Progress Report
Research Proposal
SRSFC Project # 2008-14

Development of Methods to Reduce Ground Drops during Mechanical Blueberry Harvest

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Objectives

The need to mechanize blueberry harvesting has accelerated with migrant workforce problems. Mechanical blueberry harvesters have existed for over 40 years. However, ground loss in blueberries with traditional mechanical harvesters has often exceeded 20% (Rohrbach and Mainland, 1993). Even with very well pruned bushes, ground losses of up to 18% were observed (Peterson et al., 1997; van Dalfsen and Gaye, 1999). The V-45 harvester developed by USDA reduced ground loss to less than 1% when it harvested specially pruned rabbiteye blueberry plants (Takeda et al., 2007). But, this machine is no longer being commercially manufactured (BEI Inc., per. communication). High ground loss is unacceptably in the fresh market. Often in the early season fresh market the grower will lose $1,500 or more per acre in ground drops with mechanical harvest (e.g. 6,000 lb yield, 20% ground loss, average price of $1.25/lb). The object of this research is to develop methods for crown restriction and plant architecture management that will reduce grown losses and improve the profit margin for blueberry growers.

Justification and Description

Most blueberry harvesters use a sway, slapper or rotary shaking head and all use a series of spring loaded, plastic catch pans (called “fish scales”) around the base of the bush. A narrow crown at the point of contact with fish scales greatly reduces the ground loss.

However, the point of contact of the fish scales is at 12 inches (BEI, Little Blue Tall) to u 18 inches (some self-propelled harvesters) off the ground. Historically, growers have tried to achieve this by pruning off canes growing outside a cluster of canes in the center. Many of the blueberry cultivars grown in the Southeast have a spreading form and severe pruning will leave only a cluster of canes, which greatly reduces yield. Methods of reducing ground loss without severe pruning are needed. We propose that a "Y" shape is needed for the canopy to fill the area and achieve high yields. "Y" shaped plants will be produced by early crown restriction in year one or two and then light pruning to open the center. A series of treatments were developed and evaluated to reduce ground drops in a third leaf field near Homerville, Ga. 'Premier' and 'Brightwell' rabbiteye blueberry were used in the experiment. Both are major cultivars in Georgia.

Methodology

The experiment was set up at Palmetto Ridge Farms (Wilson Farm) near Homerville, Ga. on third leaf bushes so data could be collected immediately. This is not ideal from a training stand point, but was a compromise situation. Experimental design was a randomized complete block with two long rows (two reps.) for each treatment with two cultivars. Each row contained about 56 bushes and was 260 feet long. Plant spacing was about 4.6 feet by 12 feet. All bushes were basal pruned for mechanical harvest. This required 0.77 minutes per bush.

Treatments: 1) traditionally pruned control bushes, 2) crown constriction with 24 inch long zip ties or "mule" tape (flat nylon "rope"). This technique constrict the crown to about eight to ten inches in diameter at the 12 to 18 inch level, 3) crown constriction plus 19 inch wide "T" bar trellis with canes placed outside wire to create a "Y" These were constructed from rebar with a nut welded on ends. Heavy gauge electric fence wire was passed through these washers and the T bar trellis pounded into the ground until it was 24 inches above the soil surface. These were placed about 15 feet apart and a wooden post placed on each end with two wire strainer to tighten the wire.

Each cultivar was harvested two or three types by a Korvan 9000 mechanical harvester. 'Premier' was harvested completely and 'Brightwell' partially. Fruit were weighted and ground loss was calculated on 6/25/08 by counting all the berries lost on two plots per replication. These consisted of two bushes on each plot for a total of eight bushes per treatment. The number of counted berries were multiplied by 1.62 grams for 'Premier' and 1.5 grams for 'Brightwell'. A very light pruning and placing of new canes outside the wire was conducted on Aug. 26, 2008.

Results

Trellis installation. It was best to "thread" the wire in the washer eyelets by setting up the trellis in the aisle and them moving it to the row. A few canes in the center were cut. The rest of the canes were passed under the wire and spread into a Y shape. Attaching the zip ties for crown restriction only took a few minutes. The trellis system interacted well with the mechanical harvester. There was no problem with the trellis becoming

entangled in the harvester. The light summer pruning and placing of canes outside the wire on Aug. 26, 2008 required 0.21 minutes per bush.

Ground losses were much higher than expected, perhaps because the plants were young and more of the canopy was over the center of the fish scales. In addition, the data were calculated based on the mean for the row, which included some smaller bushes. Although a full statistical analysis of the data has not been conducted, it appears there is a trend toward crown restriction and especially crown restriction plus trellising reducing the % of fruit lost to ground drops. It will be exciting to see the results as the bushes become more mature.

