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High Tunnel Pole Bean Evaluation

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Abstract
There are two major types of green beans: bush or pole. Bush are short, erect plants (determinate) with a uniform pod set resulting in a short harvest season. Pole beans are trained on poles, fence, or string, and grow 7 to 8 ft in height and bear fruit continuously (indeterminate) requiring only one field planting. Further, the consumer perceives pole beans, with its longer pod, to be of superior quality. Our objective was to evaluate two pole bean varieties: Fortex, an extra long pod (11 in.) 60 day maturity, and Blue Lake, a standard pole bean variety, 6 to 7 in. round pod with 55-day maturity. Also, we wished to compare high tunnel production with field production and obtain two crops in the high tunnel by double cropping.

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Introduction

There are two major types of green beans: bush or pole. Bush are short, erect plants (determinate) with a uniform pod set resulting in a short harvest season. Pole beans are trained on poles, fence, or string, and grow 7 to 8 ft in height and bear fruit continuously (indeterminate) requiring only one field planting. Further, the consumer perceives pole beans, with its longer pod, to be of superior quality. Our objective was to evaluate two pole bean varieties: Fortex, an extra long pod (11 in.) 60 day maturity, and Blue Lake, a standard pole bean variety, 6 to 7 in. round pod with 55-day maturity. Also, we wished to compare high tunnel production with field production and obtain two crops in the high tunnel by double cropping.

Materials and Methods

The project was established at the Armstrong Research Farm (southwestern Iowa – a well-drained silt loam soil) and the Horticulture Research Station (central Iowa – a well-drained loam soil). The previous crop at both Armstrong and the Horticulture Station in the high tunnel was peppers. Previous crop at the outdoor site on the Armstrong farm was cucurbits and at the Horticulture Station tomatoes. Both sites were fertilized according to soil test recommendations. The cultural system consisted of SRM-olive plastic mulch (wavelength selective) and trickle irrigation. Seeds were seeded in single rows with an in-row spacing of 8 in. on a single plastic row bed. Rows were 4.5-ft on center. Hog fence was used as training panels set about 6½ ft in height. Irrigation scheduling was via tensiometers. Pest management practices for field production included Sevin insecticide for bean leaf beetle. However, the bean leaf beetle was not present inside the tunnel, but leaf miner was. Insecticidal soap was used to keep the population at low levels at Armstrong, but Orthene 75S was necessary to reduce the population at the Horticulture Station. There were two replications of each variety at each site in the high tunnel and only one observational row for the outdoor field plantings.

Seeding dates were: Armstrong high tunnel on April 15 and August 1, and a field seeding date of May 20; Horticulture high tunnel on April 17 and August 5; and a field seeding date of May 15. For the high tunnel August production the April plants were removed and seeds were planted in the same planting hole.

Yield data consisted of harvesting twice a week from the high tunnels and field at both Armstrong and the Horticulture Station. Fruit were not always sorted into marketable and cull (rots, severely misshapen, small), but marketable bean pod length was determined when the harvest was sorted.

Results and Discussion

April high tunnel planting. Noticeable differences between the two production sites occurred in yield and fruit characteristics (Figure 1). At both locations Fortex commenced production June 24 (70 days after seeding) and continued for 5 weeks. Blue Lake maturity was similar to Fortex at the Horticulture Station but 12 days later at Armstrong. The 2008 spring weather conditions were cold and wet resulting in maturities about 2 weeks longer than listed in seed catalogs. Production peaked in weeks 3 and 4 and total yield of Blue Lake was

40% less than Fortex (1.03 lb/ft vs. 1.68 lb/ft) at Armstrong, however, at the Horticulture Station both varieties yielded similarly (1.71 lb/ft) (Figure 1). At both locations unmarketable beans (cullage) rose dramatically in the third week and was 72 to 100% by week 5. The second high tunnel planting (August) harvest commenced September 30 at the Horticulture Station and October 7 at Armstrong for both varieties (56 days and 68 days, respectively). The harvest period was 4 weeks, terminated by freezing weather in late October. Interestingly, at the Armstrong Farm weekly fall production was lower for Fortex, compared with spring, and Blue Lake fall production was higher than spring. For the Horticulture Station location both Fortex and Blue Lake fall production was lower than spring, averaging only one half of weekly spring production. This reduction was not due to plant population, which was approximately 100%, but some other factor perhaps such as shorter daylengths.

