

Replicated Asparagus Cultivar Evaluation and Ranking 2007-2009

New Replicated Asparagus Cultivar Evaluation- Planted 2009

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As more people are moving into North Carolina from northern states, where asparagus is commonly grown, they are looking to buy it from local growers here. It is a high-value horticultural crop that is easy to grow and can bring in extra income for growers.

Proper variety selection is important for success so a ¼ acre replicated asparagus cultivar trial was planted at the Garnett Carr farm in Roxboro, NC with 13 cultivars. Seeds were sown in the greenhouses of Aarons Creek Greenhouses in Buffalo Junction, VA in late January 2005 and transplants were planted into the field on May 4, 2005 in an Appling Sandy Loam soil.

A randomized complete block design with 12 plants per plot and 4 replications was used. The purpose of this trial is to evaluate new cultivars to see which are the most suitable for commercial production.

Since the trial was planted using seedling transplants, no harvest was taken in 2006. This was done to build food reserves in the crown of the plant to strengthen the plant for a 2-week harvest in 2007.

Trial Cultivar Descriptions

For over 20 years, new asparagus varieties that have been released are male hybrids. Asparagus is normally dioecious, meaning that it has male and female reproductive structures (flowers) on separate plants. Female plants expend energy to produce seed while in the fern growth stage. Because of this, female plants produce one-half the number of spears than male plants, which produce no seed. Seeds from female plants fall to the ground and germinate, causing a seedling asparagus weed problem. For this reason, asparagus breeders in the U.S. and other countries have gone with male hybrids obtained from super male parent plants. When these super males are crossed with a female, the majority of the F₁ generation is male, with no seeds produced. These super male hybrids yield about three times the amount of the older dioecious open-pollinated varieties, such as Mary Washington.

In this trial, the following asparagus cultivars were grown:

New Jersey Male Hybrids

Jersey Giant, Jersey Supreme, Jersey Gem, Jersey Knight and Jersey King are super male hybrids released from Rutgers University by the work of Drs. Howard Ellison and Stephen Garrison. They were the early pioneers in the discovery of male hybrid asparagus. **Jersey Giant** is a cross between NJ 56 (female) and NJ 22-8 (super male). **Jersey Supreme** is a cross between NJ 44P (female) and NJ 22-8 (super male). **Jersey Gem** is a cross between NJ G27 (female) and NJ 22-8 (super male). **Jersey Knight** is a cross between NJ 277C (female) and NJ 22-8 (super male). **Jersey King** is a cross between MD 10 (female) and NJ 22-8 (super male).

California Hybrids

The **UC (University of California) 157** cultivar is the progeny of a single cross between a male plant (not a super male) **M 120** and a female plant, **F 109**. **Frank Takatori and Frank Southers at the University of California at Riverside developed UC 157** in 1978. The **UC 115** cultivar is similar to **UC 157** in spear size. **UC 157** produced the highest amount of spears greater than 3/8” in diameter in the trial in 2007.

DePaoli (UC 115) is an asparagus hybrid that is produced by a cross between the female parent clone F600 and the male parent clone M256. The name DePaoli was selected to honor Mr. William DePaoli, Manager of the California Asparagus Commission from its creation in 1990 until his death in 1999. De Paoli is a dioecious hybrid.

Newer California hybrids include **Atlas, Apollo, and Grande** that were released by Dr. Brian Benson of California Asparagus Seed and Transplants, Inc. These cultivars all have the female parent of the **UC 157** cultivar and a male parent from the Rutgers University asparagus breeding program. These hybrids are dioecious with female plants producing seed. These cultivars had larger spear diameters compared with the NJ cultivars.

The attributes of the California Hybrids should enable the grower in a warm climate to harvest a taller spear (8-9 inches) without the tip of the spear opening up or “ferning out”, which causes spears to be tough. Taller spears are heavier, having more weight per spear. The New Jersey male hybrids and open-pollinated cultivars fern out at a shorter spear height (5-6 inches) under warm temperatures above 70 degrees F. This causes spears to be harvested at a lower height in order to maintain tender spears.