Table 1. Effect of ground loss reduction treatments on third leaf 'Premier' and 'Brightwell' blueberries

Cultivar	Treatment	Berry ground loss no. per bush on 6/25/08	Weight of ground loss per bush on 6/25/08 (grams)	Harvested yield per bush on 6/25/08 (grams)	% ground loss of 6/25/08 yield	Total yield from three harvests (grams/bush)
Premier	Control	60	97	180	35.0	922
	Crown restriction	70	113	227	33.2	1058
	Crown restriction plus trellis	55	88	223	28.3	931
Cultivar	Treatment	Berry ground loss no. per bush on 6/29/08	Weight of ground loss per bush on 6/29/08			Yield from two harvests (grams/bush)
Brightwell	Control	289	433	322	57.4	776
	Crown restriction	168	252	352	41.7	917
	Crown restriction plus trellis	196	294	403	42.2	799

Impact

This seed money project was beneficial in obtaining a $1.7 million USDA Specialty Crops Grant on mechanical harvest of blueberries. This research will continue in 2009 and 2010 with funding from this grant. We appreciate the support of SR-SFC in support of this grant.

Literature Cited

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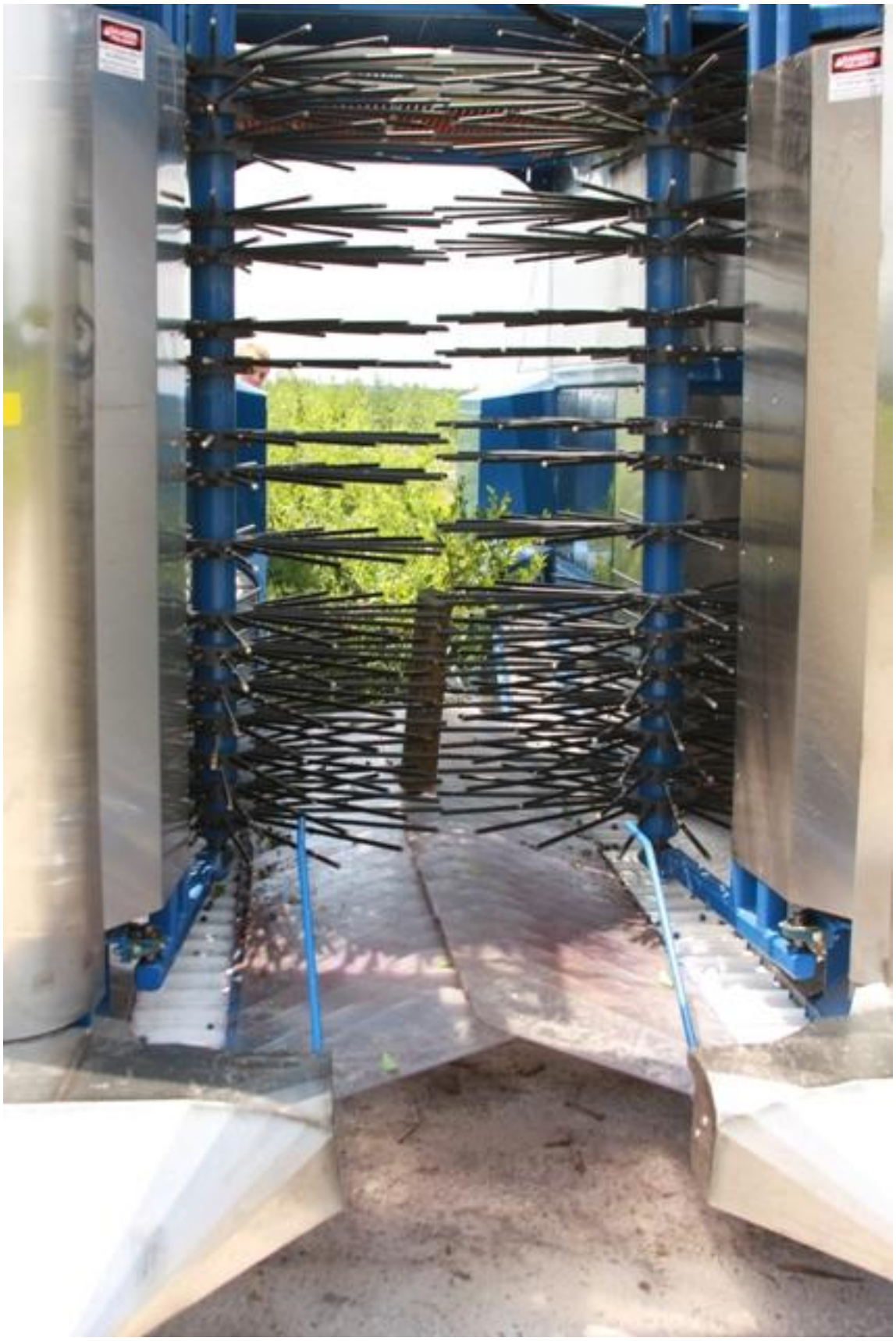
Fig. 1. Close up of harvester leaving a trellised row.

Fig. 2. Harvester leaving a trellis row. Note trellis T bar.

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