

## **Economics of High Tunnel Raspberry Production**

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High tunnels are unheated, plastic covered hoop houses that exclude rainfall and modify temperature, humidity, light quality, and wind. We tested different raspberry varieties under multi-bay 3-season structures (Haygrove Tunnels) at the Southwest Michigan Research and Extension Center (SWMREC) in Benton Harbor for four years. The raspberries have responded very favorably to tunnels. Here we use our trial results, cost estimates and recent raspberry prices to gauge the potential profitability of raspberry high tunnel production using.

### Raspberry Performance in Tunnels

In SWMREC trials with four summer and four fall-fruiting cultivars, tunnel yields were more than twice those of field grown plants and tunnel raspberries were 20-40% larger than those from the field. Fruit rot in tunnels has been greatly reduced from levels in the field. Detailed annual reports are available at: <http://www.maes.msu.edu/swmrec/>. The best fall-fruiting cultivars (Caroline, Heritage) averaged 2,600 lb per acre in the planting year and 18,600 lb per acre each year over the next two years. The two best summer-bearing varieties (Encore, Nova) yielded no fruit the year of planting, 2,200 lb per acre in year 2, and 19,200 lb in years 3 and 4. In 2008, we separately weighed marketable and cull fruit. Based on these data, we calculated total fresh marketable yields by reducing total yield by 20% to account for culls.

### Costs

We considered producing raspberries under one acre of Haygrove tunnels costing \$32,204 for materials and \$1,880 for installation labor. Tunnels were covered with Luminence polyethylene, with an initial cost of \$7,000 per acre and life expectancy of three years. Other production costs of a one acre tunnel operation were estimated by modifying budgets for field raspberry production in the Raspberry and Blackberry Production Guide for the Northeast, Midwest, and Eastern Canada (Bushway et al., 2008). We assumed the raspberry plants would remain productive for 7 years, so the costs associated with soil preparation and raspberry establishment were totaled and depreciated over 7 years. The cost of the high tunnel and plastic were depreciated over 15 and 3 years respectively. Labor costs (base wages plus payroll expenses) were set at \$10/hour. Harvest labor was \$0.40 per ½ pint.

Average annual allocated costs were \$32,600 for fall-fruiters and \$37,200 for summer-bearers. The difference in costs was primarily due to pruning requirements of the two types, and harvest costs, since the fall-fruiting raspberries produce some fruit in the planting year whereas summer-fruiting types begin fruiting a year later.

### Raspberry Prices

We assumed berries would be packed and sold wholesale through the Detroit Terminal Market. The USDA reports daily prices for common raspberry packages (flats of twelve 6 oz. clam shell containers). Using these data from 2005 to 2008, we calculated average prices to be \$3.91 per lb

during our summer season (late June to early August) and \$4.87 during our fall harvest time (mid August to late October)

Gross Revenue.

Gross revenue was estimated from average berry prices and the picking volumes (excluding cull fruit). Yields in the first harvest season were less than yields at full production. To simplify gross revenue calculations, fresh marketable yield each year was averaged over an estimated lifespan of 7 harvest years for the planting. The average marketable yield per acre for summer and fall-fruited raspberries was 11,243 lb/acre and 13,071 lb/acre resulting in gross revenues of \$43,960 and \$63,658 respectively (Table 1). The average yields are lower for summer-fruited because two years are needed to be at full production as opposed to one.

Profitability

Table 1 shows the annual net profit above the allocated costs from producing raspberries under high tunnels. All costs (depreciation, interest at 8%, labor, and non-labor costs) were summed to give an annual cost. Summer-fruited raspberries have an annual net profit above allocated costs of \$6,750 compare to \$31,053 for fall-fruited cultivars.

Risks, Unknowns, and Other Costs

These estimates indicate that high tunnel raspberry production can be profitable, particularly for fall-fruited cultivars. However, several risks and unknowns should be considered. First, we don't know whether recent raspberry prices will continue in the future or whether Michigan tunnel-grown raspberries will command the same prices as California berries. Tunnel culture is also new so growers will need time to learn the intricacies of irrigation scheduling, fertilization, tunnel venting, and training and trellising. Tunnels reduce the incidence of some diseases and insect damage, but other problems may develop over time. We assumed plantings would remain production for 7-years, but a shorter or longer longevity would greatly alter annual profits. Costs not considered in these partial budgets included land costs and property taxes, fruit cooling/storage facilities, and costs of transporting fruit to market. Growers will also need to plan for adequate harvest labor. However, based on what we know now, high tunnels are a promising approach for fresh raspberry production in Michigan.

**Table 1. Estimated income, costs, and profit from a one acre high tunnel raspberry operation**

Raspberry type	Average marketable yield (lbs) <sup>z</sup>	Price/lb	Gross income	Annual costs <sup>y</sup>	Annual net profit above allocated costs
Summer-fruited	11,243	\$ 3.91	\$ 43,960	\$ 37,210	\$ 6,750
Fall-fruited	13,071	\$ 4.87	\$ 63,658	\$ 32,605	\$ 31,053

<sup>z</sup> Average yield over 7 year planting life

<sup>y</sup> Costs do not include land purchase, property taxes, or fruit storage and transportation.