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Effects of Day-neutral Strawberries Grown in Tunnel Structures and Field Plots

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Effects of Day-neutral Strawberries Grown in Tunnel Structures and Field Plots

Abstract

Day-neutral strawberries are a high-value fruit crop for commercial growers in Iowa. Dayneutral strawberries bear fruit in the late summer and fall providing off-season fruit that obtain high market prices. Production in a high tunnel hastens the growing season and promotes greater yield and also increased berry quality by protecting ripening fruit from wind and rain. The primary goal of this project was to evaluate differences in yield and plant growth of day-neutral strawberries grown inside a tunnel structure and in the field with no cover. A secondary objective was to evaluate fresh and post-harvest berry quality of day-neutral strawberries grown inside a tunnel structure and in the field with no cover.

Keywords

RFR A1138, Horticulture

Disciplines

Agriculture | Horticulture

Effects of Day-neutral Strawberries Grown in Tunnel Structures and Field Plots

RFR-A1138

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Introduction

Day-neutral strawberries are a high-value fruit crop for commercial growers in Iowa. Day-neutral strawberries bear fruit in the late summer and fall providing off-season fruit that obtain high market prices. Production in a high tunnel hastens the growing season and promotes greater yield and also increased berry quality by protecting ripening fruit from wind and rain. The primary goal of this project was to evaluate differences in yield and plant growth of day-neutral strawberries grown inside a tunnel structure and in the field with no cover. A secondary objective was to evaluate fresh and post-harvest berry quality of day-neutral strawberries grown inside a tunnel structure and in the field with no cover.

Materials and Methods

In May 2011, dormant crowns of Albion, Seascape, and Tribute day-neutral strawberry were planted in three replicated tunnel structures and field plots at the ISU Horticulture Research Station, Ames, Iowa. Tunnel plots were maintained in three 15 ft × 36 ft tunnels that were installed in 2010 (Farmtek, Dyersville, IA). Strawberry plants were spaced 10 in. within the row and between rows in a triple row on polyethylene soil mulch treatments (Pliant Corporation, GA). Rows were spaced six ft apart. Three replications of each cultivar were established for the four treatments of flower removal and polyethylene mulches: 1) polyethylene silver

(metalized) mulch on white with flowers removed for six weeks after planting; 2) polyethylene silver (metalized) mulch on white over a layer of black polyethylene (two mulch layers) with flowers removed for six weeks after planting and the silver mulch removed after the soil temperatures were less than 60°F in the fall; 3) polyethylene silver (metalized) mulch on white with flowers removed for ten weeks after planting; 4) polyethylene silver mulch on white over a layer of black polyethylene (two mulch layers) with flowers removed for ten weeks after planting and the silver (metalized) mulch removed after the soil temperatures were less than 60°F in the fall. 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, average berry size, soluble solids concentration (SSC), initial pH, titratable acids (TA) expressed as percentage anhydrous citric acid, percentage total water mass, and percentage water loss after storage for one week. Plant biomass weight was collected after harvest was completed.

Results and Discussion

Yield of all cultivars and treatments were higher in 2011 compared with the 2010 growing season due to drier climate and the management of fertilizer through the trickle irrigation system. Albion yield was greater in the outside treatment plots when planted in silver on white mulch (one layer) and flowers removed for ten weeks, compared with treatment plots with plants grown on silver over black polyethylene (two layers) in the tunnel with flowers removed for ten weeks and in outside plots with flowers removed for ten weeks. Yield data of Seascape were similar among all treatments. Tribute yield

was greater in outside treatment plots when planted in silver on white mulch (one layer) and flowers removed for six weeks, compared with the tunnel treatment plots grown in silver on white mulch (one layer) with flowers removed for ten weeks and outside treatment plots grown in silver over black mulch (two layers) and flowers removed for ten weeks.

Berry quality analyses, measured as soluble solids concentration, pH, and titratable acids of frozen samples, are ongoing.

Growing day-neutral strawberries in tunnel structures compared with field plots with no cover showed benefits in both 2010 and 2011. Greater marketable fruit (data not presented) and more amenable harvest conditions for workers were observed in the covered environment of the high tunnels. As

previously found in 2010 and noted again in 2011, growing crops in tunnel structures can provide crop protection when weather conditions are severe, such as excessive rain, hail, or wind. Establishment of day-neutral strawberry production in tunnel structures should consider the cost of the tunnel structure compared with the cost of field production.

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Table 1. Total 2011 season yield of three cultivars of day-neutral strawberries grown in a tunnel structure and in the field.

Soil mulch and flower removal treatments ^w	Field or Tunnel	Yield per plot (kg)		
		Albion	Seascape	Tribute
Silver mulch, and flower removal six weeks after planting	Field	4.9 ab ^{z,y}	5.5 ^{z,y}	7.3 a ^{z,y}
	Tunnel	4.4 ab	5.2	5.7 abc
Silver mulch over black mulch, and flower removal six weeks after planting	Field	4.8 ab	5.1	6.2 abc
	Tunnel	3.8 b	5.1	6.8 ab
Silver mulch, and flower removal ten weeks after planting	Field	5.9 a	5.4	5.9 abc
	Tunnel	4.6 ab	4.7	4.5 c
Silver mulch over black mulch, and flower removal ten weeks after planting	Field	4.2 b	5.5	4.9 bc
	Tunnel	4.9 ab	4.3	5.7 abc
LSD P≤0.05 ^x		1.6	NS	1.9

^zPlot size was 21 plants or approximately 14.5 square feet.

^yMeans are averages of three treatment replications. Means within a column with same letter do not differ (P≤.05).

^xLeast significant difference at P≤0.05; NS = not significant.

^wStrawberries in field had no cover. Various treatments of flower removal and polyethylene mulches shown.