Purple Passion is a selection from **Violeta d’ Albinga** (cultivar from Albinga, Italy). It is an open-pollinated cultivar with many seeds produced from the female plants. Spear yield is lower than other varieties but spear diameter is very large. It has a burgundy color and is sweeter than green asparagus. When cooked, the purple pigment is destroyed and reverts back to green.

Dulce Verde is a cultivar that is higher in sugar content than other green asparagus cultivars. The fern growth on this cultivar was considerably stunted, compared to other cultivars last year. Brian Benson decided to discontinue this variety in 2007 and its poor yield caused it to be removed from my trial at the end of 2007.

University of Guelph Male Hybrid

Guelph Millennium is a recent male hybrid cultivar release from the University of Guelph in Ontario, Canada by Dr. David Wolyn.

Yield in lbs. per acre - 2007

Cultivar	Total Yield ¹	lbs.>3/8" in diam.	lbs.<3/8" in diam.	Spears/plant
UC 157 (F ₁)	1155a	1071a 93%	84 bcd	3.1a
Jersey Giant	944ab	752 b 80%	192a	3.2a
Jersey King	883abc	712 b 81%	171a	2.9a
Jersey Supreme	860abc	722 b 84%	138abc	2.9a
UC 115	821abc	697 b 85%	124abc	2.2abc
Jersey Gem	734 bcd	581 b 79%	153ab	2.6ab
Atlas	717 bcd	684 b 95%	33 de	1.4 cde
Grande	703 bcd	684 b 97%	19 de	1.7 cde
Apollo	555 cd	481 b 87%	74 cde	1.5 cde
Jersey Knight	456 de	414 b 91%	42 de	1.2 def
Purple Passion	151 ef	104 c 69%	47 de	0.6 ef
Guelph Mill.	86 f	42 c 49%	44 de	0.4 f
Dulce Verde	71 f	69 c 97%	2 e	0.2 f

¹ Cultivars with the same letter within columns are not statistically significant, Duncan's Multiple Range Test, .05 level.

Observations of the 2007 Trial

Harvest started on March 15, 2007, with just a few spears each of Grande, UC 157 and UC 115. A frost occurred on March 19 which delayed future spear emergence until March 26. The other cultivars then started to emerge with the exception of Purple Passion, Dulce Verde, and Guelph Millennium, which did not emerge until April 2.

The last harvest was taken on April 5, and on April 6, 7, and 8, we had severe frosts that stopped harvest again. A decision was made to end the 2007 harvest at this time, as the harvest period lasted three weeks, with an actual harvest of two weeks for most cultivars, with one week being lost to frost. A total of 10 harvests were made during the three-week period.

UC 157 yielded the highest and along with Atlas, Grande, and Jersey Knight, had the greatest percentage of large diameter spears, which were 93, 95, 97, and 91% respectively.

Jersey Giant, Jersey King, and Jersey Supreme were the 2nd, 3rd, and 4th highest yielders, with 80, 81, and 84% large diameter spears, respectively.

Jersey Knight was the lowest yielding cultivar of the New Jersey male hybrids.

Purple Passion was a low yielder and a prolific seed producer (from the female plants). However, growers should be able to charge a higher price for it since the spears are purple and has higher sugar content than green asparagus.

Guelph Millennium was one of the latest ones to emerge before the second frost occurrence in 2007, and did not get a chance to fully perform before the harvest was terminated, hence the low yields.

Yield in lbs. per acre – 2008

Cultivar	Total Yield ¹	lbs.>3/8" in diam.	Lbs.<3/8" in diam.	Spears/plant
Grande	3030a	2821a 93%	209 e	7.6 bc
Jer. Giant	2737ab	2263ab 82%	474 bc	10.2a
Atlas	2523abc	2298ab 91%	225 e	6.8 cd
Jer. Supreme	2485abc	2064ab 83%	421 bcd	8.7 abc
Jer. King	2458abc	1915 b 78%	543ab	9.3 ab
UC 157 (F ₁)	2385abc	2078ab 87%	307 cde	7.2 bcd
Guelph Mill.	2332abc	1653 b 71%	679a	8.7 abc
UC 115	2314abc	1875 b 81%	439 bcd	7.8 bc
Jer. Gem	2071 bc	1579 b 76%	492 b	7.7 bc
Purple Pass.	1915 bc	1723 b 90%	192 e	4.4 e
Apollo	1781 c	1501 b 84%	280 de	5.4 de
Jer. Knight	1604 c	1401 b 87%	203 e	5.3 de

¹ Cultivars with the same letter within columns are not statistically significant, Duncan's Multiple Range Test, .05 level.

