

Organic Garlic Variety Evaluation

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Introduction

Garlic is a popular crop for market growers in Kentucky. Typically planted in early fall, it can be overwintered successfully and harvested in early to mid-June. Generally, there are two types of garlic grown in Kentucky: softneck and hardneck. As the name indicates, softneck garlic has a softer neck, allowing it to be braided, while hardneck garlic will send up a flower stalk or scape during production, which gives these varieties a rigid neck.

Softneck garlic is widely grown in the western U.S. under relatively mild conditions. Softneck garlic also stores better than hardneck garlic. It is typically cheaper to produce as well, due to the fact that the bulbs are made up of more cloves than hardneck types, lowering planting costs. However, while most of the garlic that is purchased in grocery stores is of the softneck type, empirical observations have indicated that hardneck type garlic varieties tend to perform better in Kentucky. Because of the added expense, however, many growers choose to produce softneck garlic instead.

This trial was conducted to compare several varieties of commonly available hardneck and softneck garlic for production in Kentucky. The trial was conducted using organic production methods, though these results should be readily transferrable to conventional growers.

Materials and Methods

Fourteen varieties (7 hardneck, 7 softneck) were planted into black plastic mulch at two locations in Central Kentucky. The locations were the Horticulture Research Farm in Lexington, Kentucky, and Courtney Farms in Bagdad, Kentucky. Similar production practices were followed at each site.

Cloves were planted into raised beds covered with black plastic mulch on October 25 (Lexington) and November 7 (Bagdad). Cloves were planted on a double-row with in-row spacing of 8 inches and approximately 14 inches between rows on the black plastic mulch. Mulched rows were spaced on 6-foot centers. This resulted in population of 21,780 bulbs per acre. Varieties were planted in a randomized complete block design with three replicates (blocks) of each variety. Twenty cloves were planted in each plot for softneck varieties, while 16 cloves were planted per plot for the hardneck varieties. Cloves were watered as needed.

Plants were managed organically with pyrethrum (Pyganic) sprays for insects (thrips) and OMRI-approved copper (Nordox) applications for control of fungal pathogens during the spring season. Sprays were not made in fall or winter. Notes on performance of each variety were made during winter months and harvest occurred on June 7 and 14 in the Lexington and Bagdad locations, respectively. Winter survival, yield, and quality data were obtained at harvest. Yield data were determined for a 100 feet of row length based on the previously discussed plant population. Statistics were performed using the GLM and Duncan's multiple comparisons procedures of SAS statistical software. Results were considered significantly different if $P < 0.05$.

Results and Discussion

The winter of 2011/2012 was mild, with high spring temperatures resulting in many crops maturing faster than is normally expected. However, the garlic varieties in this trial matured in early June, which is typical for Central Kentucky. Although the winter of 2012 was mild, several varieties still had poor rates of survival (Tables 1 and 2). Although visual observations indicated that hardneck varieties tended to perform better through the winter, actual survival rates were not significantly different between hardneck and softneck varieties (Table 3). Survival rates ranged from 53% to 100% at the Bagdad location and from 43% to 94% at the Lexington location.

Overall, yields between the two locations were similar. Yields in Lexington ranged from 17 to 43 lbs/100 row feet, while yields ranged from 16 to 44 lbs/100 row feet in Bagdad. Polish Softneck, Music, Siberian, and Bogatyr all yielded more than 40 lbs/100-row feet for the Lexington location, while Georgian Fire, Music, and Metechi yielded more than 40 lbs/100 row feet for the Bagdad location. Polish Softneck was the only softneck variety that performed well, while several hardneck varieties were good performers. In every yield and quality measurement, except for winter survival, hardneck varieties performed better than softneck varieties (Table 3).

Music was the most consistent variety, yielding 42 and 43 lbs/100 row feet at the two locations. Average bulb weight was generally greater in the Lexington location where Bogatyr, Siberian, and Russian Red were part of the group of bulbs with the greatest weight. In Bagdad, Bogatyr, Metechi, and Georgian Fire were the largest bulbs. In general, the highest quality and highest yielding varieties trialed were hardneck types. Music, a commonly grown hardneck variety was a consistent performer in both locations and should be utilized for production in Kentucky. Bogatyr was another high-quality variety.

Although hardneck types of garlic are significantly more expensive than softneck types, they offer superior yields and quality when overwintering in Kentucky. Polish Softneck was the best performing softneck type; however, the bulbs were of a slightly lower quality than several hardneck types. If seed cost is a significant concern, this may be a softneck type worth trialing on a limited basis. This trial clearly demonstrated that hardneck garlic, although costlier, would be preferred over softneck varieties for direct market production in Kentucky.

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Table 1. Yield, overwintering survival, average clove number, and weight per bulb and bulb diameter for 14 varieties of softneck and hardneck garlic grown organically in Lexington, Kentucky, in 2011 and 2012.

