

EFFECT OF ‘SURROUND®’ (KAOLIN-BASED PARTICLE FILM) ON BELL PEPPER YIELD

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Introduction

In the southeast U.S., high temperatures during late spring and summer can result in reduced plant growth and fruit yields in bell pepper and other vegetable crops. A new technology, developed to limit insect damage in tree fruit, incorporates a kaolin-based particle film spray. This particle film has been found to cool tissues, protecting plants from extreme heat and ultraviolet radiation. Foliar sprays with inert materials such as kaolinite clay have been used in greenhouse and orchard systems to reduce leaf temperatures, water stress, and pest and disease pressures. The objective of this study was to evaluate the cooling effect of kaolin particle film sprays on bell pepper yields.

Materials and Methods

The experiment was conducted on the Horticulture farm, Coastal Plain Experiment Station, UGA, Tifton, Ga. The soil was a sandy loam with a pH of about 6.5. Fertilization consisted of 700 lb/acre of 10-10-10 fertilizer applied at preplanting, followed by a total of 66 lb N/acre and 66 lb of K/acre applied after transplanting on weekly applications starting on the third week after transplanting.

The experimental plot consisted of one 25-ft long bed that was established on 6 ft centers. Six-week-old greenhouse grown bell pepper (*C. annuum* L.) seedlings were transplanted on 24 Apr. 2003. Transplants were established on double rows with an in-row spacing of 1-ft using a mechanical transplanter.

Plants were treated with a kaolin based particle film (Surround®, Engelhard Corp., McIntyre, Ga.). Before fruit set, Surround® was applied with a back-pack sprayer as a suspension at 12.5 lb/acre (25 gallon water) and after fruit it was applied at 50 lb/acre (100 gallon water). Starting one week after transplanting, the material was applied weekly or on an as needed basis which was determined by a visual evaluation of the residual kaolin cover, and continued until harvest. Controls were plants treated with water only. The experimental design was a latin square with 4 treatment combinations [2 varieties (Camelot, 1640) x 2 Surround levels (with and without)] and 4 replications. Fruit were harvested twice and they were graded according to the USDA standards. Data were analyzed with the general linear models procedures in SAS (ver. 8, Cary, N.C.).

Results

'Camelot' produced higher numbers of both marketable fruit and cull fruit and had a higher marketable yield than '1640' (Table 1). In both marketable and cull categories, average fruit weight was similar between cultivars. The number of fruit and fruit yields (marketable and cull) were not affected by particle film applications and there was no cultivar x particle film interaction. The number and weight of fruit with symptoms of sunscald or blossom-end rot was not affected by particle film applications (data not shown). The presence of the particle film reduced bell pepper leaf temperature. Leaf temperature in the afternoon in kaolin-treated plants was about 0.4C lower than in untreated plants.

The incidence of southern blight (*Sclerotium rolfsii*) was lower ($p < 0.05$) in plants (6%) treated with particle film compared to untreated plants (0.5%), and incidences of tomato spotted wilt and of the Phytophthora spp./Phythium spp. complex tended to be lower in particle film-treated plants relative to untreated plants.

Conclusions

Despite the cooling effect on the plants, the kaolin-based particle film did not have any apparent effect on fruit quality, marketable yield, cull yields, or number of fruit produced in bell pepper.

Table 1. Effect of cultivar and kaolin-based particle film on bell pepper yield.

Treatment	Marketable			Cull		
	No. (X 1000/acre)	Yield (ton/acre)	Fruit wt. (lb/fruit)	No. (X 1000/acre)	Yield (ton/acre)	Fruit wt. (lb/fruit)
<u>Cultivar</u>						
Camelot	18.5 b ^z	3.6 b	0.42 a	7.6 b	1.6 a	0.30 a
Stiletto	31.9 a	6.7 a	0.39 a	11.7 a	1.1 a	0.28 a
<u>Particle film</u>						
Yes	2.4 a	5.0 a	0.42 a	10.1 a	1.4 a	0.28 a
No	2.7 a	5.2 a	0.39 a	9.1 a	1.3 a	0.29 a
<u>Significance of F test</u>						
Cultivar (C)	NS	**	NS	*	NS	NS
Particle film (P)	NS	NS	NS	NS	NS	NS
C x P	NS	NS	NS	NS	NS	NS

^zMean separation within columns according to Duncan's multiple range test, P < 0.05.

NS, *, ** Nonsignificant or significant at P ? 0.05, 0.01, respectively.