Observations of the 2008 Trial

The drought of 2007 seemed to have no impact on asparagus yields in 2008. At last year's twilight meeting on August 17 at 6 P.M., 40 people braved the 104 degree heat to see asparagus ferns standing like a green oasis, that received no water all year, growing in an Appling Sandy Loam soil. This is a great testament for the extreme drought tolerance of asparagus.

In 2008, harvest started on March 22 for most cultivars with the exception of Guelph Millennium. Cool temperatures occurred below 70 degrees until April 11, when yields accelerated, and Guelph Millennium started to emerge. One frost in mid-April set yields back for one week. Then yields increased until it was decided to end the harvest on April 26. The harvest period lasted five weeks, with a good harvest of four weeks for most

cultivars, with a one-week slump in yield, due to frost. A total of 21 harvests were made during the six-week period.

With the California hybrids, UC 157 moved from 1st place last year down to 6th place this year and UC 115 moved from 5th place to 8th place. This is similar to what I saw in my older trial in Granville County from 1995-2000. Apollo moved from 9th place to 11th place. However, Grande moved up from 8th place to 1st place in 2008 and Atlas moved from 7th to 3rd place. Purple Passion moved from 11th to 10th place. I will see if this trend continues or if it will follow like the others in reduced yields over time.

With the NJ hybrids, Jersey Giant remained at 2nd place, Jersey Supreme remained in 4th place, Jersey King fell from 3rd to 5th place, Jersey Gem fell from 6th to 9th place, and Jersey Knight fell from 10th to last place.

Guelph Millennium moved up from 12th to 7th place, mainly because it started to emerge on April 11, which was 20 days after the other cultivars. Since harvest lasted five weeks, it was able to show more of its full yield potential.

The percentage of large diameter spears was greatest with Grande (93%), Atlas (91%), and Purple Passion (90%), followed by UC 157 and Jersey Knight (87%), Apollo (84%), Jersey Supreme (83%), Jersey Giant (82%), UC 115 (81%), Jersey King (78%), Jersey Gem (76%), and Guelph Millennium (71%).

Yield in lbs. per acre – 2009

Cultivar	Total Yield ¹	lbs.>3/8" in diam.	lbs.<3/8" in diam.	Spears/plant
Grande	4935a	4293a 87%	642 d	12.8 d
Guelph Mill.	4868ab	2438 b 50%	2430a	19.5a
Jer. Giant	4494abc	3136ab 70%	1358 b	16.2ab
Jer. Supreme	4211abc	2948 b 70%	1263 bc	14.9abc
Atlas	3987abc	3316ab 83%	671 bcd	10.9 bcd
Jer. King	3937abc	2815 b 72%	1122 bc	13.9 bc
UC 157(F ₁)	3848abc	2962 b 77%	886 bcd	11.7 bcd
Apollo	3550abc	2879 b 81%	671 bcd	10.2 cd
Jer. Gem	3442abc	2386 b 69%	1056 bcd	12.8 bcd
Purple Pass.	3287 bc	2888 b 88%	399 d	7.6 d
Jer. Knight	3233 bc	2476 b 77%	757 bcd	10.8 cd
UC 115	3175 c	2136 b 67%	1039 bcd	10.9 cd

¹Cultivars with the same letter within columns are not statistically significant, Duncan's Multiple Range Test, .05 level.

