

# Row Covers for Early Tomato Production

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## Introduction

Our previous research has shown wavelength selective plastic (SRM-olive) coupled with a row cover has given consistent top early yields. Clear plastic mulch was also superior provided there was excellent weed control. Agribon is a polypropylene spunbond material available in several weights that give various light transmission and frost protection characteristics. It is mostly used as a floating row cover for extended season production, frost protection, and wind and insect control. We tested the traditional slitted clear plastic row cover against the agribon (AG-19, light weight at 0.55 oz/yd<sup>2</sup> with 85% light transmission).

## Materials and Methods

The principal soil type at the Horticulture Research Station, central Iowa, is a well-drained, fine textured loam. The herbicide Devrinol 50DF was applied to the soil surface on May 1 and SRM-olive (wavelength selective) polyethylene mulch applied the same day. Tomato transplants, Sunstart, Sunshine, Indy, and Mountain Fresh were set May 5. Row cover treatments (none, slitted clear, agribon, and delayed planting – set May 15) were applied the same day. The experimental design was a randomized, split plot with row cover as the whole plot and with three replications. Other cultural practices included trickle irrigation, pruning the plants to the first flower cluster, and staking and tying according to the Florida stake and weave system. Disease pressure was heavy (mostly *Septoria*) and a weekly fungicide program was followed.

Air temperature within the row covers was determined near 12 noon on seven dates (Figure 1). On May 25, approximately 4-in. diameter holes were cut in the slitted clear plastic because air temperature had exceeded 104°F. Row covers were removed from all treatments on June 1 when first flower cluster was at anthesis on the Sunstart variety. Harvest began July 22 and continued weekly to August 28, for 6 harvests. Fruit were sorted into marketable and unmarketable categories. The unmarketable or cull fruit were the result of catfacing, cracking, blotchy ripening, rots, or too small.

## Results and Discussion

The 2008 growing season temperatures were below normal with heavy rainfall. May average temperature in central Iowa was 2.6°F below normal and rainfall 4.17 in. above normal. Thus, the cloudy, cool weather favored a response to row covers.

Early and main yield of tomatoes was ( $P < 0.05$ ) affected by row cover treatment and variety, but there was no interaction between the two factors. Early total yield was increased 1.7-fold (66 cwt) with either the slitted clear plastic or agribon as compared with no row cover (Table 1). The agribon kept air temperatures about 5°F cooler than the slitted row cover, but still 7°F higher than ambient. The delayed planting treatment (May 15) produced similar yields compared with the early May 5 planting (Treatments 2 vs. 1). Thus, without a row cover there is no advantage in moving up the planting date from the traditional mid-May date in central Iowa. The marketable early yield with row cover was very low (~ 40%) largely as a result of

high incidence of catfacing and blotchy ripening incidence. The lowest percentage of marketable early yield occurred with the no cover treatments, only 20%.

All varieties are considered early (65 to 67 day maturity) except Mountain Fresh, which is a second early, 75 day. The highest early total yield occurred with Sunstart= Sunshine>Indy=Mountain Fresh. However, the percentage of marketable yield, 48.7%, was highest with Mountain Fresh resulting in no statistical difference in marketable early yield among the four varieties.

For the remaining four harvests (August 6 to 28) the no row cover treatments out produced the row covers (Table 2). These varieties were determinate types with limited truss development, therefore, the row covers advanced fruit maturation rather than increasing the number of fruit produced. The 2008 season was very harsh for quality tomato production as quality fruit percentage in this study was unusually low. In general, early varieties planted early will yield

60 to 80% marketable fruit, depending on the season. Second early and main season varieties have a higher pack out of quality fruit.

Total marketable seasonal yield (Table 3) indicated a reduction for agribon row cover compared with the slitted clear plastic of 94 cwt/acre. Further, there was no difference between slitted, clear row cover treatment, and no row cover indicating a grower must receive a differential price for the early yield advantage. Thus, if the market price for late July production was \$1.75/lb (compared with \$0.85/lb in August) then the row cover advantage would be worth \$3,100/acre or more than enough to offset added costs. For the six-week harvest period, Mountain Fresh produced the highest marketable yield (60.0% marketable) while Sunshine produced the lowest, only 20.3% fruit of the total were marketable largely as the result of blotchy ripening and cracked fruit.

### Acknowledgements

We appreciate the assistance of Matt Heard in the collection of the data for this project.

**Table 1. Effect of row cover treatment and variety on early tomato yield (July 22 plus July 27 harvests), as cwt/acre, at the Horticulture Research Station, Ames, IA, 2008.**

Row cover treatment	Temp., °F <sup>1</sup>	Marketable <sup>2</sup>	Total	% Marketable
1. None	69.3	25 B	96 B	24.8 B
2. Delayed planting, none	-	12 B	75 B	15.0 B
3. Slitted clear	82.3	63 A	169 A	39.7 A
4. Agribon, AG-19	77.9	56 A	153 A	40.0 A
Variety				
Sunstart		48	171 A	26.8 B
Sunshine		41	164 A	23.3 B
Indy		36	94 B	30.3 B
Mountain Fresh		29	58 B	48.7 A

<sup>1</sup>Air temperature within the row cover taken on seven dates from May 15 to May 30, approximately 12:30 pm.

