

## 2008 Kraut Cabbage Variety Evaluation

Christy Hoepting<sup>1</sup>, Katie Klotzbach<sup>1</sup> and Jim Ballerstein<sup>2</sup>

<sup>1</sup>Cornell Cooperative Extension Vegetable Program

<sup>2</sup>Dept. of Horticulture, NYSAES

### Objectives:

1. To evaluate kraut cabbage varieties for yield, head and growth characteristics, maturity and tolerance to disease, disorders and insects, especially onion thrips.
2. To involve Cornell and industry representatives in the selection and evaluation of new kraut cabbage varieties.

### Acknowledgements:

We wish to thank Dennis Ferlito, Tom Murphy and staff from the Bejo Research Farm for trial maintenance (and lunch!), Steve Reiners, Jeff Eckert, Tom Gordon, Dave MacCaskill, and Jim Ballerstein's summer work crew, for help with planting, harvest and evaluation.

Table 1. 2008 kraut cabbage variety entries in approximate order of maturity.

Entry	Seed Source	Days to Harvest	Years in Trial	Comments
1. Padoc	Bejo	75	2006, 2008	2635
<b>2. Fresco</b>	<b>Bejo</b>	<b>75</b>	<b>early standard</b>	
3. SG3370	Syngenta	95	2008	New!
4. Superkraut 86	Reeds	86	2004, 2006, 2008	
5. ATI B	American Takii	80	2008	
6. Cecile	Bejo	80	2008	
7. Rotunda	Bejo	75-80	2002, 2004, 2006, 2008	
8. ATI D	American Takii	80-85	2008	
9. ATI C	American Takii	80	2008	
<b>10. Kaitlin</b>	<b>Bejo</b>	<b>94</b>	<b>mid standard</b>	
<b>11. Bobcat</b>	<b>Reeds</b>	<b>76</b>	<b>early standard</b>	
12. Mentor	Bejo	90	2008	
13. Milestone	Bejo	85	2008	
<b>14. Hinova</b>	<b>Bejo</b>	<b>100</b>	<b>late standard</b>	
15. Score	Bejo	90	2006, 2008	
16. ATI A	American Takii	105-110	2008	
17. Cabton	Bejo	100	2006, 2008	2660
18. Kilaherb	Stokes	115	2008	New!
19. Mandy	Bejo	103	2002, 2006, 2008	
20. Jubilee	Bejo	104	2008	
21. Moreton	Reeds	105	2000, 2002, 2004, 2006, 2008	
22. SG3412	Syngenta	125	2008	New!

## Materials:

Twenty-two kraut cabbage varieties were evaluated from five seed companies (Table 1). Fresco and Bobcat, Kaitlin, and Hinova were used as early, main and late industry standards, respectively.

## Methods:

Transplant Production. Seeds were seeded into 72-cell trays in Cornell mix on May 5 and grown in a greenhouse at the NYSAES, Geneva. They were fertilized twice with 15-16-17 NPK soluble Peters Mix. Plants were taken outside to harden off on May 28 at which time no further fertilizer was added until the day of transplanting. When plants were 2-5 true leaves (4-5 inches tall), they were transplanted by hand into hot and dry conditions on Jun 5.

Experimental Design. The trial was located at the Bejo Research Farm in Geneva, NY in Ontario County and was arranged as a complete randomized design with 22 varieties replicated three times. Each replicate consisted of a single row of 30 plants spaced 20 inches apart with 30 inches between rows. Fertility and pest management was maintained by the Bejo Research Farm staff.

Field Information. The soil pH was ~ 6.5. Crop rotation included alfalfa from 2005 to 2008. This was the first time that this ground was cropped to crucifers in 15 years. Fertilizer application included 500 lbs per acre of 10-10-30 NPK plowed down and 500 lbs per acre of 10-20-20 N-P-K broadcast pre-plant. Weed control consisted of 1 qt. per acre Treflan pre-plant incorporated. Bravo/Cabrio + Manex was applied 6 times from Jul 18 to Sep 17 for disease management. Insects were managed using Dipel, Xentari, Dimethoate and Warrior in 6 sprays from Jul 18 to Sep 17.

Harvest Evaluation. The trial was harvested on Aug 21, Aug 28, Sep 11, Sep 24 and Oct 8 with most varieties being harvested at least twice. First, plant size, uniformity, growth habit, and number of splits, rots, sunscald (top wrapper leaf breakdown) and off-types were evaluated. Then, five sound heads were harvested and weighed. Finally, each head was cut in half and head length and width, and core length were measured, thrips severity was rated, and number of layers affected by thrips was counted. Head shape, internal color and other quality observations were made. Head shape was quantified by the difference between the width and length. Positive values indicated that the heads were wider than they were tall, and the closer this value was to zero (negative or positive) indicated the more perfectly round the head was. Internal tipburn and split cores were calculated from the total number of heads (5 heads x 3 reps) at each harvest. A representative slice from 1 head in 2 replicates was taken back to the laboratory for dry weight analysis on all harvests except Aug 21. Marketable yield was estimated from the total yield per 5 heads, which was corrected for the percentage of unmarketable rots, multiple heads and other unmarketable off-types, and large head splits, but not for small splits or sunscald. Maturity date was selected based on marketable yield, number of splits and rots in the field, core splits and visual observation.

2008 Season. The 2008 growing season was generally normal with above average temperatures in June and September, normal temperatures in July and cooler temperatures in August and October. Rainfall was above average in June, July and August, below average in September and normal in October. Local weather data from the Network for Environment and Weather Applications (NEWA) weather station located in Geneva reported monthly average temperatures of 69.1, 70.7, 66.5, 61.9 and 48.5 °F for June, July, August, September and October, respectively. Total monthly rainfall was 3.8, 4.4, 4.2, 2.4 and 5.4 inches for June, July, August, September and October, respectively. Total number of rain days per month was 15, 10, 14, 8 and 10 days for June, July, August, September and October, respectively. In the trial, worm and disease pressure was low while onion thrips pressure was moderate to high.

## Results:

Head weight (Table 2). **Early maturity class (entries 1 – 6):** Padoc (14.3 lb) had the largest head size in this maturity class, which was significantly larger than Fresco (12.1 lb) and SG3370 (11.8 lb). ATI B had the smallest head in this class (9.8 lb). **Mid-season maturity class (entries 7 – 11):** ATI C had the largest head

size (13.3 lb) followed by Bobcat (12.7 lb) and Kaitlin (12.7 lb). All entries in this maturity class had above average head size. **Mid to late-season maturity class (entries 12 – 19):** Milestone (15.9 lb) had the largest head size in this maturity class and the entire trial, followed by Score (14.5 lb), Cabton (14.4 lb) and mentor (14.0 lb), while Mandy (10.8 lb), Hinova (11.6 lb) and Kilaherb (12.8 lb) had the smallest head weights. **Late-season maturity class (entries 20 – 22):** SG3370 (14.4 lb) and Moreton (14.4 lb) had the largest head weight in this class, while Jubilee (9.5 lb) had the lowest in the entire trial.

Estimated Marketable Yield (Table 2). Marketable yield was estimated from the total yield per 5 heads, which was corrected for the percentage of unmarketable rots, multiple heads and other unmarketable off-types, and large head splits, but not for small splits or sunscald (top wrapper leaf breakdown). **Early maturity class (entries 1 – 6):** Padoc had the largest estimated marketable yield (65.5 ton/A) on Aug 21, followed by Cecile (60.3 ton/A) on Sep 11, while Superkraut 86 (48.9 ton/A) and ATI B (49.5 ton/A) had the smallest on Aug 29. Superkraut 86 had the smallest marketable yield at maturity in the entire trial. **Mid-season maturity class (entries 7 – 11):** Kaitlin (65.5 ton/A) on Sep 11, Bobcat (65.4 ton/A) on Sep 24 and ATI D (65.1 ton/A) on Sep 24 had the highest estimated marketable yield in this maturity class, while ATI C (57.85 ton/A) had the lowest. **Mid to late-season maturity class (entries 12 – 19):** Milestone (81.0 ton/A) on Oct 8 had the highest estimated marketable yield in this maturity class and in the entire trial, followed by Score (76.0 ton/A) on Oct 8, while Mandy (56.5 ton/A) had the lowest. **Late-season maturity class (entries 20 – 22):** Moreton (75.1 ton/A) on Oct 8 had the largest head size, while Jubilee (49.8 ton/A) on Oct 8 had one of the lowest in the trial.

% Unmarketable (Table 2 & 3). Percent unmarketable includes rots, large splits and multiple heads and other unmarketable off-types. **Early maturity class (entries 1 – 6):** This class had the highest incidences of unmarketable heads mostly due to large splits. Padoc (12.3%) had the most on Aug 21 due mostly to large splits (11.1%), and minor multiple heads (1.2%) and rot (1.2%). Cecile (1.2%) and ATI B (3.8%) on Aug 29 had the least unmarketable heads. Unmarketable heads due to large splits increased dramatically between Aug 29 and Sep 11 in Superkraut 86 and ATI B. ATI B (1.5%) had multiple heads, and Padoc (1.2%), Cecile (Aug 29: 1.2%; Sep 11: 1.5%) and ATI B (2.5%) had low incidences of rot. **Mid-season maturity class (entries 7 – 11):** ATI D was the only variety in this maturity class that did not have any unmarketable heads due to large splits. Kaitlin (Sep 11: 1.2%; Sep 24: 0%) and Bobcat (Sep 11: 1.2%; Sep 24: 1.5%) also had low incidences of unmarketable heads at maturity, while ATI C (Sep 11: 34.4%; Sep 24: 17.9%) had the highest incidence of unmarketable heads in the entire trial. Kaitlin (1.2%) was the only variety that had minor multiple heads. On Sep 24, Bobcat (1.5%), ATI C (1.9%) and Rotunda (2.2%) had minor incidences of rot. **Mid to late-season maturity class (entries 12 – 19):** Mentor, Milestone, Hinova, ATI A, Kilaherb and Mandy had no unmarketable heads in this trial, while Cabton (2.8%) had the most on Oct 8. Milestone (2.2%) on Oct 8 and Score (1.8%) on Sep 24 were the only varieties in this maturity class that had minor large splits. Cabton (1.6%) was the only variety that had multiple heads, while Kilaherb (3.2%), Mentor (2.7%), Score (1.8%), Milestone (1.6%) and Mandy (1.3%) had very low incidence of other marketable off-types. On Oct 8, Cabton (2.8%) was the only variety in this class that had rots. **Late-season maturity class (entries 20 – 22):** Moreton (75.1 ton/A) and SG3412 (72.6 ton/A) had no unmarketable heads, while SG3412 had 4% on Oct 8 due to 1.9% large splits and 2.1% rots. Jubilee and Moreton both had 1.2% marketable off-types.

