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Evaluation of Day-neutral Strawberry Plant Spacing to Maximize Production Potential

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Abstract
Day-neutral strawberries are a high-value fruit crop that have potential for commercial production in Iowa in both field and tunnel systems. Field production typically includes polyethylene soil mulches and trickle irrigation inputs, and maximizing productivity per unit area conserves resources. Tunnel production potentially hastens the growing season and promotes greater yield and increased berry quality, but square footage in a tunnel is limited. Standard planting spacing is 12 in. × 12 in. in both field and tunnel production. The impact of increasing the plant density of day-neutral strawberry has not been evaluated under Iowa's growing conditions. The primary goal of this project was to evaluate differences in yield and growth of day-neutral strawberries grown at differing spaces that increase plant density in outside plots.

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Evaluation of Day-neutral Strawberry Plant Spacing to Maximize Production Potential

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Introduction

Day-neutral strawberries are a high-value fruit crop that have potential for commercial production in Iowa in both field and tunnel systems. Field production typically includes polyethylene soil mulches and trickle irrigation inputs, and maximizing productivity per unit area conserves resources. Tunnel production potentially hastens the growing season and promotes greater yield and increased berry quality, but square footage in a tunnel is limited. Standard planting spacing is 12 in. × 12 in. in both field and tunnel production. The impact of increasing the plant density of day-neutral strawberry has not been evaluated under Iowa's growing conditions. The primary goal of this project was to evaluate differences in yield and growth of day-neutral strawberries grown at differing spaces that increase plant density in outside plots.

Materials and Methods

In May 2011, dormant crowns of Albion day-neutral strawberry were planted in eight replicated field plots at the ISU Horticulture Research Station, Ames, Iowa. Strawberry plants were spaced within and between rows in a multiple row system on one layer of silver over white polyethylene soil mulch (Pliant Corporation, GA). Rows were spaced six feet apart. Treatments included: 1) 6-in. spacing within rows between plants and between rows (quintuple rows) resulting in four plants per square foot; 2) 8-in. spacing within rows between plants and between rows (quadruple rows) resulting in 2.4 plants per square foot; 3) 10-in. spacing within rows between plants and between rows (triple rows) resulting in 1.4 plants per square foot; 4) 12-in. spacing within rows between plants and between rows (double rows) resulting in .8 plants per square foot. Runners were removed throughout the season. Water was provided at 1 in. per week by rainfall or through rural water irrigation. Data variables collected included total berry yield and average berry size. Plant biomass weight was collected after harvest was completed.

Results and Discussion

Total number and yield (weight) of berries were higher in 10-in. and 12-in.-spaced plots compared with the 6-in. and 8-in.-spaced plots. Average berry weight was highest in the 12-in. spacing and was similar for the 10-in. and 8-in.-spaced plots. Average percentage of marketable fruit was similar among spacing treatments. Potential yield per square foot was calculated from the number of plants per square foot by the average yield per plant and was not statistically analyzed. Increasing plant density from 12-in. spacing to closer plant spacing can increase yield potential, subsequently increasing the profitability of a tunnel structure. Increased plant density has both benefits and drawbacks. Increased plant density can reduce space needed and increase efficiency of fertilizer use, pesticide spray, irrigation inputs, and overall labor. However, increased plant density can also increase establishment costs, increase competition among plants, and decrease air movement around the plants, thereby potentially increasing disease and insect incidence. Additional analyses from plant biomass data are ongoing.

Acknowledgements

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Table 1. Yield of Albion day-neutral strawberries grown at different plant spacing in the field.

Spacing treatment	Total number of berries per plant	Total berry weight per plant (kg) (yield)	Average berry weight (g)	Percentage marketable fruit (g)	Potential yield per square foot of row (kg)
6-in. spacing or 4 plants/ft^2	13 c[z,y]	0.12 c[z,y]	8.8 c[z,y]	89 %	0.48
8-in. spacing or 2.4 plants/ft^2	18 b	0.18 b	9.9 b	89 %	0.43
10-in. spacing or 1.4 plants/ft^2	22 a	0.22 a	10.3 b	89 %	0.31
12-in. spacing or 0.8 plants/ft^2	23 a	0.26 a	11.5 a	93 %	0.21
LSD P≤0.05[x]	3	0.04	0.8	NS	

[z]Data from five plants randomly selected from a plot size of 10 ft long × 2.5 ft wide.
[y]Means are averages of eight treatment replications. Means within a column with same letter do not differ (P≤.05).
[x]Least significant difference at P≤0.05, NS = not significant.