<sup>2</sup>Mean values followed by the same letter are not statistically different, at the 5% level.

**Table 2. Effect of row cover treatment and variety on main yield (Aug 6 to 28), as cwt/acre, at the Horticulture Research Station, Ames, IA, 2008.**

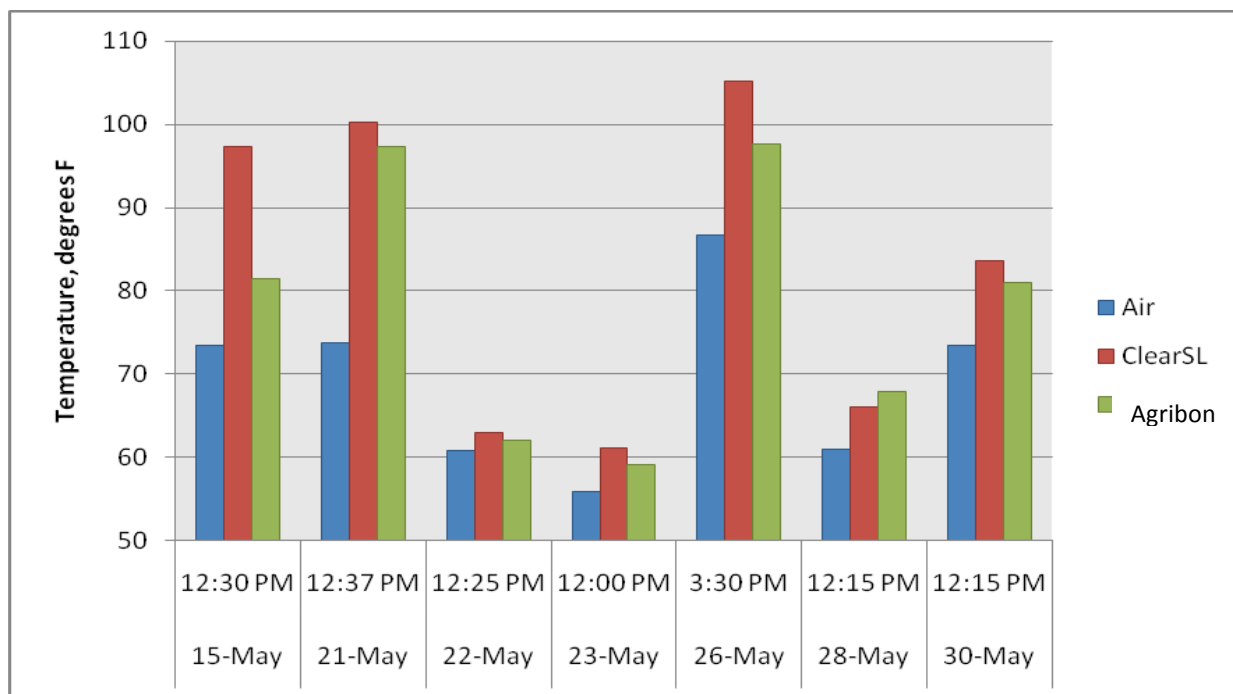
Row cover treatment	Marketable <sup>1</sup>	Total	% Marketable
1. None	227 A	537 A	40.4
2. Delayed planting, none	210 AB	437 AB	45.4
3. Slitted clear	214 AB	404 BC	44.0
4. Agribon, AG-19	127 B	313 C	36.9
<u>Variety</u>			
Sunstart	127 C	339 B	38.7 B
Sunshine	63 C	339 B	17.0 C
Indy	248 B	468 A	51.6 A
Mountain Fresh	342 A	550 A	60.0 A

<sup>1</sup>Mean values followed by the same letter are not statistically different, at the 5% level.

**Table 3. Effect of row cover treatment and variety on total seasonal yield (July 22 to Aug 28), as cwt/acre, at the Horticulture Research Station, Ames, IA, 2008.**

Row cover treatment	Marketable <sup>1</sup>	Total	% Marketable
1. None	252 AB	633	39.1
2. Delayed planting, none	222 AB	512	42.2
3. Slitted clear	277 A	573	45.8
4. Agribon, AG-19	183 B	466	37.8
<u>Variety</u>			
Sunstart	175 C	510	34.7 C
Sunshine	104 C	503	20.3 D
Indy	284 B	562	50.3 B
Mountain Fresh	371 A	608	60.0 A

<sup>1</sup>Mean values followed by the same letter are not statistically different, at the 5% level.



**Figure 1. Mean air temperature was taken over seven May dates. Three of seven days were sunny and four out of seven days were partly cloudy or cloudy and rainy. The mean temperatures were taken approximately from 12-1 p.m. every day when the temperatures were anticipated to be the highest.**



Agribon and slitted, clear-hooped row covers.



Tomato flower at anthesis – subject to high temperature flower abortion.



Remove or open row cover to avoid high air temperatures when first flower clusters are open.



Removal of row cover about the first of June in central Iowa.