Plant Characteristics (Table 4). **Plant Size:** **Early maturity class (entries 1 – 6):** The varieties in this size class were generally large with ATI B having the largest plant size and SG3370 having the smallest. **Mid-season maturity class (entries 7 – 11):** Kaitlin, followed by ATI C had the largest plant sizes, which were large to very large, while Rotunda had the smallest plant size and was large to medium-large. **Mid to late-season maturity class (entries 12 – 19):** Cabton had the largest plant size in the entire trial. Score and Mandy were also very large in this size class while ATI A and Mentor were the smallest (large to medium-large). **Late-season maturity class (entries 20 – 22):** Moreton had the third largest plant size in the trial, while Jubilee and SG3412 were slightly smaller (large to very large).

**Uniformity:** **Early maturity class (entries 1 – 6):** Uniformity in this size class was good to very good. ATI B (ranked 7<sup>th</sup> overall) and Superkraut 86 (ranked 9<sup>th</sup> overall) had the most uniform growth in this class, while Fresco (ranked 20<sup>th</sup> overall) and SG3370 (ranked 18<sup>th</sup> overall) had some of the poorest uniformities in the trial, but were still good. **Mid-season maturity class (entries 7 – 11):** This class had the most uniform varieties with Rotunda having excellent uniformity and the best in the trial, followed by Bobcat (ranked 3<sup>rd</sup> overall) and

Kaitlin (ranked 4<sup>th</sup> overall) which had very good to excellent uniformity. ATI D (ranked 13<sup>th</sup> overall) had the poorest uniformity in this class which was very good to good. **Mid to late-season maturity class (entries 12 – 19):** Kilaherb (ranked 5<sup>th</sup> overall) and Hinova (ranked 6<sup>th</sup> overall) were the most uniform in this class with very good uniformity, while Score (good uniformity, ranked 19<sup>th</sup> overall) and Mentor (good to very good uniformity, ranked 17<sup>th</sup> overall) had the poorest uniformity in this class. **Late-season maturity class (entries 20 – 22):** Jubilee had very good to excellent uniformity and was the second best in the trial.

**Growth Habit: Early maturity class (entries 1 – 6):** The varieties in this maturity class had the most tipped growth habit in the trial with Superkraut 86 (slightly tipped to tipped, ranked 14<sup>th</sup> overall) having the most tipped growth habit in the trial. SG3370 (ranked 6<sup>th</sup> overall) and Cecile (ranked 8<sup>th</sup> overall) had the best growth habit, which was upright to slightly tipped. **Mid-season maturity class (entries 7 – 11):** Kaitlin (upright to slightly tipped, ranked 2<sup>nd</sup> overall) had the most upright growth habit in this class, followed by Bobcat (upright to slightly tipped, ranked 6<sup>th</sup> overall) and ATI C (upright to slightly tipped, ranked 8<sup>th</sup> overall), while ATI D (ranked 10<sup>th</sup> overall) was slightly tipped. **Mid to late-season maturity class (entries 12 – 19):** Most of these varieties had upright to slightly tipped growth habit, while Mentor (ranked 13<sup>th</sup> overall) and Milestone (ranked 10<sup>th</sup> overall) were slightly tipped. **Late-season maturity class (entries 20 – 22):** Jubilee (upright to slightly tipped) had the most upright growth habit in the trial, and SG3412 (ranked 10<sup>th</sup> overall) was slightly tipped.

**Sunscald and Split Cores (Table 4).** These traits were included to aid in judging maturity. For the purpose of this study, sunscald was a condition where the top surface of the wrapper leaves turned purple or white and then began to break down via secondary bacterial rots. Since this was a surface that could be trimmed, heads with sunscald were not considered unmarketable, but one should take note, that there might be more loss due to trimming off these outer leaves than is indicated in the estimated yield. Spilt cores were noticed when the heads were cut in half. Large and small head splits, yield and internal visual appearance were also taken into consideration when judging maturity.

**Head Characteristics (Table 5).** **Head Shape: Early maturity class (entries 1 – 6):** With exception of Fresco, which had the second roundest head in the trial, and Cecile (ranked 5<sup>th</sup> overall for roundness), the varieties in this class had heads that were more wide than tall, especially ATI B. **Mid-season maturity class (entries 7 – 11):** Rotunda had the most roundest head shape in the trial, followed by ATI D (ranked 4<sup>th</sup> overall), which had a tapered base, and Bobcat (ranked 6<sup>th</sup> overall). Notably, ATI C had a pointed head. **Mid to late-season maturity class (entries 12 – 19):** ATI A (ranked 3<sup>rd</sup> overall) had the roundest head in this maturity class, while Mentor had one of the most flattest head shapes in the trial. Kilaherb had a flat-round head that was pointed at the top and tapered at the base. **Late-season maturity class (entries 20 – 22):** Jubilee and SG3412 had the second roundest head shapes in the trial while Moreton had one of the flattest head shapes in the trial.

**Internal Color:** This year, there were no striking differences among varieties with respect to internal color as they were all yellow-white (more yellow than white) or white-yellow (more white than yellow). Kaitlin appeared to have the whitest internal color of all the varieties in the trial, followed by SG3370 and ATI B from the early maturity class. Fresco was the most yellow, but was still commercially acceptable.

**Core Length:** Core sizes ranged from 2.8 to 4.7 inches with Bobcat and Padoc having the shortest and longest, respectively. Padoc's core had a water soaked appearance. Some of ATI D and Kilaherb's cores were slanted.

**Tip Burn:** ATI D (60%), Bobcat (36%), ATI B (33.3%), Kilaherb (30%) and Rotunda (13.3%) had tip burn at maturity.

**Percent Dry Weight:** At maturity, percent dry weight ranged from 4.7% to 8.6% with Padoc and Hinova having the least and highest, respectively. Varieties of dry weights of 8% or greater included Cecile from the early maturity class, ATI D from the mid-season maturity class, Hinova and ATI A from the mid to late maturity class, and Jubilee and Moreton from the late maturity class.

**Onion Thrips Damage (Table 6).** **Early maturity class (entries 1 – 6):** ATI B was the only variety in the entire trial that had no thrips feeding injury. SG3370 (depth - 1.5; severity – 0.2; ranked 4<sup>th</sup> overall), Fresco (depth –

2.1; severity – 0.7; ranked 6<sup>th</sup> overall) and Superkraut 86 (depth – 3.3; severity – 0.6; ranked 7<sup>th</sup> overall) all had below average thrips damage. Padoc (depth – 15.4; severity – 3.5) had the worst thrips damage in the entire trial. Cecile had the second highest thrips damage in the trial (depth – 7.1, 5.9; severity – 1.5, 2.1; ranked 14<sup>th</sup> overall), **Mid-season maturity class (entries 7 – 11):** ATI C (depth – 0.2, 1.3; severity – 0.1, 0.3; ranked 3<sup>rd</sup> overall), Bobcat (depth – 0.8, 1.4; severity – 0.1, 0.5; ranked 4<sup>th</sup> overall) and Kaitlin (depth – 3.8, 2.7; severity – 0.6, 1.2; ranked 7<sup>th</sup> overall) had below average thrips damage. Rotunda (depth – 4.4, 4.8; severity – 2.4, 2.7; ranked 13<sup>th</sup> overall) and ATI D (depth – 3.8, 6.3; severity – 0.8, 1.9; ranked 12<sup>th</sup> overall) had the third and fourth highest thrips damage in the trial, respectively. **Mid to late-season maturity class (entries 12 – 19):** Cabton (depth – 1.9, 1.0; severity – 0.5, 0.3; ranked 4<sup>th</sup> overall) had the least thrips damage in this maturity class. Mandy (depth – 1.3, 2.4; severity – 0.6, 0.4; ranked 5<sup>th</sup> overall) and Kilaherb (depth – 2.2, 2.8; severity – 1.0, 1.0; ranked 6<sup>th</sup> overall) had below average thrips damage. ATI A (depth – 5.5, 3.4; severity – 0.7, 0.7; ranked 9<sup>th</sup> overall) had notably above average depth of thrips damage, but below average severity of damage. Hinova (depth – 7.0, 6.8; severity – 1.4, 1.3; ranked 14<sup>th</sup> overall) had the second highest thrips damage in the trial. **Late-season maturity class (entries 20 – 22):** Jubilee (depth – 0, 0.5; severity – 0, 0; ranked 2<sup>nd</sup> overall) had the second lowest thrips damage in the trial, while Moreton and SG3412 had average and above average thrips damage.

Cabbage Maggot (data not shown): Cabton had 4.4% incidence of feeding damage in heads at harvest, while Superkraut 86, Rotunda, Kaitlin and Hinova had 2%.

### Variety Summaries (in order of approximate maturity):

#### 5-Star Ratings:

★★★★★ : perfect; ★★★★☆ : very good; ★★★☆☆ : average;  
★★☆☆☆ : below average; ★☆☆☆☆ : unacceptable

**Compare to trial average:** For each variable, the trial average is the average for all replicates of all varieties per harvest date. Compare an individual variety to the trial average to see if it performs above, below or at average.

