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Evaluation of Softneck and Hardneck Garlic Produced Within or Without High Tunnels

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Introduction

Garlic is a popular allium vegetable in many regions of West Virginia. There are two types of garlic that are grown: hardneck and softneck. Hardneck garlic has larger cloves, which are easier to peel relative to softneck types. Softneck garlic has braidable stems and stores better than hardneck garlic but is less cold tolerant.

Chilling is required to initiate bulbing in garlic, so the crop is planted in the fall and harvested in early summer. As the days get longer in the spring and temperatures increase, the garlic rapidly expands the size of the bulb.

Some of the advantages of high tunnels for crop growth result from the accumulated growing degree days from warmer soil and air temperatures as well as the dry growing environment from rainfall exclusion. The objective of this project was to evaluate soft and hardneck garlic cultivars grown within or outside of high tunnels in West Virginia.

Materials and Methods

Garlic seed cloves from six garlic varieties including elephant garlic were obtained and planted on a commercial produce farm in Harrison County, West Virginia on October 25, 2014. Individual cloves were planted on raised beds covered with black plastic mulch (1 mil) as a twin row planting arrangement with 6 inches between plants and rows on the bed approximately 12 inches apart (Figure 1). Each plot was 7.5 square feet, and the varieties were replicated three times in a randomized complete block design. The high tunnel was approximately 30 feet wide and 72 feet long covered with two layers of polyethylene plastic. Drip irrigation was used as needed.

The garlic was harvested in July 2015 when the top growth was approximately two-thirds dry. The bulbs were pulled and the tops and roots trimmed before separating marketable and unmarketable bulbs and measuring fresh weight and bulb diameter. Marketable bulbs were placed in mesh sacks and cured for six weeks. In late August, the cured garlic bulbs were sorted for marketable and unmarketable bulbs and a final marketable weight was calculated.



‘Inchelium Red’

Figure 1. Garlic was planted in October and harvested in early July. Bulbs were pulled and trimmed before curing.

Results

The hardneck cultivar ‘Music’ yielded the largest bulb (clove) weight and marketable yield of the hardneck varieties while ‘Inchelium Red’ yielded the largest clove weight among the softneck varieties (Table 1). However, ‘Idaho Silverskin’ produced the largest marketable yield relative to other softneck cultivars evaluated after curing.

Producing garlic in high tunnels did not significantly increase average bulb weight of either hardneck or softneck cultivars (Table 1). However, the spring and summer of 2015 had above average rainfall. Open field plots had significantly greater rotting of bulbs relative to the high tunnel garlic (Figure 2). High tunnel garlic had less rotting during storage/curing, and thus had greater total marketable yields compared with the open field plots. Given the high retail price for garlic, this may be a suitable niche crop for high tunnel production in West Virginia.

Table 1. Marketable yields of open field and high tunnel garlic cultivars.

Cultivar	Type	Location	Fresh Wt./Bulb (g)	Bulb Diameter (mm)	Marketable Yield lbs./1,000 ft ²
Asian Tempest	hardneck	High Tunnel	57	57	132
		Open Field	58	49	93
Purple Italian	hardneck	High Tunnel	47	48	83
		Open Field	57	51	64
Idaho Silverskin	softneck	High Tunnel	75	62	187
		Open Field	91	58	187
Incheleum Red	softneck	High Tunnel	71	68	133
		Open Field	126	72	111

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Table 1 (continued)

Cultivar	Type	Location	Fresh Wt./Bulb (g)	Bulb Diameter (mm)	Marketable Yield lbs./1,000 ft ²
Metechi	hardneck	High Tunnel	66	63	173
		Open Field	88	62	93
Music	hardneck	High Tunnel	148	73	347
		Open Field	104	61	120
Elephant Garlic		High Tunnel	204	80	560
		Open Field	202	84	467
<i>Significance*</i>					
Cultivar:			*	*	*
Protected Culture:			NS	NS	*

*Significant at P<0.05.

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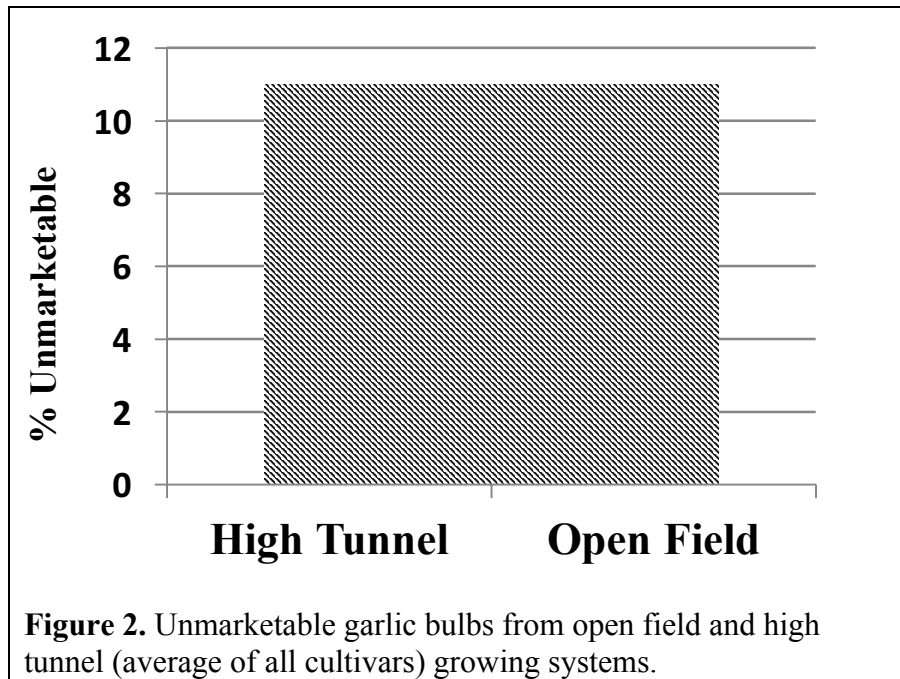


Figure 2. Unmarketable garlic bulbs from open field and high tunnel (average of all cultivars) growing systems.