Tunnel orientation did have an effect on production. The outside west row at Armstrong (N-S orientation) produced 28% fewer beans than the inside row. This was probably the result of wind speed coming from the southwest. At the Horticulture Station (E-W orientation) the north outside row produced 35% fewer beans. In this case the effect may have been from shading from the inside south bean row.

May field planting. Horticulture Station production began July 22 for Fortex (68 days to maturity) and continued until September 8 while Blue Lake (81 days to maturity) was 13 days later (August 5) and continued until September 15 (Figure 2). Corresponding values for the Armstrong May 20 field seeding were: Fortex harvest began July 18 (59 days to maturity) and continued until September 25 while Blue Lake started August 4 (76 days to maturity) and continued until September 25. Blue Lake weekly production was similar for both locations, but Fortex yield was very low at the Armstrong Farm. This could have been the result of herbicide drift from nearby field crop fields. Even at the Horticulture Station Fortex cullage was very high, 50 to 75%. Thus, Fortex is not adaptable to field production.

For a more complete report with photos and pod bean characteristics go to: www.public.iastate.edu/~taber/Extension/Progress%20Rpt%2008/Beanreport.pdf

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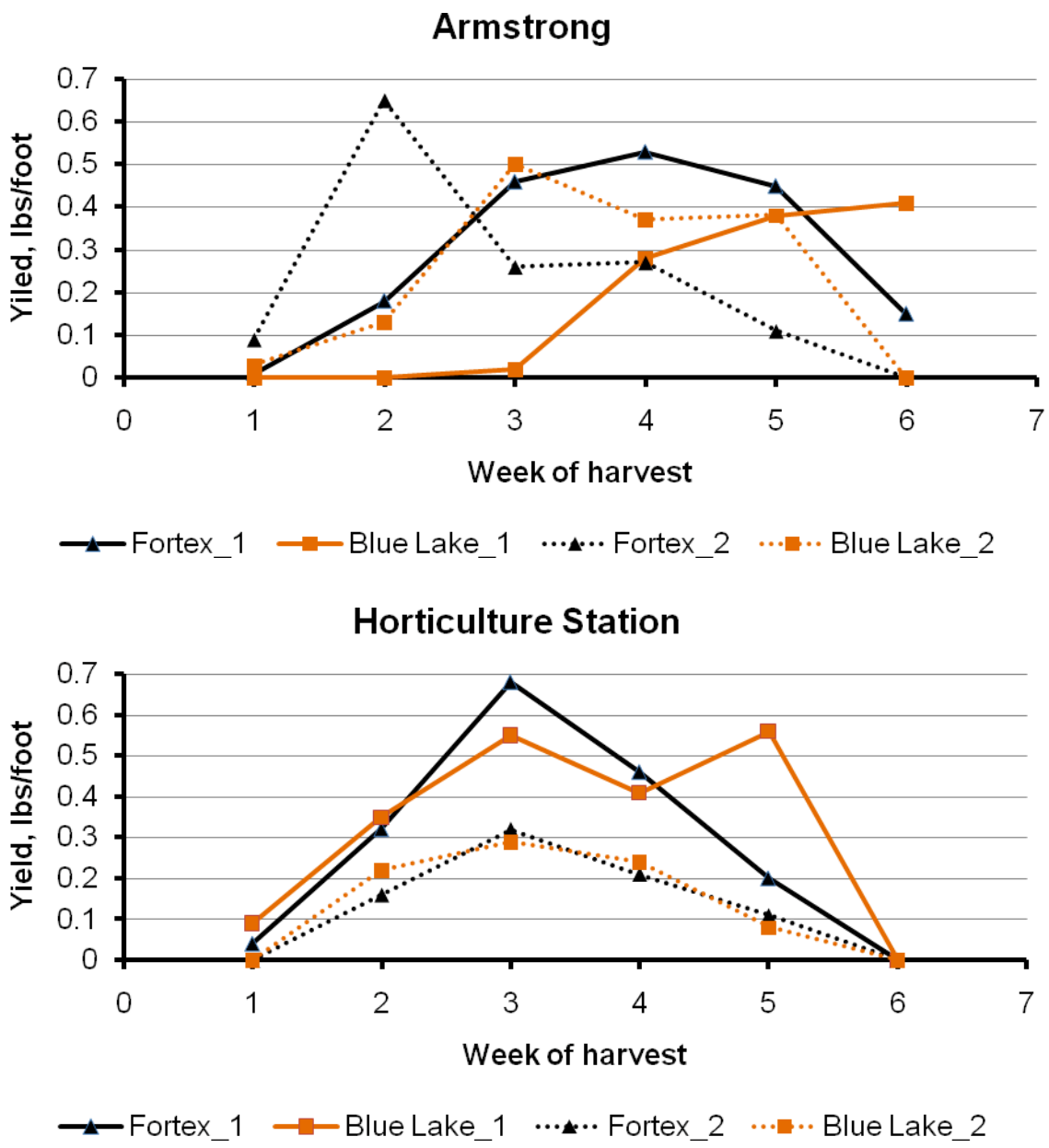