#### Early maturity class (entries 1 – 6):

Padoc/2635 (Bejo): ★★☆☆☆ Earliest variety in the trial – slightly mature on August 21<sup>st</sup> with 11.1% large head splits, 22.2% small head splits, 1.2% rots and 9.9% sunscald (top wrapper leaf breakdown), and no split cores, did not hold until Aug 29. **Plant Characteristics:** Large sized plants with very good to good uniformity, most slightly tipped growth habit in the trials. **Head Weight and Marketable Yield:** Largest head weight (14.3 lb) in early maturity class and 4<sup>th</sup> largest head size overall, largest marketable yield (65.5 ton/A) in the early maturity class (10<sup>th</sup> overall), highest incidence of unmarketable heads (12.3%) in the early maturity class and second highest incidence in the entire trial, due to 11.1% (2<sup>nd</sup> highest overall) large head splits and 1.2% rots, also had 1.2% marketable off-types. **Head Characteristics:** Round-flat head shape, 2.7 cm more wide than tall, outer leaves have coarse appearance/loosely packed, yellowish white internal color with center of head yellow, longest core length (4.7 inches) in the entire trial with a water-soaked appearance, lowest percent dry weight (4.7% on Aug 29). **Thrips Damage:** Highest thrips depth and severity in the entire trial (15.4 layers deep, 3.5 out of 5.0 severe). Notes: thrips damage would have been lower and marketable yield would be higher if harvested 1 week sooner.

Fresco (Bejo) – Early standard: ★★★☆☆ Mature on August 29<sup>th</sup> with 9.6% large head splits, 35.9% small head splits, 0% rots, 4.5% sunscald (top wrapper leaf breakdown) and no split cores. Over-mature on September 11<sup>th</sup> with 65% large split heads, 21.3% small split heads, 16.2% sunscald and 4.4% rot. **Plant Characteristics:** Large plant size with good uniformity, which was the poorest in the entire trial, and slightly tipped growth habit. **Head Weight and Marketable Yield:** Second largest head weight (12.1 lb) in early maturity class and 11<sup>th</sup> overall. Third highest marketable yield (57.5 ton/A) in early maturity class and 16<sup>th</sup>

overall. Above average unmarketable yield (9.6%) due to above average large splits (9.6%), no rots and no off-types. **Head Characteristics:** Second roundest head shape in the trial, outer leaves have coarse appearance/loosely packed, yellowish-white internal color, above average core length (3.9 inches), below average percent dry weight (5.4% on August 29). **Thrips Damage:** Below average thrips damage (depth: 2.1 layers deep; severity: 0.7 out of 5, 6<sup>th</sup> lowest overall).

SG3370 (Syngenta): ★★½ Mature on August 29<sup>th</sup> with 9.7 % large split heads, 45.2% small head splits, 0% rots, 0% sunscald (top wrapper leaf breakdown), and 6.7% split cores. Past maturity on September 11<sup>th</sup> with 65% large head splits, 21.3% small head splits, 4.4% unmarketable rot and 25.7% sunscald. **Plant Characteristics:** large to medium plant size (smallest in entire trial) with good uniformity (2<sup>nd</sup> poorest overall), and upright to slightly tipped growth habit (6<sup>th</sup> overall, best in early class). **Head Weight and Marketable Yield:** Third largest head weight (11.8 lb) in early maturity class and 12<sup>th</sup> overall. Forth highest marketable yield (55.8 ton/A) in early maturity class and 18<sup>th</sup> overall. Above average unmarketable yield (9.7%) due to above average large splits (9.7%), no rots and no off-types. **Head Characteristics:** Round to round-flat head shape with heads that were 2.6 cm more wide than tall, outer leaves appeared coarse/loosely packed. Second whitest internal color (whitish-yellow) in the entire trial, above average core length (4.2 inches), Above average percent dry weight (5.9%) on August 29. **Thrips Damage:** Forth lowest thrips damage in trial (depth: 1.5 layers deep; severity: 0.2 out of 5).

Superkraut 86 (Reeds): ★★½ Mature on August 29<sup>th</sup> with 8.5% large head splits, 38.3% small head splits, and no rots, sunscald (top wrapper leaf breakdown) or split cores. Past maturity on September 11<sup>th</sup> with 41% large head splits, 30.4% small head splits, 0% rots, 0% sunscald and 20% split cores. **Plant Characteristics:** Large plant size with very good uniformity (2<sup>nd</sup> best of early maturity class), and slightly tipped to tipped growth habit (poorest in entire trial). **Head Weight and Marketable Yield:** Below average head weight (10.2 lb) and second lowest marketable yield (48.9 ton/A) in the trial. Above average unmarketable yield (8.5%) due to above average large splits, no rots and no off-types. **Head Characteristics:** Round-flat head shape with heads that were 2.6 cm more wide than tall, yellow-white internal color, above average core length (3.9 inches), below average percent dry weight (5.4%) on Aug 29, one of the lowest in the trial. **Thrips Damage:** Average depth of thrips damage (3.3 layers deep) and below average severity (0.6 out of 5). **Cabbage maggot:** 2.2% incidence of feeding damage in heads at harvest.

ATI B (American Takii): ★½ Mature on August 29<sup>th</sup> with 1.3% large head splits, 31.3% small head splits, 2.5% rots, 3.6% sunscald (top wrapper leaves breaking down) and 0% split cores. Past maturity on September 11<sup>th</sup> with 38.8% large head splits, 17.6% small head splits, 3.3% unmarketable rots, 9.1% sunscald (top wrapper leaf breakdown) and 33% split cores. **Plant Characteristics:** Large to very large sized plants (largest in early maturity class, 7<sup>th</sup> overall) with very good uniformity (7<sup>th</sup> best overall), slightly tipped growth habit and basal buds. Sits close to the ground, may be tricky to harvest. **Head Weight and Marketable Yield:** Smallest head weight (9.8 lb) in early maturity class and second smallest overall with smallest marketable yield (49.4 ton/A) in entire trial. Below average unmarketable yield (3.8%) due to below average large splits (1.3%), highest incidence of unmarketable rots (2.5%) in the trial and one of few varieties with unmarketable off-types (1.5% multiple heads). **Head Characteristics:** The flattest head shape in the trial (round-flat) with heads that were 4.5 cm more wide than tall, outer leaves have coarse appearance/loosely packed, second whitest internal color (whitish-yellow) in the entire trial, above average core length (4.0 inches), above average percent dry weight (6.1%) on August 29, **33.3% tipburn. Thrips Damage:** the only variety in the entire trial with no thrips injury!

Cecile (Bejo): ★★★★★ Mature on August 29<sup>th</sup> to September 11<sup>th</sup> with no large head splits or sunscald (top wrapper leaf breakdown), 5.2 and 15.9% small head splits, 1.2% and 1.5% rots, and 6.7 and 0% split cores. Past maturity on September 24 with 0% large head splits, 27% small head splits, 1.9% rots, 6.3% sunscald and 33.3% split cores. **Plant Characteristics:** Large sized plants with good to very good uniformity and upright to slightly tipped growth habit (8<sup>th</sup> overall, 2<sup>nd</sup> best in early class). **Head Weight and Marketable Yield:** Below average head weight (10.1 lb, 11.7 lb) and 13<sup>th</sup> overall. Second highest marketable yield (60.3 lb on Sep 11) in early maturity class and 13<sup>th</sup> overall. Below average unmarketable (1.2%, 1.4%) due to rot, no

large splits, no off-types. **Head Characteristics:** Round head shape with heads that were 1.5 cm more wide than tall, second roundest heads in early class. Third whitest internal color (white-yellow) in trial, thin leaves, only variety in early maturity class with below average core length (3.5 inches), highest dry weight in maturity class (6.6%, 8.0%), looks good! **Thrips Damage:** Above average depth of thrips damage (7.1 and 5.9 layers) and severity (1.5 and 2.1 out of 5).

#### **Mid-season maturity class (entries 7 – 11):**


Rotunda (Bejo): ★★½ Mature on September 11<sup>th</sup> to 24<sup>th</sup> with 10% and 2.2% large head splits, 26.4 and 41.4% small head splits, 1.7 and 2.2% rots, 0% and 4.4% sunscald (top wrapper leaf breakdown), and 13.3 and 6.7% split cores. **Plant Characteristics:** Large to medium-large plant size (smallest in mid maturity class) with excellent uniformity (best in the entire trial!), and slightly tipped to upright growth habit. **Head Weight and Marketable Yield:** Smallest head weight (11.7 lb, 12.3 lb) in mid maturity class and 9<sup>th</sup> overall. Below average marketable yield (54.7 ton/A, 61.5 ton/A) and 14<sup>th</sup> overall. Above average unmarketable yield (11.7% and 4.4%) due to below average large splits (10%, 2.2%), above average and highest incidence in the mid maturity class of rots (1.7%, 2.2%) and no off-types. **Head Characteristics:** The roundest heads in the entire trial which were only 0.3 cm more wide than tall, good head fill, thin leaves. Yellow-white internal color (most yellow of this maturity class), above average core length (4.3 inches), above average percent dry weight (7.5%, 6.2%), **13.3% tipburn**. **Thrips Damage:** Above average and highest in this maturity class thrips damage (depth: 4.4 and 4.8 layers deep; severity: 2.4 and 2.7 out of 5). **Cabbage maggot:** 2.2% incidence of feeding damage in heads at harvest.

ATI D (American Takii): ★ Mature on September 11<sup>th</sup> to 24<sup>th</sup> with 0% large head splits and rots, and, 3.8% and 3.1% small head splits, 2.4 and 5.9% sunscald (top wrapper leaf breakdown), and 26.7% and 13.37% split cores. **Plant Characteristics:** Large sized plants with very good to good uniformity (poorest in mid maturity class), and slightly tipped growth habit. **Head Weight and Marketable Yield:** Above average head weight (10.9 lb, 12.4 lb) and 8<sup>th</sup> overall. Above average marketable yield (57.3 ton/A, 65.1 ton/A) and 12<sup>th</sup> overall, third highest in this maturity class. No unmarketable heads (0% large splits and 0% rots) at harvest, best in the entire trial! 1.5% off-types. **Head Characteristics:** Round heads with a tapered base, which were 1.4 cm more wide than tall, air spaces beside the core. Third whitest internal color (white-yellow) in the entire trial, above average core length (4.1 inches), some slanted cores, highest percent dry weight (8.0, 7.4%) in this maturity class. **Highest incidence of tipburn in the trial (60%).** **Thrips Damage:** Above average and second highest in this maturity class thrips damage (depth: 3.8 and 6.3 layers deep; severity: 0.8 and 1.9 out of 5).