Observations of the 2009 Trial

The 2009 harvest went smoothly, with only one light frost on April 6 that brought temperatures down to 31-32 degrees, without a harvest delay after the frost. Harvest started on March 24, with Guelph Millennium (GM) not showing the 20-day delay in emergence compared to other cultivars as it showed in 2008. Instead, two out of four GM treatments had spears emerging on March 24, with the other two treatments starting four and ten days later, respectively.

The majority of days were cool, with temperatures rarely getting over 85 degrees. So there were no “growth flushes” that caused a large number of spears to be produced in a short period of time. The harvest period lasted six weeks with a total of 36 harvests made during the six-week period.

Compared to 2008 yields, with the California hybrids, Grande remained in 1st place. Atlas moved from 3rd to 5th place, Apollo moved from 11th to 8th place, UC 157 moved from 6th to 7th place, UC 115 moved from 8th to 12th place, and Purple Passion remained at 10th place.

With the New Jersey hybrids, Jersey Giant moved from 2nd to 3rd place, Jersey Supreme remained at 4th place, Jersey King moved from 5th to 6th place, Jersey Gem remained at 9th place, and Jersey Knight moved from 12th to 11th place.

Guelph Millennium moved from 7th to 2nd place. It is a high yielder, but only 50% of the spears harvested were greater than 3/8 inches in diameter.

The percentage of large diameter spears was greatest with Purple Passion (88%), Grande (87%), Atlas (83%), Apollo (81%), UC 157 and Jersey Knight (77%), Jersey King (72%), Jersey Giant and Jersey Supreme (70%), Jersey Gem (69%), UC 115 (67%), and Guelph Millennium (50%).

Spear toughness or tenderness is determined by the tightness of the spear tip, not by spear diameter. A tight spear tip will cause the spear to be tender while a loose tip will cause the spear to be tough and fibrous. As the spear tip opens up or “ferns out”, fiber development starts in the base of the spear to enable the elongated spear to change into a woody stalk to support the weight of the fern, after the harvest season is over. As temperatures increase over 70 degrees F., spears will fern out at shorter heights, causing the grower to pick shorter spears (sacrificing spear height) in order to harvest tender spears. Under cool temperatures below 70 degrees, spears will elongate more before ferning out, enabling the grower to harvest taller spears with tight tips that remain tender.

Cultivars that fern out at taller heights enable the grower to harvest spears that weigh more than ones that fern out at shorter heights, with spears that remain tender. In 2008, Atlas had tight spear tips at 9” tall, Apollo at 11” tall, Grande at 12” tall, UC 157 at 11” tall, and UC 115 at 10” tall and Guelph Millennium at 7½” tall. The other cultivars ferned out at shorter spear heights under warm temperatures.

Asparagus Cultivar Evaluation Three-Year Ranking

The table below shows how each asparagus cultivar ranked in numerical order from highest yielding (1) to lowest yielding (12) in 2007, 2008, and 2009.

Cultivar	2007	2008	2009
UC 157	1	6	7
Jersey Giant	2	2	3
Jersey King	3	5	6
Jersey Supreme	4	4	4
UC 115	5	8	12
Jersey Gem	6	9	9
Atlas	7	3	5
Grande	8	1	1
Apollo	9	11	8
Jersey Knight	10	12	11
Purple Passion	11	10	10
Guelph Millennium	12	7	2

The above table shows that the cultivars that show yield stability during the last three years are Jersey Giant, Jersey Supreme, and Jersey King, in that order. Jersey Giant still yields well and has a wide geographic adaptability across the U.S.

Yields of some of the California hybrids have decreased, while others have moved up and down. More time is needed to properly evaluate these cultivars. Purple Passion yields have remained fairly stable. Yields are low but growers should be able to get higher prices because of its purple color and higher sugar content than green asparagus.

Guelph Millennium yields have shot up to second place in 2009, but only 50% of spears were greater than 3/8" in diameter.

New Replicated Asparagus Cultivar Evaluation

An expansion of the original asparagus trial was made to evaluate new cultivars and experimental lines from plant breeders. Another replicated trial was planted adjacent to the original trial. Seeds were sown in the greenhouses of Aarons Creek Greenhouses in Buffalo Junction, VA in late January 2009 and transplants were planted into the field on April 28, 2009 in an Appling Sandy Loam soil.