Figure 1. Weekly total yield, lb/ft, of Fortex and Blue Lake pole beans seeded mid-April (solid line) and first of
August (dotted line) in a high tunnel at both the Armstrong Farm and Horticulture Station, 2008.

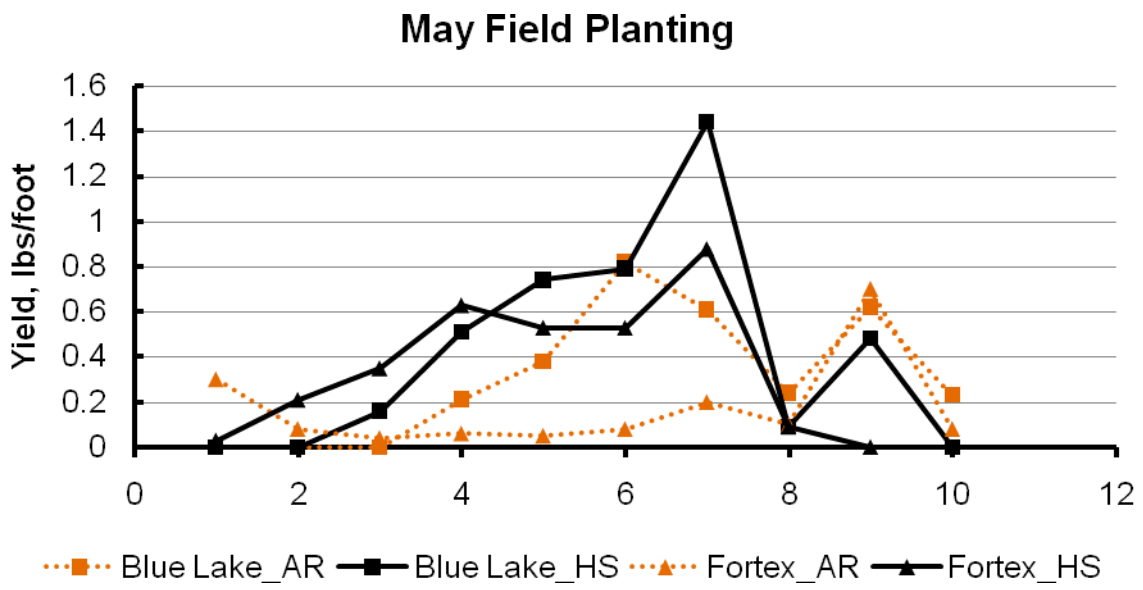

Figure 2. Weekly total yield, lb/ft, of Fortex (triangles) and Blue Lake (squares) pole beans field seeded late May at the Armstrong Farm (AR) and the Horticulture Station (HS) 2008.