ATI C (American Takii): ★★★ Mature on September 11<sup>th</sup> to 24<sup>th</sup> with 34% and 16% large head splits, 49% and 56.3% small head splits, 0% and 1.9% rots, 34.4% and 24.9% sunscald (top wrapper leaf breakdown), and 0% and 20% split cores. **Plant Characteristics:** Large to very large plant size (2<sup>nd</sup> largest in this maturity class) with very good uniformity, and upright to slightly tipped growth habit. **Head Weight and Marketable Yield:** Largest head weight (12.2 lb, 13.3 lb) in mid maturity class and 6<sup>th</sup> overall. Below average marketable yield (50.3 ton/A, 57.5 ton/A), which is the lowest in this maturity class and 14<sup>th</sup> overall, due to the highest incidence of unmarketable heads (34.4, 17.9%) in the entire trial with 34 and 16% large head splits and 1.9% rots on Sep 24. **Head Characteristics:** Round heads that come to a point at the top, which are 3.1 cm more wide than tall, thin leaves. Yellow-white to white-yellow internal color, below average core length (3.7 inches), above average percent dry weight (7.5%, 6.4%), **6.7% tipburn**. Looks good! **Thrips Damage:** Lowest thrips damage in this maturity class and 3<sup>rd</sup> best overall (depth: 0.2 and 1.3 layers deep; severity: 0.1 and 0.3 out of 5).


Kaitlin (Bejo) – Mid Standard: ★★★★★ Mature on September 11<sup>th</sup> to 24<sup>th</sup> with 0% large head splits, rots and sunscald (top wrapper leaf breakdown), and, 9.7% and 22.4% small head splits, and 40% and 40% split cores. **Plant Characteristics:** Large to very large plant size (largest in this maturity class) with very good to excellent uniformity, and upright to slightly tipped growth habit (best in this maturity class, 2<sup>nd</sup> overall). **Head Weight and Marketable Yield:** Above average head weight (12.7 lb, 11.5 lb), second largest in mid maturity class and 7<sup>th</sup> overall. Best marketable yield (65.5 ton/A, 60.4 ton/A) in this maturity class and 9<sup>th</sup> overall. Second lowest incidence of unmarketable heads (1.2%, 0%) in this maturity class and 2<sup>nd</sup> overall, no large


splits, no rots, 1.3% off-types, 1.2% of which were unmarketable multiple heads. **Head Characteristics:** Round heads which are 2.5 cm more wide than tall, minor incidence of black hydathodes (unknown cause). Whitest interior color (white to white-yellow) of any variety in the trial, below average core length (3.3 inches, 3<sup>rd</sup> shortest overall), dense, below average percent dry weight (6.8%, 6.6%). **Thrips Damage:** Below average thrips damage (depth: 3.8 and 2.7 layers deep; severity: 0.6 and 1.2 out of 5). **Cabbage maggot:** 2.2% incidence of feeding damage in heads at harvest.

**Bobcat (Reeds) – Early Standard:**  Mature on September 24<sup>th</sup> with 0% large head splits, 9.3% small head splits, 1.5% rots, 3% sunscald (top wrapper leaf breakdown), and 70% split cores. **Plant Characteristics:** Large plant size with very good to excellent uniformity (3<sup>rd</sup> best overall), and upright to slightly tipped growth habit. **Head Weight and Marketable Yield:** Second largest head weight (12.7 lb) in mid maturity class and 7<sup>th</sup> overall. Above average marketable yield (65.4 ton/A), which is the second largest in this maturity class and 11<sup>th</sup> overall. Below average incidence of unmarketable heads (1.5%) due to rots, no off-types. **Head Characteristics:** Round heads which are 1.7 cm more wide than tall, thin leaves, outer leaves have coarse appearance/loosely packed. Yellow-white internal color, smallest core length (2.8 inches) in entire trial, below average percent dry weight (6.5%), **36% tipburn.** **Thrips Damage:** Below average thrips damage (depth: 1.4 layers deep; severity: 0.5 out of 5, 4<sup>th</sup> best overall).

#### **Mid to late-season maturity class (entries 12 – 19):**

**Mentor (Bejo):**  Mature on September 11<sup>th</sup>, 24<sup>th</sup> to October 8<sup>th</sup> with 0% large head splits and rots, and, 2.7%, 10.7% and 11.5% small head splits, 0%, 0% and 2% sunscald (top wrapper leaf breakdown), and 0%, 6.7% and 20% split cores. **Plant Characteristics:** Large to large-medium plant size with good to very good uniformity (poorest in this maturity class), and slightly tipped growth habit. **Head Weight and Marketable Yield:** Above average and third largest head weight (12.8 lb, 13.3 lb, 14.0 lb) and marketable yield (67.1 ton/A, 69.6 ton/A, 73.4 ton/A) in this maturity class and 5<sup>th</sup> overall. No unmarketable heads, 2.7% off-types, no rots. **Head Characteristics:** One of the most flattest head shapes in the trial (flat-round), leaves near base have coarse appearance/loosely packed. Yellow-white internal color, below average core length (3.6 inches), very dense, below average percent dry weight (6.6%, 6.5%, 6.5%), **60% black mid-rib.** **Thrips Damage:** Above average thrips damage (depth: 4.1, 4.0 and 4.4 layers deep; severity: 0.9, 1.8 and 1.5 out of 5).

**Milestone (Bejo):**  Mature on September 24<sup>th</sup> to October 8<sup>th</sup> with 0% and 2.2% large head splits, 16.8% and 8.8% small head splits, 0% and 0% rots, 14.8% and 0% sunscald (top wrapper leaf breakdown), and 20% and 26.7% split cores. **Plant Characteristics:** Large to very large plant size with very good to good uniformity, and slightly tipped growth habit. **Head Weight and Marketable Yield:** Largest head weight (14.2 lb, 15.9 lb) and marketable yield (74.4 ton/A, 81.0 ton/A) in the entire trial. No unmarketable heads, 1.6% off-types. **Head Characteristics:** Round to round-flat head shape which were 2.1 cm more wide than tall, leaves near outside have coarse appearance/loosely packed. Yellow-white internal color with yellow center, below average core length (3.1 inches), dense, below average percent dry weight (6.5%, 7.5%). **Thrips Damage:** Above average thrips damage (depth: 3.3 and 3.9 layers deep; severity: 1.3 and 2.0 out of 5).

**Hinova (Bejo) – Late standard:**  Mature on September 24<sup>th</sup> to October 8<sup>th</sup> with 0% large head splits and rots, and, 3% and 3.9% small head splits, 1.5% and 6.5% sunscald (top wrapper leaf breakdown), and 0% and 13.3% split cores. **Plant Characteristics:** Large to very large plant size with very good uniformity, and upright to slightly tipped growth habit. **Head Weight and Marketable Yield:** Lowest head weight (10.0 lb, 11.6 lb) in mid to late maturity class and 14<sup>th</sup> overall. Second lowest marketable yield (52.1 ton/A, 60.5 ton/A) in this maturity class and 15<sup>th</sup> overall. No unmarketable heads, no off-types. **Head Characteristics:** Flat-round heads that are tapered at the base, which are 2.8 cm more wide than tall. White-yellow internal color (3<sup>rd</sup> whitest in trial), below average core length (3.6 inches), dense, highest percent dry weight (7.8%, 8.6%) in the trial. Looks good! **Thrips Damage:** Second highest thrips damage in the entire trial (depth: 7.0 and 6.8 layers deep; severity: 1.4 and 1.3 out of 5). **Cabbage maggot:** 2.2% incidence of feeding damage in heads at harvest.



Score (Bejo): ★★★★★ Mature on September 24<sup>th</sup> to October 8<sup>th</sup> with 1.8% large head splits on Sep 24, 16.9% small head splits on Sep 24, 0% rots on Sep 24, 5.3% sunscald (top wrapper leaf breakdown) on Sep 24, and 20% and 0% split cores. **Plant Characteristics:** Very large plant size (2<sup>nd</sup> largest overall) with good uniformity (2<sup>nd</sup> worst overall), and upright to slightly tipped growth habit, some basal buds. **Head Weight and Marketable Yield:** Second largest head weight (14.0 lb, 14.5 lb) and marketable yield (71.9 ton/A, 76.0 ton/A) in entire trial. Above average incidence of unmarketable heads (1.8%, 0%) due to large splits on Sep 24, 1.8% off-types, no rots. **Head Characteristics:** Round heads, which are 2.6 cm more wide than tall, thick leaves, outer leaves have coarse appearance/loosely packed, tight center. Yellow-white internal color, below average core length (3.7 inches), above average percent dry weight (7.1%, 7.7%). Looks good! **Thrips Damage:** Above average thrips damage (depth: 3.6 and 3.6 layers deep; severity: 1.6 and 1.5 out of 5).

ATI A (American Takii): ★★★★★ Mature on September 24<sup>th</sup> to October 8<sup>th</sup> with 0% large head splits, rots and sunscald (top wrapper leaf breakdown), and 1.3% and 3.2% small head splits, and 13.3% and 0% split cores. **Plant Characteristics:** Large to medium-large plant size (smallest in this maturity class) with very good uniformity and upright to slightly tipped growth habit. **Head Weight and Marketable Yield:** Above average head weight (12.5 lb, 13.3 lb, 6<sup>th</sup> overall) and marketable yield (65.2 ton/A, 69.8 ton/A, 7<sup>th</sup> overall). No unmarketable heads, no rots, no off-types. **Head Characteristics:** Round heads that come to a point at the top, which are 1.3 cm more wide than tall. Yellow-white to white-yellow internal color, below average core length (3.7 inches), dense, second highest percent dry weight (7.6%, 8.1%) in trial. Looks good! **Thrips Damage:** Above average depth of thrips damage (5.5 and 3.4 layers deep), but below average thrips damage severity (0.7 and 0.7 out of 5).


