **E** – excellent.

<sup>3</sup>Uprightness: **T** – tipped; **ST** – slightly tipped; **U** – upright. <sup>4</sup>Estimated yield = total weight per replicate area extrapolated to 1 acre area; \*based on 30 x 18” plant spacing. <sup>5</sup>Estimated marketable yield = estimated yield x (100% - %rots - %off-types). <sup>6</sup>Depth of onion thrips: number of leaf layers damaged by thrips.

<sup>7</sup>Onion Thrips Damage Severity Rating: 0 = no damage; 1 = little; 2 = low; 3 = maximum commercial acceptability; 4 = high; 5 = severe. <sup>8</sup>numbers in a column followed by the same letter are not significantly different according to Fisher’s Protected LSD test, P > 0.05. <sup>9</sup>Average of all entries; numbers in **bold** placed better than trial average; numbers in *italics* placed equal to or worse than the trial average for each variable. <sup>10</sup>Fisher’s Protected LSD test, P = 0.05. <sup>11</sup>underlined values indicate the best result in each column.

Table 3. Percent shrink, trim and total loss, and final head size and greenness of storage cabbage varieties out of common and refrigerated storage, 2006.

Variety	Common Storage (22-Feb)					Cold Storage (28-Apr)				
	% shrink	% trim loss	% total loss	Final avg. head wt (lb)	Green (mm) <sup>1</sup>	% shrink	% trim loss	% total loss	Final avg. head wt (lb)	Green (mm)
Topgun	<i>16.0</i>	<i>15.0</i>	<i>31.0</i>	3.28	<b><u>7.8</u></b>	<i>10.3</i>	<i>13.5</i>	<i>23.8</i>	3.47	<b><u>5.2</u></b>
2697	<i>13.4</i>	<i>19.5</i>	<i>32.9</i>	4.38	<i>1.7</i>	<b>8.5</b>	<i>14.4</i>	<i>22.9</i>	4.84	<i>0.0</i>
Budena	<i>14.1</i>	<i>13.8</i>	<i>27.9</i>	3.42	<b>5.5</b>	<i>10.0</i>	<b>11.9</b>	<i>21.8</i>	3.43	<b>3.4</b>
Candella	<i>14.1</i>	<i>19.8</i>	<i>33.9</i>	2.00	3.3	<i>14.6</i>	<i>14.9</i>	<i>29.4</i>	2.44	<i>0.6</i>
WC 287	<b>10.2</b>	<i>14.0</i>	<b>24.2</b>	4.14	<b>5.0</b>	<b>6.6</b>	<i>13.2</i>	<b>19.8</b>	<b>5.60</b>	<i>1.8</i>
Amtrak	<i>12.7</i>	<i>15.7</i>	<i>28.4</i>	<b>6.30</b>	2.6	<i>9.4</i>	<b>11.5</b>	<i>20.9</i>	<b>6.35</b>	<i>1.1</i>
Huron	<b>10.0</b>	<i>13.1</i>	<b>23.1</b>	<b>6.14</b>	4.2	<b>8.3</b>	<i>13.1</i>	<i>21.4</i>	<b>5.37</b>	<i>1.8</i>
2672	<i>12.0</i>	<b>12.7</b>	<i>24.7</i>	<b>5.58</b>	3.7	<b>8.5</b>	<b>10.6</b>	<b>19.2</b>	<b>6.10</b>	<i>0.8</i>
CLX 3966	<i>11.6</i>	<b>11.9</b>	<b>23.6</b>	4.32	<b>5.3</b>	<b><u>6.3</u></b>	<b>11.1</b>	<b>17.4</b>	<b>5.91</b>	<i>1.8</i>
CLX 3973	<i>12.6</i>	<i>13.5</i>	<i>26.1</i>	4.79	<b>7.1</b>	<i>9.2</i>	<i>14.2</i>	<i>23.4</i>	<b>5.76</b>	<i>1.9</i>
Shelton	<b>11.3</b>	<i>15.7</i>	<i>27.0</i>	<b>5.18</b>	2.9	<i>9.3</i>	<i>16.4</i>	<i>25.7</i>	5.18	<i>0.0</i>
3321	<b>10.7</b>	<b><u>10.3</u></b>	<b>21.0</b>	<b><u>8.38</u></b>	<b>4.5</b>	<b>7.1</b>	<b><u>10.1</u></b>	<b><u>17.1</u></b>	<b><u>8.67</u></b>	<b>3.6</b>
NIZ17-725	<b>11.3</b>	<b>11.0</b>	<b>22.3</b>	<b>5.85</b>	<b>6.1</b>	<b>7.8</b>	<i>12.4</i>	<b>20.2</b>	<b>5.80</b>	<i>0.3</i>
NIZ17-764	<b>8.3</b>	<i>16.2</i>	<i>24.6</i>	<b>6.07</b>	4.1	<b>7.9</b>	<b>11.0</b>	<b>18.8</b>	<b>6.52</b>	<i>1.3</i>
Counter	<b>9.3</b>	<b>10.5</b>	<b>20.0</b>	<b>7.25</b>	2.6	<b>8.5</b>	<b>11.5</b>	<b>20.0</b>	<b>6.01</b>	<i>1.4</i>
3307	<b>9.3</b>	<b><u>10.2</u></b>	<b><u>19.5</u></b>	<b>5.47</b>	3.3	<b>6.9</b>	<i>12.9</i>	<b>19.7</b>	<b>5.27</b>	<b>2.1</b>
Princeton	<b><u>7.7</u></b> <sup>3</sup>	<b>11.8</b>	<b><u>19.5</u></b>	<b>5.41</b>	<b>4.4</b>	<b>8.2</b>	<i>11.8</i>	<b>20.0</b>	5.15	<b>4.4</b>
Rona	<b>11.1</b>	<b>7.6</b>	<b>18.8</b>	4.73		8.7	<b><u>7.0</u></b>	<b><u>15.6</u></b>	4.76	
Lectro	<b>9.3</b>	<b><u>6.8</u></b>	<b><u>16.1</u></b>	4.07		<b>7.5</b>	<b>10.5</b>	<b>18.0</b>	3.86	
Super Red 115	<i>13.4</i>	<b>8.1</b>	<b>21.4</b>	4.64		<b>8.2</b>	<b>10.8</b>	<b>18.9</b>	5.05	
<b>Trial Average</b> <sup>2</sup>	<b>11.5</b>	<b>12.8</b>	<b>24.3</b>	<b>5.09</b>	<b>4.3</b>	<b>8.7</b>	<b>12.1</b>	<b>20.7</b>	<b>5.24</b>	<b>2.0</b>

<sup>1</sup>millimeters of green on outside of head after trimming. <sup>2</sup>Average of all entries; numbers in **bold** placed better than trial average; numbers in *italics* placed equal to or worse than the trial average for each variable. <sup>3</sup>**underlined** values indicate the best result in each column.

Figure 1. Summary of scale diagrams for average head size prior to storing, and after common (15 weeks) and cold (refrigerated, 24weeks) storage.

