Performance of Eleven Asparagus Cultivars in Southwest Missouri

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Introduction

Asparagus (*Asparagus officinalis* L.) is a high-value vegetable that is very well-suited to small-scale production in the Midwest. While the soils may not be optimal in southwest Missouri for asparagus production, the climate is well-suited and markets for fresh, locally-grown spears are excellent. Modern asparagus cultivars have not been extensively evaluated in the region, and producers need cultivar performance data to guide them when establishing such a long-lived, high-value crop. We present results from a six-year study that compared 11 asparagus cultivars.

Methods

An asparagus planting of 0.7 acre was established in 1999 at the University of Missouri-Columbia's Southwest Research Center near Mt. Vernon, in USDA Hardiness Zone 6 (37^o 4' lat, 93^o 53' long, and 1,240 ft alt). The soil is a prairie-derived Creldon silt loam (fine, mixed, mesic Mollic Fragiudalf) that is level, moderately well-drained, and with a fragipan at 18 to 36 inches. During the study, annual rainfall ranged from a low of 37.5 inches in 2000 to a high of more than 48 inches in 2004 (year total not yet complete at time of publication), however five of the six years during the study were droughty, receiving less than the average annual rainfall of 43.2 inches. Maximum summer temperatures ranged from 95 ^{o}F in 2004 to 106 ^{o}F in 2000, while minimum winter temperatures ranged from -9 ^{o}F in 2000 to -1 ^{o}F in 2003.

Seed from eleven modern asparagus cultivars (Jersey Asparagus Farms, Inc., Pittsgrove, NJ) (Table 1) was sown in a greenhouse on March 31, 1999. After deep plowing, liming (pH goal of 7.0), fertilizing (12-24-24 NPK according to soil test), and disking the soil, the seedlings were transplanted into the field on June 7 and 25, 1999. Additional P (50 lbs/acre) was applied in-furrow post planting. Plants were fertilized annually in late spring by hand-applying NH_4NO_3 along the rows to yield 75 lbs N/acre. A variety of pre- and post-emergence herbicides (Clethodim, Dicamba, Glyphosate, Linuron, Napropamide, and Trifluralin) were used, according to directions, to suppress weeds, as was mowing. A population of asparagus beetle (*Crioceris asparagi* L.) became established in the plantation but economic threshold levels were not reached and no action was taken to suppress them. Supplemental irrigation water was applied as needed in summer via an overhead sprinkler system. The entire planting was mowed to the ground well after dormancy each winter.

Experimental plots consisted of three parallel 15-ft rows containing 12 plants per row, with two replicated plots per cultivar. Rows were 5 ft apart and separated lengthwise by alleys of 3.5 ft; thus plots were 225 ft^2. Additional separate asparagus experiments (not described here) were also simultaneously established within and among this cultivar evaluation so that the plots were

spread out and interspersed over a large plantation area in a completely randomized design. Harvest data were collected from all 36 plants per plot. The plots were allowed to become well-established before initiating harvest during their fourth season in 2002, and continuing through 2004. Harvests were conducted April 15- May 1, 2002; April 15 - May 24, 2003; and April 9 - May 21, 2004. Spears were hand-harvested generally every two days during the harvest period, counted, weighed, and evaluated for quality. Quality was evaluated by many different people and was based on a scale of 1 to 5, with 1 being the largest, highest quality spears and 5 being small, scrawny, unmarketable spears. Mean weight per spear was also calculated. An analysis of variance on the yield and quality data was conducted using the SAS GLM Procedure, and mean separations were compared using an LSD Test (SAS Institute, Cary, NC).

Results

Yields in 2002 were poor because of a serious spring drought – we normally set up our irrigation system after spring harvest and were not well-prepared for a rare spring drought. The 2003 and 2004 yields, however, were excellent. Table 1 provides details on yields and quality of the eleven cultivars. The cultivar 'Jersey Deluxe' produced the greatest overall three-year yield, both in terms of total spear weight and total number of spears; however its average weight per spear and quality were lower than some cultivars. 'Jersey Giant' was impressive, with the second highest overall yield and the highest quality among all cultivars. The cultivar 'Apollo' placed fourth in overall production but yielded the largest spears. The cultivar 'UC157' performed very well during the 2002 spring drought, but thereafter was inferior and produced the poorest quality spears overall.

Statistically, we did not find true differences in total yield by weight among cultivars. However, significant differences were detected in number of spears per cultivar (P # 0.057), mean spear weight (P# 0.026), and spear quality (P# 0.012). An interesting trend observed was that the cultivars producing the greatest number of spears tended to produce smaller spears, and conversely, cultivars producing fewer spears were larger. No year by cultivar interactions were detected.

Including the poor 2002 yield data, the total calculated yield per acre of our best cultivar (Jersey Deluxe) was 1,788 lbs/acre. However, if we look only at 2003 and 2004 yields (realizing how important spring moisture is), our total yield was much better at 2,632 lbs/acre. These yields appear low compared to general yield expectations from other published asparagus variety trials (Lawson, 1999; 2000), and may be due to some of the following reasons: 1) our soils may not be inherently ideal for asparagus production due to drainage, acidity, and other issues; 2) we were only able to irrigate post-harvest; 3) our weed control was not optimal; and 4) our N fertilizer regimen was not nearly as aggressive as that of Lawson (1999, 2000). In general, all eleven asparagus cultivars performed well in this environment, with some cultivars clearly outperforming others. Asparagus production in southwest Missouri appears to have very good potential.

Literature Cited

Lawson, V., 2000. Midwestern Vegetable Variety Trial Report for 2000. Purdue University Bulletin No. 798. Purdue University, West Lafayette, IN.

Lawson, V., 1999. Midwestern Vegetable Variety Trial Report for 1999. Purdue University Bulletin No. 788. Purdue University, West Lafayette, IN.

Table 1. Marketable Yields of 11 Asparagus Cultivars at Southwest Center, Mt. Vernon, MO, 2002 - 2004

Cultivar	2002 Yield (lb/acre)[1]	2003 Yield (lb/acre)[1]	2004 Yield (lb/acre)[1]	Mean 3-yr Yield (lb/acre)[1, 2]	Ave. Spear Weight (gram)[2]	Spear Quality [2, 3]
Jersey Deluxe	834	2700	1830	1788 a	8.8 bc	2.60 bc
Jersey Giant	685	2040	2352	1692 a	9.2 abc	1.90 a
NJ857	796	2500	1715	1670 a	8.7 bc	2.95 cd
Apollo	730	1868	2200	1599 a	10.6 a	2.55 bc
NJ 931	805	2227	1525	1519 a	10.2 ab	2.80 cd
UC 157	1216	1716	1590	1508 a	8.0 c	3.35 d
Guelph Millennium	376	1857	2091	1441 a	9.6 ab	2.20 ab
Jersey Supreme	576	1948	1743	1422 a	9.0 abc	2.70 bc
Atlas	634	1589	1835	1353 a	8.8 bc	2.75 bc
Jersey Gem	551	1668	1591	1270 a	8.0 c	2.90 cd
NJ855	386	1372	1377	1045 a	9.0 abc	2.60 bc
Mean	690	1953	1804	1482	9.1	2.66

[1] Yield (lb/acre) extrapolated from mean yield of two 225 ft^2 plots containing 36 plants.
[2] Means with different letters are significantly different according to the LSD test ($P \# 0.05$).
[3] Spear quality based on scale of 1 to 5, where 1 = excellent ..., 5 = poor.