Cabton/2660 (Bejo): ★★★★★<sup>1/2</sup> Mature on September 24<sup>th</sup> to October 8<sup>th</sup> with 0% and 0% large head splits, 1.6% and 2.2% small head splits, 0% and 2.8% rots, 1.9% and 2.2% sunscald (top wrapper leaf breakdown), and 6.7% and 0% split cores. **Plant Characteristics:** Very large plant size (largest in entire trial) with very good to good uniformity, and upright to slightly tipped growth habit (2<sup>nd</sup> best in entire trial). **Head Weight and Marketable Yield:** Third largest head weight (14.4 lb, 14.4 lb) and fourth largest marketable yield (74.1 ton/A, 73.1 ton/A) in the entire trial, 1.6% and 2.8% unmarketable heads due to 1.6% off-types (multi-heads) and 2.8% rots. **Head Characteristics:** Round heads which are 2.3 cm more wide than tall, outside leaves have coarse appearance/loosely packed. Yellow-white to white internal color, second longest core length in the trial (4.3 inches), below average percent dry weight (6.2%, 7.3%) in the trial. Looks good! **Thrips Damage:** Least thrips damage in this maturity class (depth: 1.9 and 1.0 layers deep; severity: 0.5 and 0.3 out of 5, 4<sup>th</sup> best overall). **Cabbage maggot:** 4.4% incidence of feeding damage in heads at harvest.


Kilaherb (Stokes): ★★★★★ Mature on September 24<sup>th</sup> to October 8<sup>th</sup> with 0% large and small head splits and rots, and 0% and 8.3% sunscald (top wrapper leaf breakdown), and 6.7% and 26.7% split cores. **Plant Characteristics:** Large plant size with very good uniformity (best in this maturity class) and upright to slightly tipped growth habit (2<sup>nd</sup> best in this maturity class and 4<sup>th</sup> best overall). **Head Weight and Marketable Yield:** Below average head weight (11.8 lb, 12.8 lb) and marketable yield (62.0 ton/A, 67.1 ton/A). No unmarketable heads, no rots and 3.2% (marketable) off-types (highest in trial). **Head Characteristics:** Round heads that come to a point at the top, which are 1.3 cm more wide than tall, near base leaves appear coarse/lightly packed, air spaces beside core, dense center. Yellow-white to white-yellow internal color with yellow centers, below average core length (3.7 inches), some slanted cores, second highest percent dry weight (7.6%, 8.1%) in trial, **30% tipburn**. **Thrips Damage:** Below average thrips damage (depth: 2.2 and 2.8 layers deep; severity: 1.0 and 1.0 out of 5, 6<sup>th</sup> overall).


Mandy (Bejo): ★★★★★<sup>1/2</sup> Mature on September 24<sup>th</sup> and October 8<sup>th</sup> with 0% large and small head splits, rots and sunscald (top wrapper leaf breakdown), and 0% and 20% split cores. **Plant Characteristics:** Very large plant size (2<sup>nd</sup> largest in this size class, 4<sup>th</sup> overall) with very good to good uniformity and upright to slightly tipped growth habit (3<sup>rd</sup> best overall). **Head Weight and Marketable Yield:** Smallest head weight (8.1 lb, 10.8 lb, 15<sup>th</sup> overall) and marketable yield (42.3 ton/A, 56.5 ton/A, 17<sup>th</sup> overall) in this maturity class. No unmarketable heads, no rots and 1.3% (marketable) off-types. **Head Characteristics:** Round-flat head shape

that was 1.9 cm more wide than tall. Whitest internal color in this maturity class (3<sup>rd</sup> whitest overall), wide and below average core length (3.4 inches), dense, below average percent dry weight (6.8%, 7.3%). **Thrips Damage:** Below average thrips damage (depth: 1.3 and 2.4 layers deep; severity: 0.6 and 0.4 out of 5, 5<sup>th</sup> overall).

#### **Late-season maturity class (entries 20 – 22):**

**Jubilee (Bejo):**  Mature on September 24<sup>th</sup> and October 8<sup>th</sup> with 0% large and small head splits, rots, sunscald and split cores. **Plant Characteristics:** Large to very large sized plants with very good to excellent uniformity (2<sup>nd</sup> best in entire trial) and the most upright growth habit in the entire trial (upright to slightly tipped), stands tall. **Head Weight and Marketable Yield:** Smallest head weight (8.1 lb, 9.5 lb) in the entire trial and second smallest marketable yield (42.4 ton/A, 49.8 ton/A) in the entire trial. No unmarketable heads, no rots and 1.2% (marketable) off-types. **Head Characteristics:** Round heads which were only 0.5 cm more wide than tall. Yellow-white internal color, below average core length (3.3 inches), dense, above average percent dry weight (8.0%, 7.4%) in trial. Looks good, but small! **Thrips Damage:** Second lowest thrips damage (depth: 0 and 0.5 layers deep; severity: 0 and 0.1 out of 5) in the entire trial.

**Moreton (Bejo):**  Mature on September 24<sup>th</sup> and October 8<sup>th</sup> with 0% large and small head splits, rots and split cores, and 0% and 3% sunscald (top wrapper leaf breakdown). **Plant Characteristics:** Very large sized plants (3<sup>rd</sup> largest overall) with good to very good uniformity and the upright to slightly tipped growth habit. **Head Weight and Marketable Yield:** Third largest head weight (12.7 lb, 14.4 lb) and marketable yield (66.6 ton/A, 75.1 ton/A) in the entire trial. No unmarketable heads, no rots and 1.2% (marketable) off-types. **Head Characteristics:** Flat-round heads (flattest in trial) which were 4.8 cm more wide than tall, thick leaves, air spaces beside core. Yellow-white internal color, below average core length (3.8 inches), above average percent dry weight (7.1%, 8.0%). **Thrips Damage:** Below average thrips damage (depth: 3.1 layers deep; severity: 1.2 out of 5) on Sep 24, and above average thrips damage (depth: 4.1 layers deep; severity: 1.2 out of 5) on Oct 8.

**SG3412 (Syngenta):**  Mature on October 8<sup>th</sup> with 1.9% large split heads, 2.2% small split heads, 2.1% rots, 3.9% sunscald (top wrapper leaf breakdown) and 0% split cores. **Plant Characteristics:** Large to very large sized plants with very good to good uniformity and slightly tipped growth habit (poorest in this maturity class). **Head Weight and Marketable Yield:** Third largest head weight (14.4 lb) and 6<sup>th</sup> largest marketable yield (72.6 ton/A) in the entire trial with 4% unmarketable heads due to 1.9% large splits and 2.1% rots, no off-types. **Head Characteristics:** Very round head shape which were only 0.5 cm more wide than tall, leaves have coarse appearance/loosely packed, may shatter. This variety is ready (i.e. stumps pop when you cut them), but it is still very loose. Yellow-white internal color, below average core length (3.6 inches), below average percent dry weight (7.2%). **Thrips Damage:** Below average depth of thrips damage (3.1 layers deep) and above average severity (1.5 out of 5).

#### **For more information:**

Go to the Cornell Cooperative Extension Vegetable Program's website:

<http://cyp.cce.cornell.edu/>

from the side menu, click on "crop production" and then "cabbage and cole crops"

Available at this website:

Final written report complete with data tables

Photo files, a virtual tour of the kraut cabbage variety trial including field and harvest photos.

If you would like a report complete with color photos sent to you, contact:

Christy Hoeping

585-798-4265 x38 or cah59@cornell.edu

Table 2. Head size and estimated marketable yield, kraut cabbage variety trial, 2008. Entries listed in approximate order of maturity.

