Using reflective plastic mulch to enhance plant quality and pest management in tomato

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Plastic mulches provide many positive advantages for farmers, such as increased yields, early maturing crops, crops of higher quality, enhanced insect management, and weed control. A tomato field trial was carried out at Poamoho Experimental Station from June to October 2015. The main objective of the trial was to assess the effectiveness of a silver reflective plastic mulch to suppress insect vectors of viruses, and other relevant pests in tomato. Two main viruses affect tomato production in Hawaii. Tomato Yellow Leaf Curl (TYLCV) is transmitted by the silverleaf whitefly, *Bemisia tabaci*, and Tomato Spotted Wilt Virus (TSWV) is transmitted by several species of thrips.

Fig. 1 Plants growing in black plastic mulch (left) and plants growing in the reflective mulch (right)

The trial tested two tomato varieties: a) 72618 (Nirit Seeds) resistant to TYLCV but susceptible to TSWV, and b) Shiren (Hazera Seeds) susceptive to both viruses. The trial consisted of six plots 30 ft x 25ft, each. Three plots were covered with reflective plastic mulch and the other three with standard black plastic mulch. Each plot had six rows (three rows per each variety), and seven plants per row. Spacing was 5 feet in between rows and 2.5 feet in between plants. Data collection started three weeks after transplant. The effect of plastic mulch type on plant growth was assessed by taking weekly measurements of plant height, stem diameter, number of nodes per plant, and plant diameter. A subset of plants were harvested 5 weeks after transplant and oven dried to obtain plant dry biomass. The effect of plastic mulch type on pest incidence was assessed by taking counts of silverleaf whitefly (eggs, nymphs and adults), thrips, leafminers and mites. Adult whiteflies were counted in-field using the leaf turn method. Whitefly egg and nymph, leafminer, and mite counts were assessed by collecting three terminal leaflets from the seventh node of the terminal growing point of the plant. The Disease Severity Index (DSI) was used to assess visual symptoms of TYLCV and TSWV, ranging from 0 (no symptoms) to 4 (severe virus symptoms). Plants were harvested for five consecutive weeks to obtain yield data.

Results of the trial showed dramatic differences between the two types of mulch. Plants growing in the reflective mulch grew faster and more vigorously compared to plants in the black plastic mulch (Fig. 1). Plants in the reflective mulch flowered and set fruit two weeks earlier than plants growing in the black mulch. Pest densities were significantly lower in plants growing in the reflective mulch compared to plants growing in the black mulch. The reflective mulch did not prevent the transmission and spread of TYLCV in the susceptible variety (Shiren). At the end of the trial all plants of the susceptible variety showed symptoms of TYLCV. Plants of both varieties had significantly more marketable yield when growing in the reflective mulch treatment compared to the black mulch (Fig. 2).

At the end of the trial a field day was hosted to showcase the results of the study. A large group of farmers, agricultural professionals, and local agricultural providers attended the event. The reflective mulch used in this trial was obtained from a mainland provider. After this field demonstration, a local provider is making the reflective mulch available for Hawaii farmers.

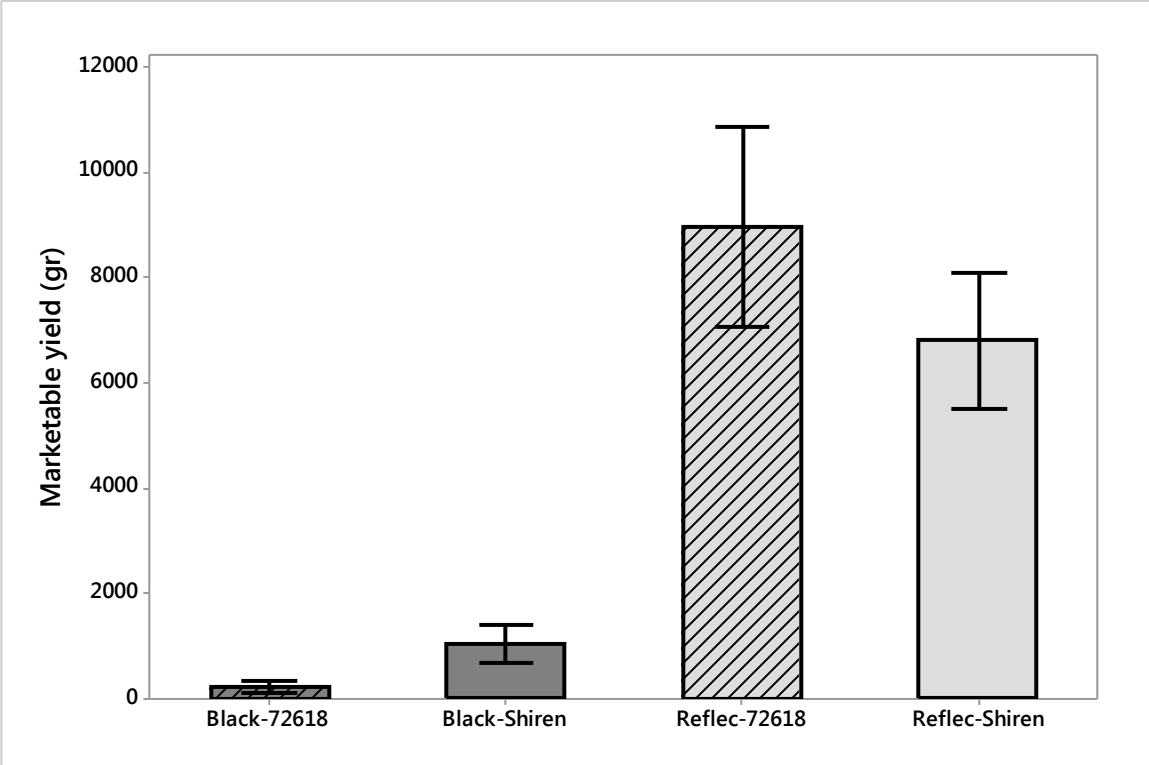

Fig. 2. Mean marketable yield by treatment (black and reflective mulch) and by variety (72618 and Shiren)

Acknowledgments

Marisol Quintanilla is thanked for her help with data collection/processing and for help running the field day. Camila Gerez and Christian Mathias are thanked for their help in the field and in the laboratory. Jari Sugano, Jensen Uyeda and Mark Wright are thanked for their help with the field day. Theodore Radovich and Hue Nguyen are thanked for their recommendations for soil fertilization. Poamoho Experimental Station personnel for their help with the field installation and management. This research was funded by the USDA Western SARE program. Grant title: Low-input integrated management of tomato viruses. Grant number: SW12-040