Variety	Type ^z	Yield ^y (lbs/100 row feet)	Survival ^x (%)	Average Bulb Diameter (in./bulb)	Average Bulb Weight (oz.)	Average Clove No. (No./bulb)
Polish Softneck	S	43 a ^w	90 a	2.3 bcd	2.6 cd	19
Music	H	42 a	86 a	2.3 bcd	2.7 bc	9
Bogatyr	H	41 a	73 ab	2.4 abc	2.9 ab	8
Siberian	H	40 a	75 ab	2.2 cd	2.9 ab	11
California Early	S	37 a	88 a	2.3 bcd	2.2 ef	12
Metechi	H	37 a	67 ab	2.4 abc	2.9 ab	11
Russian Red	H	35 a	59 ab	2.6 a	3.2 a	10
German Red	H	31 ab	94 a	2.2 d	1.8 gh	8
Georgian Fire	H	28 ab	57 ab	2.5 ab	2.8 bc	9
St. Helens	S	28 ab	67 ab	2.1 d	2.2 de	6
Western Rose	S	26 ab	75 ab	1.7 ef	1.9 fg	18
Italian Late	S	25 ab	65 ab	1.9 e	2.0 efg	16
California Late	S	18 b	72 ab	1.7 f	1.4 h	17
Chinese Pink	S	17 b	43 b	2.3 bcd	2.1 efg	14

^zType of garlic H= hardneck, S= softneck.

^yYield based on a plant population of 21,780 bulbs per acre.

^xSurvival calculated based on number of bulbs per plot that survived the winter divided by number planted per plot.

^wMeans in the same column followed by different letters were significantly different at $P < 0.05$ as determined by Duncan's multiple range test.

Table 2. Yield, overwintering survival, average clove number, and weight per bulb and bulb diameter for 14 varieties of softneck and hardneck garlic grown organically in at the Courtney Farm in Bagdad, Kentucky, in 2011/2012.

Variety	Type ^z	Yield ^y (lbs/100 row feet)	Survival ^x (%)	Average Bulb Weight (oz.)	Average Clove No. (No./bulb)	Comments
Georgian Fire	H	44 a	92 a	2.5 ab	6	Very spicy, uniform large bulbs
Music	H	43 ab	100 a	2.1 bc	7	Mild flavor, uniform bulbs with large cloves
Metechi	H	43 ab	90 ab	2.6 a	8	Very spicy, uniform large bulbs
Polish Softneck	S	35 abc	100 a	1.6 de	18	Mild flavor, little spice, small to medium bulbs with some very large bulbs
Bogatyr	H	34 bcd	79 ab	2.2 abc	7	Large bulbs with large cloves, medium spice
Russian Red	H	33 cd	81 ab	2.1 bc	6	Good flavor, medium spice, large bulbs, uniform
Siberian	H	32 cd	92 a	1.9 cd	9	Mild flavor, medium to large bulbs

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Table 2 (continued)

Variety	Type ^z	Yield ^y (lbs/100 row feet)	Survival ^x (%)	Average Bulb Weight (oz.)	Average Clove No. (No./bulb)	Comments
German Red	H	26 de	98 a	1.3 e	6	Spicy but mild garlic flavor, small to medium bulbs
Western Rose	S	22 ef	95 a	1.2 e	13	Medium spice, small bulbs with significant rot
Early California	S	21 ef	85 ab	- -	27	Must harvest early or will split
Late California	S	19 ef	85 ab	1.2 e	27	Pungent, small bulbs with many small cloves
Italian Late	S	19 ef	83 ab	1.2 e	18	Very spicy, small bulbs with some rot
Chinese Pink	S	19 ef	67 bc	1.6 de	12	Medium spice, must harvest early or will split
St. Helens	S	16 f	53 c	1.5 de	11	Mild flavor, small bulbs

^zType of garlic H= hardneck, S= softneck.

^yYield based on a plant population of 21,780 bulbs per acre.

^xSurvival calculated based on number of bulbs per plot that survived the winter divided by number planted per plot.

^wMeans in the same column followed by different letters were significantly different at $P < 0.05$ as determined by Duncan's multiple range test.

Table 3. Yield, overwintering survival, average clove number, and weight per bulb and bulb diameter comparisons between hardneck and softneck garlic varieties grown in Lexington and Bagdad, Kentucky, in 2011/2012.

Type	Yield ^z (lbs/100 row feet)	Survival ^y (%)	Average Bulb Diameter (in./bulb)	Average Bulb Weight (oz.)	Average Clove No. (No./bulb)
Hardneck	36 a ^x	80 a	2.3 a	2.4 a	8
Softneck	25 b	76 a	2.0 b	1.8 b	16

^zYield based on a plant population of 21,780 bulbs per acre.

^ySurvival calculated based on number of bulbs per plot that survived the winter divided by number planted per plot.

^xMeans in the same column followed by different letters were significantly different at $P < 0.05$ as determined by Duncan's multiple range test.