Entry	Average Head Weight (lbs)					% Unmarketable <sup>1</sup>					Estimated Markable Yield (ton/acre) <sup>2</sup>				
	Aug 21	Aug 29	Sep 11	Sep 24	Oct 8	Aug 21	Aug 29	Sep 11	Sep 24	Oct 8	Aug 21	Aug 29	Sep 11	Sep 24	Oct 8
1. Padoc	<b>14.3 a</b> <sup>3</sup>	15.6 a				<b>12.3</b>	20.4				<b>65.5 a</b>	65.4			
2. Fresco	10.5 b	<b>12.1 b</b>				<b>4.0</b>	<b>9.6</b>				<b>52.7 ab</b>	<b>57.5</b>			
3. SG3370	9.9 b	<b>11.8 b</b>				<b>6.0</b>	<b>9.7</b>				48.8 b	<b>55.8</b>			
4. Superkraut 86	8.1 c	<b>10.2 c</b>	11.2			7.6	<b>8.5</b>	41.1 a			39.3 b	<b>48.9</b>	34.3 c		
5. ATI B		<b>9.8 c</b>	<b>12.0</b>				<b>3.8</b>	43.6 a				<b>49.4</b>	35.5 c		
6. Cecile		<b>10.1 c</b>	<b>11.7</b>	<b>12.5 c-f</b>			<b>1.2</b>	<b>1.4 bc</b>	1.9 b			<b>52.1</b>	<b>60.3 ab</b>	<b>64.1 a-c</b>	
7. Rotunda		9.6 c	<b>11.7</b>	<b>12.3 ef</b>			1.4	<b>11.7 b</b>	<b>4.4 b</b>			49.8	<b>54.7 a-c</b>	<b>61.5 a-c</b>	
8. ATI D			<b>10.9</b>	<b>12.4 d-f</b>				<b>0.0 c</b>	<b>0.0 b</b>				<b>57.3 ab</b>	<b>65.1 a-c</b>	
9. ATI C		10.5 c	<b>12.2</b>	<b>13.3 a-e</b>			1.4	<b>34.4 a</b>	<b>17.9 a</b>			54.1	<b>50.3 a-c</b>	<b>57.5 bc</b>	
10. Kaitlin			<b>12.7</b>	<b>11.5 f</b>	<b>13.5 bc</b>			<b>1.2 bc</b>	<b>0.0 b</b>	2.1			<b>65.5 a</b>	<b>60.4 a-c</b>	<b>69.1 a-d</b>
11. Bobcat			11.2	<b>12.7 b-f</b>				<b>1.2 bc</b>	<b>1.5 b</b>				40.3 bc	<b>65.4 a-c</b>	
12. Mentor			<b>12.8</b>	<b>13.3 a-e</b>	<b>14.0 bc</b>			<b>0.0 c</b>	<b>0.0 b</b>	<b>0.0</b>			<b>67.1 a</b>	<b>69.6 ab</b>	<b>73.4 a-c</b>
13. Milestone			<b>12.2</b>	<b>14.2 ab</b>	<b>15.9 a</b>			<b>0.0 c</b>	<b>0.0 b</b>	<b>2.2</b>			<b>64.0 a</b>	<b>74.4 a</b>	<b>81.0 a</b>
14. Hinova				<b>10.0 g</b>	<b>11.6 de</b>				<b>0.0 b</b>	<b>0.0</b>				<b>52.1 cd</b>	<b>60.5 c-e</b>
15. Score			<b>12.6</b>	<b>14.0 a-c</b>	<b>14.5 ab</b>			<b>1.4 bc</b>	<b>1.8 b</b>	<b>0.0</b>			<b>65.4 a</b>	<b>71.9 ab</b>	<b>76.0 ab</b>
16. ATI A				<b>12.5 d-f</b>	<b>13.3 bc</b>				<b>0.0 b</b>	<b>0.0</b>				<b>65.2 a-c</b>	<b>69.8 a-c</b>
17. Cabton			11.9	<b>14.4 a</b>	<b>14.4 b</b>			<b>0.0 c</b>	<b>1.6 b</b>	<b>2.8</b>			<b>62.1 a</b>	<b>74.1 a</b>	<b>73.1 a-c</b>
18. Kilaherb			11.5	<b>11.8 ef</b>	<b>12.8 cd</b>			<b>0.0 c</b>	<b>0.0 b</b>	<b>0.0</b>			<b>60.2 ab</b>	<b>62.0 a-c</b>	<b>67.1 b-d</b>
19. Mandy				<b>8.1 h</b>	<b>10.8 ef</b>				<b>0.0 b</b>	<b>0.0</b>				<b>42.3 d</b>	<b>56.5 de</b>
20. Jubilee				<b>8.1 h</b>	<b>9.5 f</b>				<b>0.0 b</b>	<b>0.0</b>				<b>42.4 d</b>	<b>49.8 e</b>
21. Moreton				<b>12.7 b-f</b>	<b>14.4 b</b>				<b>0.0 b</b>	<b>0.0</b>				<b>66.6 a-c</b>	<b>75.1 ab</b>
22. SG3412			12.3	<b>13.9 a-d</b>	<b>14.4 b</b>			<b>0.0 c</b>	<b>0.0 b</b>	<b>4.0</b>			<b>64.5 a</b>	<b>72.8 a</b>	<b>72.6 a-c</b>
<i>P Value</i>	<i>0.0000</i>	<i>0.0000</i>	<i>NS</i>	<i>0.0000</i>	<i>0.0000</i>	<i>NS</i>	<i>NS</i>	<i>0.0000</i>	<i>0.0010</i>	<i>NS</i>		<i>NS</i>	<i>0.0240</i>	<i>0.0012</i>	<i>0.0023</i>
<i>Trial Average</i> <sup>4</sup>	<i>10.7</i>	<i>11.2</i>	<i>12.0</i>	<i>12.2</i>	<i>13.2</i>	<i>7.5</i>	<i>7.0</i>	<i>9.1</i>	<i>1.7</i>	<i>1.0</i>	<i>51.6</i>	<i>54.1</i>	<i>55.8</i>	<i>62.8</i>	<i>68.7</i>

<sup>1</sup>% unmarketable includes rots, large splits and multiple heads. <sup>2</sup>Estimated marketable yield is extrapolated from total weight of 5 sound heads in an area 20.8 ft<sup>2</sup> minus the % unmarketable. <sup>3</sup>underlined values indicate the best result per column; values in a column followed by the same letter are not significantly different, Fisher's Protected LSD Test (p>0.05). **Bolded** values indicate performance that is equal to or better than the trial average. <sup>4</sup>Trial average: the average of all replicates for all varieties per Harvest. **Highlights** indicate harvest when variety was at optimum maturity.

Table 3. Field information including splits, rots and off types at harvest, kraut cabbage trial 2008. Entries listed in approximate order of maturity.

Entry	% Large Splits in Heads <sup>1</sup>					% Small Splits in Heads					% Off-Types at Maturity	% Unmarketable Due to Rot				
	Aug 21	Aug 29	Sep 11	Sep 24	Oct 8	Aug 21	Aug 29	Sep 11	Sep 24	Oct 8	Total (%um) <sup>5</sup>	Aug 21	Aug 29	Sep 11	Sep 24	Oct 8
1. Padoc	<u>11.1</u> <sup>2</sup>	20.4	72.9			<u>22.2</u> ab <sup>3</sup>	31.8 a	8.3 d-f			1.2	<u>1.2</u>	<u>0.0</u>	<u>0.0</u>		
2. Fresco	2.5	<u>9.6</u>	65.0			22.1 ab	<u>35.9</u> a	21.3 b-d			<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	4.4		
3. SG3370	6.0	<u>9.7</u>	75.9	89.2		28.7 a	<u>45.2</u> a	5.6 d-f	7.7 d-f		<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	
4. Superkraut 86	7.6	<u>8.5</u>	41.0	35.1		20.8 ab	<u>38.3</u> a	30.4 ab	51.3 a		<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	2.6	
5. ATI B	1.2	<u>1.3</u>	38.8	29.1		15.8 b	<u>31.4</u> a	17.6 b-e	43.9 a		1.5 (1.5)	1.3	<u>2.5</u>	3.3	2.2	
6. Cecile	1.3	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>		3.7 c	<u>5.2</u> b	<u>15.9</u> b-f	27.0 bc		<u>0.0</u>	<u>0.0</u>	<u>1.2</u>	<u>1.5</u>	1.9	
7. Rotunda	<u>0.0</u>	<u>0.0</u>	<u>10.0</u>	<u>2.2</u>		2.6 c	4.1 b	<u>26.4</u> bc	<u>41.4</u> ab		<u>0.0</u>	<u>0.0</u>	1.4	<u>1.7</u>	<u>2.2</u>	
8. ATI D			<u>0.0</u>	<u>0.0</u>				<u>3.8</u> ef	<u>3.1</u> ef		1.5			<u>0.0</u>	<u>0.0</u>	
9. ATI C	1.2	1.4	<u>34.0</u>	<u>16.0</u>		15.1 b	35.2 a	<u>49.0</u> a	<u>56.3</u> a		<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>1.9</u>	
10. Kaitlin			<u>0.0</u>	<u>0.0</u>	2.1			<u>9.7</u> c-f	<u>22.4</u> cd	36.9 a	1.3 (1.2)			<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
11. Bobcat	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>		<u>1.0</u> c	<u>0.0</u> c	2.6 ef	<u>9.3</u> d-f		<u>0.0</u>	1.2	1.2	1.2	<u>1.5</u>	
12. Mentor			<u>0.0</u>	<u>0.0</u>	<u>0.0</u>			<u>2.7</u> ef	<u>10.7</u> c-f	<u>11.5</u> b	2.7			<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
13. Milestone		<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>2.2</u>		<u>0.0</u> c	<u>0.0</u> f	<u>16.8</u> c-f	<u>8.8</u> bc	1.6		<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
14. Hinova				<u>0.0</u>	<u>0.0</u>				<u>3.0</u> ef	<u>3.9</u> bc	<u>0.0</u>			<u>0.0</u>	<u>0.0</u>	
15. Score			1.4	<u>1.8</u>	na			7.9 d-f	<u>16.9</u> c-e	na	1.8			<u>0.0</u>	<u>0.0</u>	na
16. ATI A				<u>0.0</u>	<u>0.0</u>				<u>1.3</u> ef	<u>3.2</u> bc	<u>0.0</u>			<u>0.0</u>	<u>0.0</u>	
17. Cabton			<u>0.0</u>	<u>0.0</u>	<u>0.0</u>			<u>0.0</u> f	<u>1.6</u> ef	<u>2.2</u> bc	1.6 (1.6)			<u>0.0</u>	<u>0.0</u>	<u>2.8</u>
18. Kilaherb			<u>0.0</u>	<u>0.0</u>	<u>0.0</u>			<u>0.0</u> f	<u>0.0</u> f	<u>0.0</u> c	3.2			<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
19. Mandy				<u>0.0</u>	<u>0.0</u>				<u>0.0</u> f	<u>0.0</u> c	1.3			<u>0.0</u>	<u>0.0</u>	
20. Jubilee				<u>0.0</u>	<u>0.0</u>				<u>0.0</u> f	<u>0.0</u> c	1.2			<u>0.0</u>	<u>0.0</u>	
21. Moreton				<u>0.0</u>	<u>0.0</u>				<u>0.0</u> f	<u>0.0</u> c	1.2			<u>0.0</u>	<u>0.0</u>	
22. SG3412			<u>0.0</u>	<u>0.0</u>	<u>1.9</u>			<u>0.0</u> f	<u>0.0</u> f	<u>2.2</u> bc	<u>0.0</u>			<u>0.0</u>	<u>0.0</u>	<u>2.1</u>
P Value						0.0001	0.0189	0.0002	0.0000	0.0000	NS					
Trial Average <sup>4</sup>	3.4	5.1	19.9	8.7	0.6	15.1	26.2	11.1	15.9	6.2	0.8	0.4	0.6	0.7	0.6	0.4

<sup>1</sup>Large and Small Splits: Only large splits are considered unmarketable. <sup>2</sup>underlined values indicate the best result per column. <sup>3</sup>values in a column followed by the same letter are not significantly different, Fisher's Protected LSD Test (p > 0.05). <sup>4</sup>Trial average: the average of all replicates for all varieties per harvest. **Bolded** values indicate performance that is equal to or better than the trial average. Compare performance of individual varieties to trial average. <sup>5</sup>um: % unmarketable off types in brackets. **Highlights** indicate harvest at optimum maturity.

