

Prospects of the Mother Stalk Growing Method for Asparagus Season Extension

Thomas J. Orton
Rutgers Agricultural Research and Extension Center
121 Northville Road
Bridgeton, NJ 08302-5919

Introduction

Perishable food products were, until recent times, only available to consumers as they could be produced under local agricultural conditions. Cheap energy and modern transportation systems changed all of that, and fresh vegetables and fruits are now available to consumers throughout the year and in all locations of North America and the developed world. As fossil fuels are depleted and subject to global market fluctuations, the cost of imported perishable foods has become progressively more unstable. Local food production is desirable because it is both more secure and less dependant on energy costs.

In temperate locations such as New Jersey, climatic conditions impose clear limitations on traditional agriculture. These limitations have been circumvented in some instances via engineered structures that alter climatic parameters, for example high and low tunnels. Greenhouses are also in extensive use, but usually require substantial energy inputs to operate effectively. It is also possible to use solar or other unconventional energy sources to heat soil and surrounding atmosphere, creating a favorable environment for prolonged plant growth. Thus, it has been possible to extend the effective growing season, enabling plants to be established earlier and to be maintained in a productive state longer.

Asparagus is a perennial vegetable that has a typical production season of 6-8 weeks. During this period, axillary shoots elongate from the submerged crown to form the spears that are the harvested product. If spear harvest is allowed to continue beyond 8 weeks, the long-term health of the plant is adversely affected. Specifically, the plant will have inadequate canopy and time to garner photosynthates that will be used to replenish the crown for next year's growth.

The 'Mother Stalk' growing method (MS) was developed in Taiwan and China to allow spear harvest to continue beyond the 8-week period. The method capitalizes on the phenomenon of 'relative apical dominance', where the number of active growing shoots has an accumulated inhibiting effect on the elongation of new axillary shoots from the crown. If the number of active shoots is maintained at a certain level, new axillary shoots will continue to elongate from the crown throughout the growing season. Research results in Asia have shown that long-term crown health is not adversely affected by the MS method.

Materials and Methods

A two-year field experiment was conducted at RAREC to test the validity of the MS asparagus growing method in New Jersey, using Rutgers varieties. The MS method consisted of allowing three shoots to reach full maturity, followed by harvest of all subsequent spears. In addition to a direct MS treatment, a third regime was also tested: Harvest spears traditionally for two weeks following first spear appearance, then switch to the MS (3-shoots) method. The test plots were staked for wind protection, and during the fern growth phase were irrigated at regular intervals (twice weekly) via drip, and fertilized regularly (soluble 20-20-20 at 2-week intervals) through the drip lines.

Results and Discussion

During year 1 (2007), the best overall treatment was the modified MS method, with an average of 1.392 kg/m for the whole season (April-October; see Table below). The MS method alone was 1.162 kg/m and the traditional control 0.811 kg/m. Following year 2 (2008), however, the modified MS treatment had dropped to 0.946 kg/m, while the MS treatment increased to 1.353 kg/m. The control was approximately equal for year 2 as compared to year 1.

Table: Overall Seasonal Average Unit Spear Yield of Mother Stalk (MS) vs. Conventional Asparagus Growing Methods

<u>Treatment</u>	<u>Yield (kg/m) Year 1</u>	<u>Yield (kg/m) Year 2</u>
Modified MS	1.392	0.946
MS	1.162	1.353
Control	0.811	0.853

The dynamics of spear yield were quite distinct in all instances. A spike of relatively high productivity occurred during the Spring (April-June) following by a period of relatively reduced yields (July-August) in the MS treatments. During September-October, another high yield spike occurred in the MS treatments. Unfortunately, abstaining from harvests during the summer is not an option for the method, since new shoots must be continually removed to be effective.

Records were kept of labor and material costs associated with increased management of the MS treatments. The MS method requires certain incremental capital investments above those needed for traditional production, including drip irrigation and a staking system. In addition to incremental labor for the installation and operation of stakes and irrigation, harvesting costs for MS were found to be higher than for traditional production methods. Unit harvesting costs were the lowest during the Spring yield spike for all treatments, and lowest overall in the controls. As yields decreased, unit harvesting costs soared to as much as ten times the Spring average. Simultaneously, an analysis of wholesale prices showed that they are historically the highest in mid-April when the harvesting season generally begins in the mid-Atlantic region, then decreases steadily through July before rebounding.

It was concluded that the MS method of asparagus harvesting is a viable strategy to extend the production season, but only within economic thresholds and on a limited scale. The standard MS procedure does not appear to have an adverse effect on crowns, and may even promote better crown health (due to irrigation and nutrition?), but the modified MS treatment was clearly detrimental to long-term crown health. It is speculated that the MS method will be most applicable for direct marketing asparagus operations at present, not large-scale wholesale operations.