A randomized complete block design with 12 plants per plot and 4 replications was used. The cultivars included NJ 953 and Jaleo from Vilmorin Seed Co., Brock Imperial and

Early California from Brock Seed Co., and Hybrids #1, #2, and #3, from Neil Stone, University of California, Riverside.

NJ 953 is an all-male hybrid from Rutgers University and should be more adaptable to warmer climates as compared with Jersey Giant.

Jaleo is a clonal hybrid from Vilmorin Seed Co., adaptable to warm climates.

Brock Imperial and Early California are hybrids from Brock Seed Co.

Hybrids #1, 2, and 3 are dioecious hybrids from Neil Stone, University of California – Riverside, bred to maintain good spear qualities with tight tips.

Sincere appreciation is given to Mr. Gregg Gordon of Aarons Creek Greenhouses in Buffalo Junction, VA who donated the space in one of his greenhouses to germinate the asparagus seed in these trials.

The following people listed below are also thanked for their donation of the asparagus seed for the trials:

Mr. Scott Walker

Jersey Asparagus Farms

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Jersey Giant, Jersey King, Jersey Supreme, Jersey Gem, and Jersey Knight

Dr. Brian Benson

California Asparagus Seed and Transplants, Inc.

2815 Anza Avenue

Davis, CA 95616

benson@davis.com

UC 157, Atlas, Apollo, Grande, Purple Passion

Mr. Don Brock

Brock Seed Co.

P.O. Box 549

El Centro, CA 92244

Brock Imperial, Early California

Mr. Joe Sands

Vilmorin Seed Co.

2551 N. Dragoon #131

Tucson, AZ 85745

NJ 953, Jaleo

Mr. Neil Stone
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De Paoli (UC 115), Hybrid #1, #2, and #3

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Guelph Millennium

Asparagus Crown and Seed Sources - 2009

1. Scott Walker
Jersey Asparagus Farms, Inc.
105 Porchtown Rd.
Pittsgrove, NJ 08318
856-358-2548
856-358-6127 FAX
New Jersey Hybrids
2. Timothy Nourse
Nourse Farms, Inc.
41 River Rd.
South Deerfield, MA 01373
413-665-2658
413-665-7888 FAX
Jersey King
3. David Daisy
Daisy Farms
91098-60th St.
Decatur, MI 49045
269-782-6321
New Jersey Hybrids, Purple Passion
4. Dick Walsworth
Rt. 1
Mears, MI 49436
269-873-2418
New Jersey Hybrids

5. Ron Richter Farms
Rt. 2
90487-60th St.
Decatur, MI 49045
269-423-7339
New Jersey Hybrids, Viking KB3

6. Krohne Plant Farms
65295 CR342
Hartford, MI 49057
269-424-5423
269-424-3126 FAX
New Jersey Hybrids

7. John Pendleton
1446 E.1850 Rd.
Lawrence, KS 66046
785-843-1409
UC 157, Atlas, Purple Passion

This list is intended only as a convenient reference for growers. Inclusion in the list does not imply endorsement by North Carolina State University, nor does exclusion imply that the crowns or seed of a particular source are inferior. The list does not pretend to be exhaustive, and undoubtedly there are other suitable sources of asparagus crowns and seed.

For a more in-depth look at asparagus production, order Publication 826, "Asparagus Production, Management, and Marketing", by Carl Cantaluppi and Robert Precheur, a 33 page bulletin which includes sites and soils, varieties, climate, yields, harvesting, handling, storage, direct marketing, growing white asparagus, maintaining the planting, insect, disease, and weed control, and estimated costs and returns of asparagus production.

It is a regional publication that focuses primarily on the northeast, Midwest, and southeastern U.S. It contains 26 color photographs, which show asparagus culture and the different insects and diseases of asparagus. For your copy, contact Carl Cantaluppi, Granville County Extension, P.O. Box 926, Oxford, NC 27565. Telephone: 919-603-1350, or e-mail carl_cantaluppi@ncsu.edu