Table 4. Plant characteristics of kraut cabbage varieties at harvest, 2008. Entries listed in approximate order of maturity.

Entry	Plant Characteristics			% Sunscald (top wrapper leaf breakdown)					% Split Cores					
	Size (rank) <sup>1</sup>	Uniformity (rank) <sup>2</sup>	Growth Habit (rank) <sup>3</sup>	Aug 21	Aug 29	Sep 11	Sep 24	Oct 8	Aug 21	Aug 29	Sep 11	Sep 24	Oct 8	
1. Padoc	L (8)	VG-G (11)*	ST (11)	<b>9.9</b>	9.2	8.3			<b>0.0</b>					
2. Fresco	L (9)	G (20)	ST (12)	5.5	<b>4.5</b>	16.2				<b>0.0</b>				
3. SG3370	LM (15)	G (18)	U-ST (6)	13.6	<b>0.0</b>	25.7	<b>0.0</b>			<b>6.7</b>				
4. Superkraut 86	L (10)	VG (9)	ST-T (14)	<b>1.3</b>	<b>0.0</b>	<b>0.0</b>	<b>3.3</b>			<b>0.0</b>	<b>20.0</b>			
5. ATI B	L-VL (7)	VG (7)	ST (10)	<b>3.6</b>	<b>3.6</b>	9.1	23.2			<b>0.0</b>	33.3			
6. Cecile	L (9)	G-VG (16)	U-ST (8)	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	6.3			<b>6.7</b>	<b>0.0</b>	33.3		
7. Rotunda	L-LM (12)	<u>E (1)<sup>5</sup></u>	ST-U (9)	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>4.4</b>				<b>13.3</b>	<b>6.7</b>		
8. ATI D	L (9)	VG-G (13)	ST (10)			<b>2.4</b>	<b>5.9</b>				<b>26.7</b>	<b>13.3</b>		
9. ATI C	L-VL (7)	VG (8)	U-ST (8)	<b>1.2</b>	3.8	<b>34.4</b>	<b>24.9</b>			6.7	<b>0.0</b>	<b>20.0</b>		
10. Kaitlin	L-VL (5)	VG-E (4)	U-ST (2)			<b>0.0</b>	<b>0.0</b>	<b>0.0</b>			<b>40.0</b>	<b>40.0</b>		
11. Bobcat	L (11)	VG-E (3)	U-ST (6)	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>3.0</b>				33.3	<b>70.0</b>		
12. Mentor	L-LM (13)	G-VG (17)	ST (13)			<b>0.0</b>	<b>0.0</b>	<b>2.0</b>			<b>0.0</b>	<b>6.7</b>	<b>20.0</b>	
13. Milestone	L-VL (6)	VG-G (12)	ST (10)		<b>0.0</b>	1.4	<b>14.8</b>	<b>0.0</b>			40.0	<b>20.0</b>	<b>26.7</b>	
14. Hinova	L-VL (6)	VG (6)	U-ST (5)				<b>1.5</b>	<b>6.5</b>				<b>0.0</b>	<b>13.3</b>	
15. Score	VL (2)	G (19)	U-ST (7)			2.8	<b>5.3</b>	na			<b>20.0</b>	<b>20.0</b>	<b>0.0</b>	
16. ATI A	L-ML (14)	VG (10)	U-ST (4)				<b>0.0</b>	<b>0.0</b>				<b>13.3</b>	<b>0.0</b>	
17. Cabton	<u>VL (1)</u>	VG-G (10)	U-ST (2)			<b>0.0</b>	<b>1.9</b>	<b>2.2</b>				<b>6.7</b>	<b>0.0</b>	
18. Kilaherb	L (10)	VG (5)	U-ST (4)			1.2	<b>0.0</b>	<b>8.3</b>				<b>6.7</b>	<b>26.7</b>	
19. Mandy	VL (4)	VG-G (14)	U-ST (3)				<b>0.0</b>	<b>0.0</b>				<b>0.0</b>	<b>20.0</b>	
20. Jubilee	L-VL (6)	VG-E (2)	<u>U-ST (1)</u>				<b>0.0</b>	<b>0.0</b>				<b>0.0</b>	<b>0.0</b>	
21. Moreton	VL (3)	G-VG (15)	U-ST (6)				<b>0.0</b>	<b>3.0</b>				<b>0.0</b>	<b>0.0</b>	
22. SG3412	L-VL (7)	VG-G (11)	ST (10)			1.2	1.5	<b>3.9</b>				<b>0.0</b>	<b>0.0</b>	
<b>Trial Average<sup>4</sup></b>				<b>3.9</b>	<b>2.1</b>	<b>6.0</b>	<b>4.8</b>	<b>2.4</b>		<b>0.0</b>	<b>3.4</b>	<b>20.6</b>	<b>15.1</b>	<b>9.7</b>

<sup>1</sup>Plant Size: \* M = medium; ML = medium-large; L = large; VL = very large. Ranked in order from largest to smallest. <sup>2</sup>Uniformity: \* E = excellent; VG = very good; G = good; F = fair; P = poor. Ranked in order from most to least uniform. <sup>3</sup>Growth habit: \*U = upright; ST = slightly tipped; T = tipped. Ranked in order from largest to smallest. <sup>4</sup>trial average: the average of all replicates for all varieties per harvest. Compare performance of individual varieties to trial average. <sup>5</sup>underlined values indicate the best result per column; **bolded** values indicate a result equal to or better than the trial average. \* For hyphenated descriptions, the first entry is more dominant (eg. ML-L means that plant size is more ML than L). **Highlights** indicate optimal harvest of variety.

Table 5. Head and internal characteristics of kraut cabbage varieties, 2008. Entries listed in approximate order of maturity.

Entry	Head Characteristics		Internal			Percent Dry Weight			
	Head Shape <sup>1</sup>	Roundness W-L (cm) <sup>2</sup>	Internal Color (rank) <sup>4</sup>	% Tip Burn at Maturity <sup>3</sup>	Core Length (in)	Aug 29	Sep 11	Sep 24	Oct 8
1. Padoc	RF	2.7 c-e <sup>5</sup>	YW (8)	<u>0.0</u>	4.7 a	4.7			
2. Fresco	R	<b>0.5 i</b>	YW (9)	<u>0.0</u>	3.9 c-e	<b>5.4</b>			
3. SG3370	R-RF*	2.6 c-e	WY (2)	<u>0.0</u>	4.2 b	<b>5.9</b>			
4. Superkraut 86	RF	2.6 c-e	YW (8)	<u>0.0</u>	3.9 d-f	<b>5.4</b>	7.8		
5. ATI B	RF	4.5 a	WY (2)	33.3	4.0 cd	<b>6.1</b>	<b>8.0</b>		
6. Cecile	R	<b>1.5 h</b>	WY (3)	<u>0.0</u>	<b>3.5 g-i</b>	<b>6.6</b>	<b>8.0</b>	7.1	
7. Rotunda	R	<u><b>0.3 i</b></u>	YW (7)	13.3	4.3 b	<b>6.0</b>	<b>7.5</b>	<b>6.2</b>	
8. ATI D	R-TB	<b>1.4 h</b>	WY (3)	60.0	4.1 bc		<b>8.0</b>	<b>7.4</b>	
9. ATI C	RP	3.1 c	YW-WY (5)	<b>6.7</b>	<b>3.7 e-g</b>	<b>5.6</b>	<b>7.5</b>	<b>6.4</b>	
10. Kaitlin	R	2.5 de	<u>W-WY (1)</u>	<u>0.0</u>	<b>3.3 jk</b>		<b>6.8</b>	<b>6.6</b>	7.2
11. Bobcat	R	<b>1.7 gh</b>	YW (4)	36.0	<b>2.8 k</b>		6.7	<b>6.5</b>	
12. Mentor	FR	4.8 a	YW (7)	<u>0.0</u>	<b>3.6 g-i</b>		<b>6.6</b>	<b>6.5</b>	<b>6.5</b>
13. Milestone	R-RF	<b>2.1 e-g</b>	YW (6)	<u>0.0</u>	<b>3.1 k</b>		7.7	<b>6.5</b>	<b>7.5</b>
14. Hinova	FR-TB	2.8 cd	WY (3)	<u>0.0</u>	<b>3.6 g-i</b>			<b>7.8</b>	<b>8.6</b>
15. Score	R	2.6 c-e	YW (8)	<u>0.0</u>	<b>3.7 f-h</b>		7.6	<b>7.1</b>	<b>7.7</b>
16. ATI A	RP	<b>1.3 h</b>	YW-WY (5)	<u>0.0</u>	<b>3.7 d-g</b>			<b>7.6</b>	<b>8.1</b>
17. Cabton	R	<b>2.3 d-f</b>	YW-W (4)	<u>0.0</u>	4.3 b		7.8	<b>6.2</b>	<b>7.3</b>
18. Kilaherb	FR-P-TB	3.8 b	YW (7)	30.0	4.3 b		7.1	<b>7.6</b>	<b>7.9</b>
19. Mandy	RF	<b>1.9 f-h</b>	WY (3)	<u>0.0</u>	<b>3.4 h-j</b>			<b>6.8</b>	<b>7.3</b>
20. Jubilee	R	<b>0.5 i</b>	YW (7)	<u>0.0</u>	<b>3.3 i-k</b>			<b>8.0</b>	<b>7.4</b>
21. Moreton	FR	4.8 a	YW (8)	<u>0.0</u>	<b>3.8 d-g</b>			<b>7.1</b>	<b>8.0</b>
22. SG3412	R	<b>0.5 i</b>	YW (4)	<u>0.0</u>	<b>3.6 gh</b>		7.5	6.7	<b>7.2</b>
<i>P Value</i>		<i>0.0000</i>			<i>0.0000</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>
<i>Trial Average</i> <sup>6</sup>		<b>2.3</b>		<b>8.2</b>	<b>3.8</b>	<b>5.6</b>	<b>7.5</b>	<b>6.9</b>	<b>7.6</b>

