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Fall Broccoli Production in High Tunnels

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Broccoli is a cool-season, frost-tolerant crop. The harvest portion of broccoli is the compact, slightly dome-shaped head that is comprised by numerous immature flower buds. Broccoli that forms a single large head and thick stalks requires 50-70 days to harvest. Vegetative growth occurs over a wide range of temperatures, but high-quality head development requires temperatures in the range of 54-68 ºF. If temperatures are below 41ºF, plant growth is significantly reduced. In Indiana, fall production of broccoli in open-field can be challenging because of the relatively long growing season and unpredictable weather. With increased heat accumulation in high tunnels, it is possible to have a second crop of broccoli following tomato.

Materials and Methods

A fall broccoli trial was conducted in a high tunnel at the Southwest Purdue Agricultural Center, Vincennes, IN in 2016 to test the potential of growing broccoli in high tunnels after tomato.

Six broccoli cultivars Blue Wind, Bay Meadows, Gypsy, Arcadia, Green Magic and Belstar were evaluated in the trial. Seeds were planted on Aug 1. Transplants were grown inside a shaded high tunnel. Seedlings were transplanted in the high tunnel on Sep. 2 on beds with plastic mulch and drip tape. Two rows of plants were planted on each bed, in-row and between row spacing were 1.5 feet. Harvest was conducted once a week from Oct. 25 to Dec. 2. Completely randomized block design with three blocks and five plants per experimental unite was used in the experiment.

Results and Discussion

Plants started to form heads in the middle October. The first harvest occurred on Oct. 25 on cultivars Blue Wind and Green Magic. Harvest for cultivars Belstar and Arcadia started the latest on Nov. 11. Central heads were harvested when they were about 6 inches in diameter with stem about 8 to 10 inches long. Harvesting the central head stimulates the growth of side shoots. Relatively warmer temperatures in high tunnels allowed formation of marketable secondary heads for some cultivars in Nov. Cultivars Green Magic and Blue Wind developed about 2 side heads per plant, which was significantly greater than cultivars Gypsy, Arcadia and Belstar. Cultivars Green Magic and Gypsy had the highest marketable yields (including first and secondary head), which were significantly higher than cultivars Arcadia and Belstar. With the current spacing, an 80 feet long bed inside a 96 feet long high tunnel can accommodate about 100 plants. Harvesting up to 100 lbs of high-quality broccoli per bed can be expected.

Few disease problem was observed in the trial. Caterpillars including cabbageworm larva and cabbage looper larva were the major challenge encountered during the seedling growing stage. Products with the active ingredient Bt are fairly effective in controlling larva.

Table 1. First harvest dates of broccoli cultivars evaluated in a high tunnel at the Southwest Purdue Agricultural Center in Vincennes, IN in fall 2016.

Cultivar	**First harvest dates**
Blue Wind	Oct. 25
Bay Meadows	Nov. 4
Gypsy	Oct. 31
Arcadia	Nov. 11
Green Magic	Oct. 25
Belstar	Nov. 11

Table 2. No. of secondary heads per plant of broccoli cultivars evaluated in a high tunnel at the Southwest Purdue Agricultural Center in Vincennes, IN in fall 2016.

Cultivar	**Harvested no. of secondary heads per plant**
Blue Wind	1.80 ab
Bay Meadows	1.20 bc
Gypsy	0.46 cd
Arcadia	0.13 d
Green Magic	2.0 a
Belstar	0 d

Table 3. Marketable yield of broccoli cultivars evaluated in a high tunnel at the Southwest Purdue Agricultural Center in Vincennes, IN in fall 2016.

Cultivar	**Marketable yield (lb) per plant**	**Marketable yield (lb) of a 80 feet bed (100 plants)**
Blue Wind	0.87 bc	87
Bay Meadows	0.88 bc	88
Gypsy	1.02 ab	102
Arcadia	0.64 c	64
Green Magic	1.19 a	119
Belstar	0.69 c	69