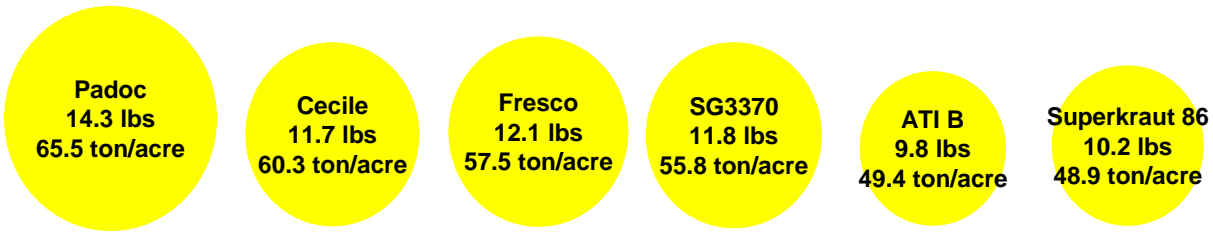
<sup>1</sup>Head shape: R= round; RP= round with a point; RF= round-flat; FR= flat – round (i.e. more flat than round); TB= tapered base. <sup>2</sup>Roundness: width minus length. Values closest to zero are the most perfectly round. Positive values indicate the head is more wide than tall. <sup>3</sup>% tipburn of all heads evaluated at optimum harvest. <sup>4</sup>internal color: W = white; WY = white-yellow; YW = yellow-white (i.e. more yellow than white). (rank): in order of whitest to yellowist. <sup>5</sup>values followed by the same letter in a column are not significantly different, Fisher's Protected LSD test (p>0.05). <sup>6</sup>trial average: the average of all replicates for all varieties per harvest. Compare performance of individual varieties to trial average. underlined values indicate the best result per column; **bolded** values indicate a result equal to or better than the trial average. **Highlights** indicate optimal harvest of variety.

Table 6. Onion thrips damage at harvest, kraut cabbage variety evaluation, 2008. Entries listed in approximate order of maturity.

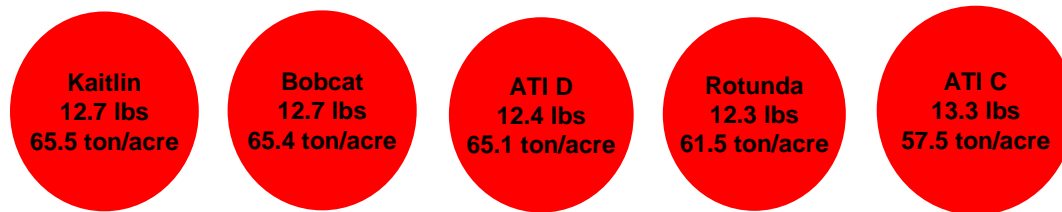
Entry	Harvest 1: Aug 21		Harvest 2: Aug 29		Harvest 3: Sept 11		Harvest 4: Sept 24		Harvest 5: Oct 8	
	Depth <sup>1</sup>	Severity <sup>2</sup>	Depth	Severity	Depth	Severity	Depth	Severity	Depth	Severity
1. Padoc	<u>15.4</u>	<u>3.5</u>	8.0 a <sup>3</sup>	3.0 a						
2. Fresco	<u>1.2</u>	0.4	<b>2.1 bc</b>	<b>0.7 c</b>						
3. SG3370	<u>1.2</u>	<u>0.1</u>	<b>1.5 b-d</b>	<b>0.2 de</b>						
4. Superkraut 86	4.2	0.7	<b>3.3 b</b>	<b>0.6 cd</b>	4.9 ab	1.6 b				
5. ATI B			<b>0.0 d</b>	<b>0.0 e</b>	0.4 ef	0.2 d				
6. Cecile			<b>7.1 a</b>	<b>1.5 b</b>	<b>5.9 a</b>	<b>2.1 ab</b>	9.0 a			
7. Rotunda			<b>2.8 b</b>	<b>0.8 c</b>	<b>4.4 ab</b>	<b>2.4 a</b>	<b>4.8 c-e</b>	<b>2.7 a</b>		
8. ATI D					<b>3.8 bc</b>	<b>0.8 c</b>	<b>6.3 bc</b>	<b>1.9 b</b>		
9. ATI C			<b>0.4 cd</b>	<b>0.1 de</b>	<b>0.2 f</b>	<b>0.1 d</b>	<b>1.3 jk</b>	<b>0.3 gh</b>		
10. Kaitlin					<b>3.8 bc</b>	<b>0.6 cd</b>	<b>2.7 f-j</b>	<b>1.2 b-f</b>	3.8 bc	1.7 ab
11. Bobcat					<b>0.8 d-f</b>	<b>0.1 d</b>	<b>1.4 h-k</b>	<b>0.5 e-h</b>		
12. Mentor					<b>4.1 b</b>	<b>0.9 c</b>	<b>4.0 d-f</b>	<b>1.8 b</b>	<b>4.4 b</b>	<b>1.5 ab</b>
13. Milestone					<b>1.9 d-f</b>	<b>0.6 cd</b>	<b>3.3 e-h</b>	<b>1.3 b-e</b>	<b>3.9 bc</b>	<b>2.0 a</b>
14. Hinova							<b>7.0 b</b>	<b>1.4 b-d</b>	<b>6.8 a</b>	<b>1.3 a-c</b>
15. Score					<b>1.9 de</b>	<b>0.5 cd</b>	<b>3.6 e-g</b>	<b>1.6 bc</b>	<b>3.6 bc</b>	<b>1.5 ab</b>
16. ATI A							<b>5.5 b-d</b>	<b>0.7 d-g</b>	<b>3.4 bc</b>	<b>0.7 c-e</b>
17. Cabton					<b>2.1 de</b>	<b>0.6 cd</b>	<b>1.9 g-j</b>	<b>0.5 f-h</b>	<b>1.0 de</b>	<b>0.3 de</b>
18. Kilaherb					<b>1.7 d-f</b>	0.9 c	<b>2.2 f-j</b>	<b>1.0 c-f</b>	<b>2.8 bc</b>	<b>1.0 b-d</b>
19. Mandy							<b>1.3 i-k</b>	<b>0.6 e-h</b>	<b>2.4 cd</b>	<b>0.4 de</b>
20. Jubilee							<b>0.0 k</b>	<b>0.0 h</b>	<b>0.5 e</b>	<b>0.0 e</b>
21. Moreton							<b>3.1 e-i</b>	<b>1.2 b-f</b>	<b>4.1 b</b>	<b>1.2 bc</b>
22. SG3412					<b>2.2 cd</b>	<b>0.3 cd</b>	<b>3.3 e-h</b>	1.3 b-e	<b>3.1 bc</b>	<b>1.5 ab</b>
<i>P Value</i>			<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>
<i>Trial Average<sup>4</sup></i>	<b>5.5</b>	<b>1.2</b>	<b>3.1</b>	<b>0.9</b>	<b>2.7</b>	<b>0.8</b>	<b>3.6</b>	<b>1.2</b>	<b>3.3</b>	<b>1.1</b>

<sup>1</sup>depth of onion thrips damage: number of layers affected. <sup>2</sup>severity of onion thrips damage: scale of 0 - 5, 0 = no thrips, 1 = low; 3 = commercially acceptable, 5 = really bad. <sup>3</sup>Values followed by the same letter in a column are not significantly different, Fisher's Protected LSD test (p>0.05). <sup>4</sup>trial average: the average of all replicates for all varieties per harvest. Compare performance of individual varieties to trial average. underlined values indicate the best result per column; **bolded** values indicate a result equal to or better than the trial average. <sup>4</sup>Trial average: the average of all replicates for all varieties per harvest. Compare performance of individual varieties to trial average. **Highlights** indicate harvest when varieties are mature.

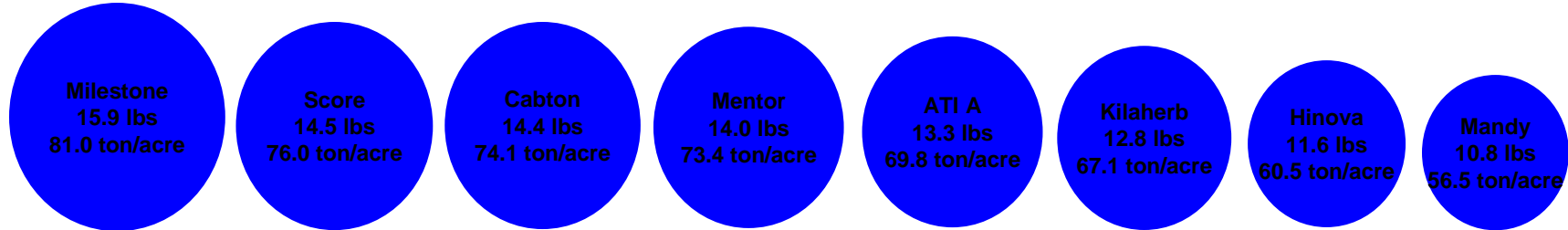
## Early Season Maturing Class



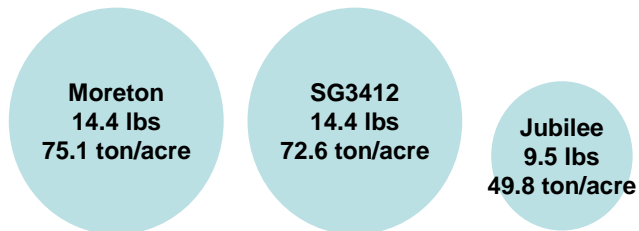
## Mid-Season Maturing Class



## Mid to Late-Season Maturing Class



## Late Season Maturing Class



**Figure 1.** Scaled diagram of kraut cabbage varieties at optimum harvest (i.e. highest marketable yield) scaled to average head weight, in order of marketable yield per maturity class, 2008.